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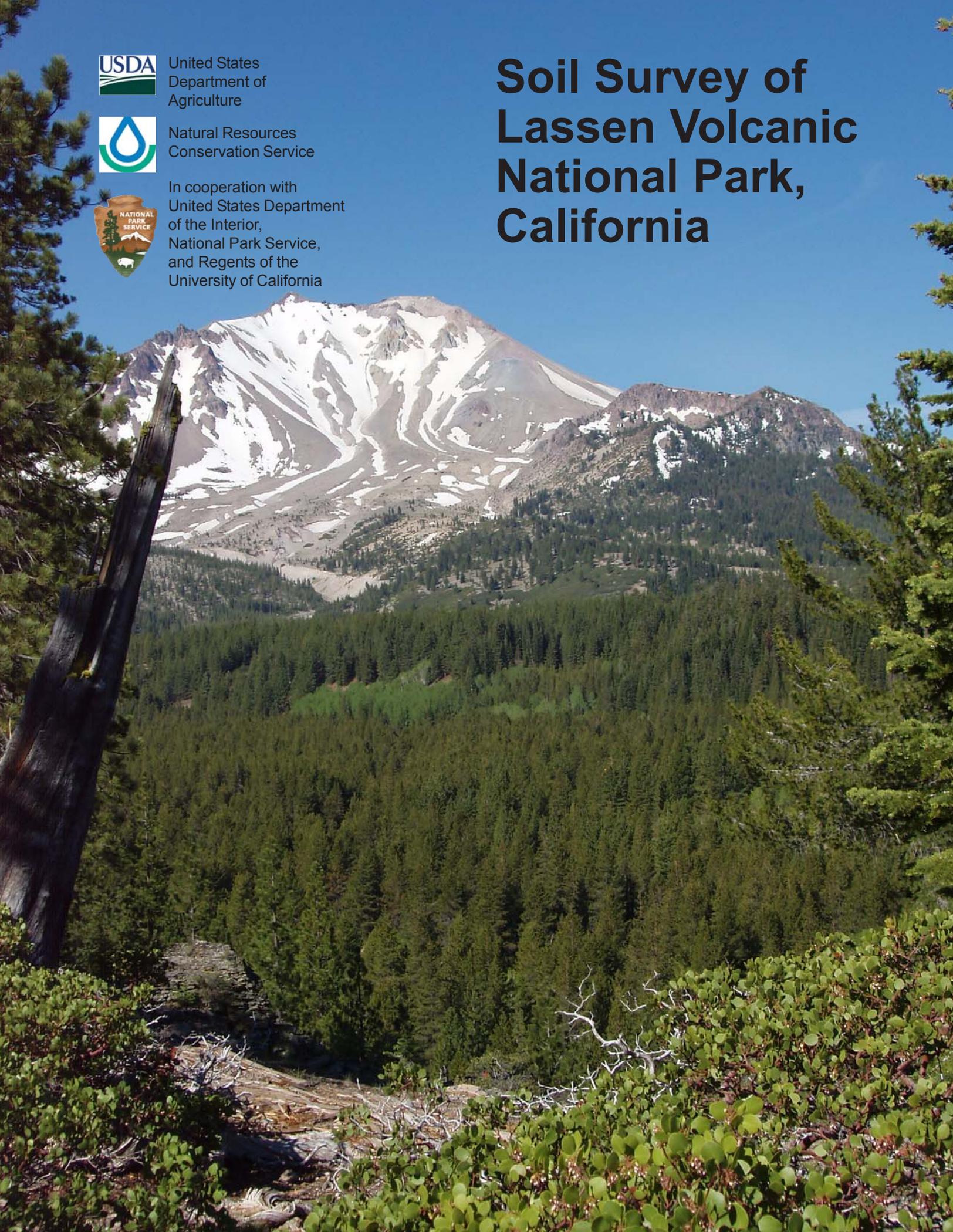


Natural Resources
Conservation Service



In cooperation with
United States Department
of the Interior,
National Park Service,
and Regents of the
University of California

Soil Survey of Lassen Volcanic National Park, California



How To Use This Soil Survey

General Soil Map

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

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

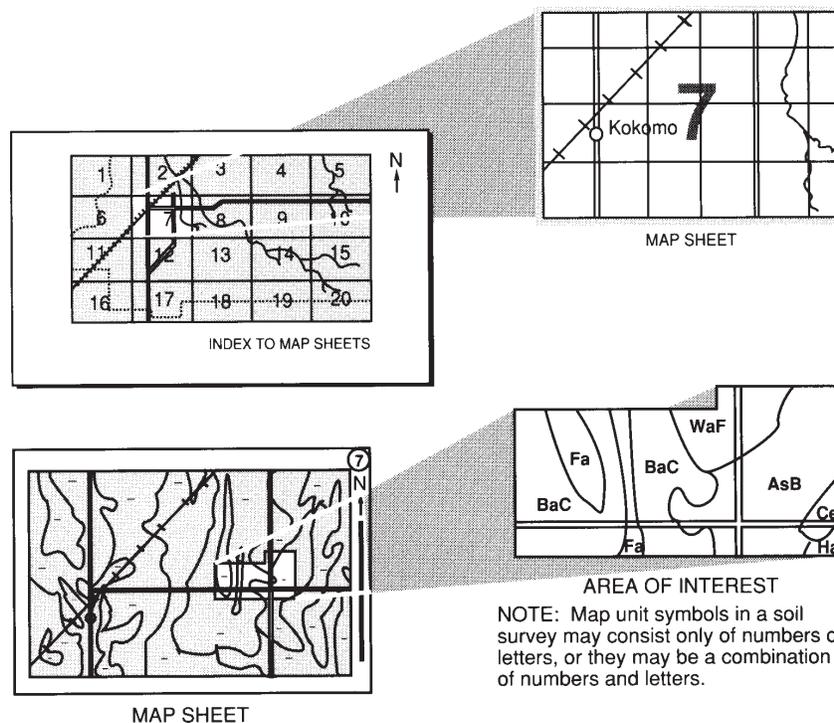
Detailed Soil Maps

The detailed soil maps 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**. Note the number of the map sheet and go to that sheet.

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

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



National Cooperative Soil Survey

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey. This survey was made cooperatively by the Natural Resources Conservation Service; the United States Department of the Interior, National Park Service; and the Regents of the University of California.

Major fieldwork for this soil survey was completed in 2008. Soil names and descriptions were approved in 2009. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 2008. The most current official data are available on the Internet.

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.

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Cover Caption

View from the edge of the Central Plateau on the northeast side of Lassen Peak showing the destruction and regeneration from the 1914 to 1917 series of eruptions.

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

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Issued 2010

Foreword

This soil survey was developed in conjunction with the National Park Service Inventory and Monitoring Program and is intended to serve as the official source document for soils occurring within Lassen Volcanic National Park.

This soil survey contains information that affects current and future land use planning in the park. It contains predictions of soil behavior for selected land uses. The survey highlights soil limitations, actions needed to overcome the limitations, and the impact of selected land uses on the environment. This soil survey is designed to meet the needs of the National Park Service and their partners for a better understanding of the various soil properties present in the park and their affect on various natural ecological properties in order to understand, protect, and enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations. Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each map unit is shown on the detailed soil maps. Each soil in the survey area is described, and information on specific uses is given. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or Lassen Volcanic National Park.

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Soil Survey of Lassen Volcanic National Park, California

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United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with United States Department of the Interior, National Park Service, and Regents of the University of California

LASSEN VOLCANIC NATIONAL PARK includes parts of Shasta, Lassen, Plumas, and Tehama Counties, California (fig. 1). It is bordered on the southwest by Tehama County, and the rest of the area borders Lassen National Forest Area, California.

General Nature of the Survey Area

This section gives general information about the survey area. It discusses the environment, history, and climate of Lassen Volcanic National Park.

Past and Future Environment

This section was prepared by Marchel Munnecke.

Volcanic activity and glaciers have created the landscape of Lassen Volcanic National Park. Recent deposits of volcanic material provide a unique view of primary succession in action. Primary succession is the establishment of vegetation on freshly deposited lava, debris flows, and thick ash deposits. The new material goes through a

Soil Survey of Lassen Volcanic National Park, California

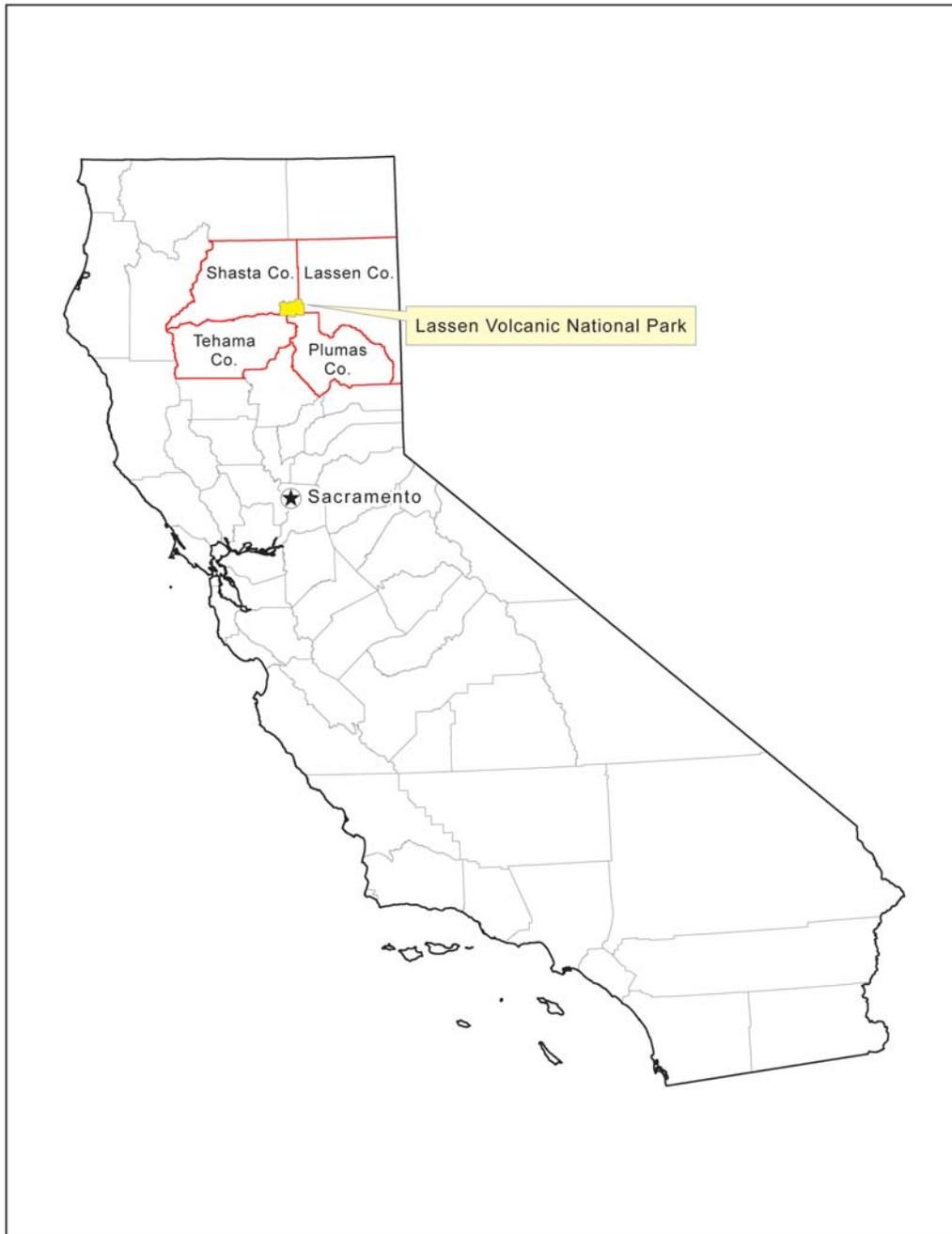


Figure 1.—Location of Lassen Volcanic National Park in California.

protracted process of pedogenesis, invoked by physical weathering and the slow recruitment of organic material. Because the seed sources are buried under freshly deposited volcanic flow, new seeds come from adjacent forests. Young seedlings have to survive harsh soil conditions and exposure to full sun. Many of these seedlings do not survive, and many of those that do are chlorotic, indicating that they are not able to assimilate the required nutrients. In the survey area Sierra lodgepole pine and forbs are commonly the pioneer species. The development of soil and the production of

forestlands may take decades to centuries. These processes are ongoing in the Devastated Area, in Chaos Jumbles, and around Cinder Cone.

Possible global warming and the consequential change in climate will have an affect on the distribution and composition of the ecological sites. (See the section "Ecological Sites in Lassen Volcanic National Park.") The predictions of change vary, but most indicate a warmer climate that will possibly have more precipitation but in shorter durations of time. This would mean a longer drier summer. Several models suggest that species may move upslope and northward, potentially indicating a loss of habitat for the alpine sites. Other studies, however, indicate alpine species will be established downslope from their historic range. Prolonged drought may inhibit species from moving upslope into harsher conditions. Fire frequency and severity may increase because the fuels may be dry for longer.

History

This section was prepared by Marchel Munnecke.

Mount Lassen (also known as Snow Mountain), which has an elevation of more than 10,000 feet, was the central point of four distinct tribes: Yana, Yahi, Mountain Maidu, and Atsugewe. The descendents of these original inhabitants still live in the surrounding areas. Permanent homes and villages were at the lower elevations of Mount Lassen, where the winters were much less severe than at the higher elevations. During summer, spring, and fall, many types of game were abundant. In summer temporary camps were set up at the higher elevations, where fish were plentiful in the mountain streams. Mount Lassen is considered a sacred mountain to these four tribes and to other tribes and native people as well. The lush meadows were managed by the local inhabitants for food, medicinals, and basketry materials. The plants and animals, under this traditional management, provided abundantly for the needs of the tribal population.

Peter Lassen was one of the first white settlers in the survey area, acquiring 22,000 acres of land in 1844. Because of hunters and trappers, who brought in more settlers, and the subsequent gold rush to California, the local native way of life was devastated. Due to forced relocations, illness, starvation, and massacre, the local native population decreased dramatically in a relatively short time period.

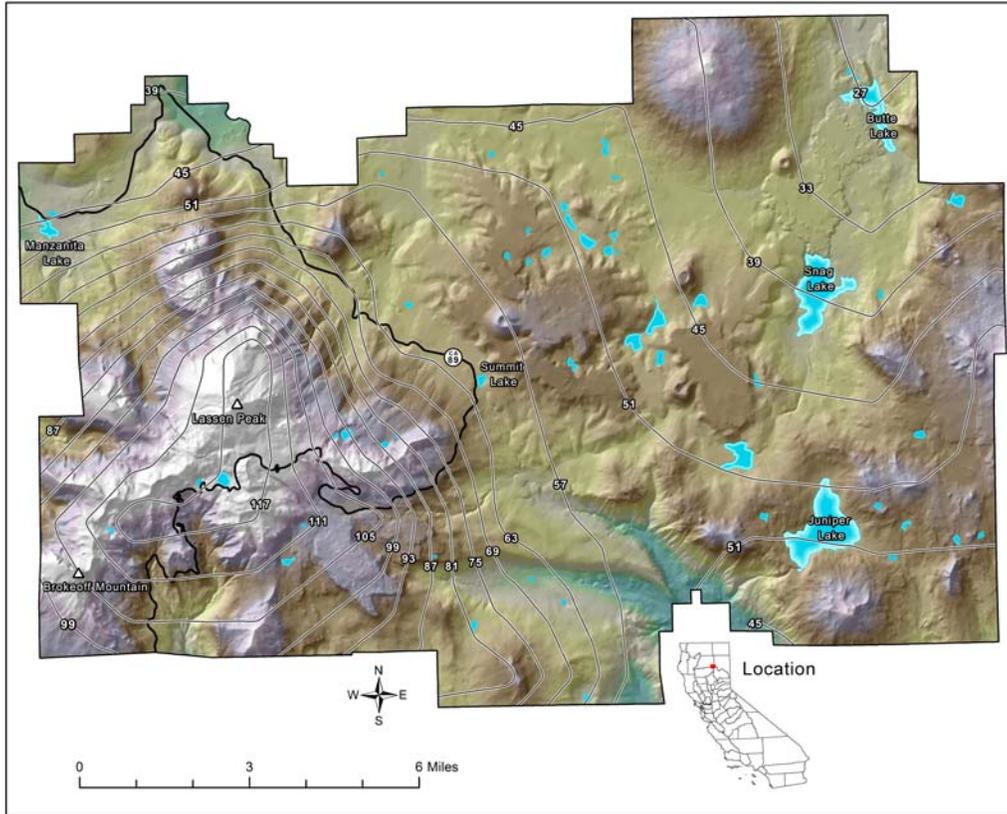
More settlers came to the survey area, setting up ranches throughout the present park boundaries. Many of the meadows were used for grazing sheep, cattle, mules, or horses. Some of the meadows were manipulated to facilitate grazing and accessibility.

Lassen National Forest was established in 1905. Lassen Volcanic National Park was officially established in 1916, providing increased protection for the natural resources.

The Fernley & Lassen Railroad, built in 1913, transported lumber out of Westwood. The rail line was very busy and had several spur routes. Because the main logging era came after the development of Lassen Volcanic National Park, most of the park was never logged.

Efforts of fire suppression have been successful in reducing the fire spread but have had detrimental effects on forest structure and composition. Before the settlers came to the survey area, the fire rotation was 76 years; during the settlement period, it was 177 years. Since the beginning of fire suppression policies in 1905, the fire rotation has become 577 years (Taylor and Solem, 2001). Fire suppression has allowed less fire-resistant, shade-tolerant species to reproduce and persist in the forest understory. This has increased the overall basal area of the forests and shifted the species composition towards white fir and red fir at the expense of the pine species. These forests are now more prone to severe canopy fires due to the accumulation of dead and "ladder" fuels created by the dense understory trees.

Soil Survey of Lassen Volcanic National Park, California



The average relative humidity in mid-afternoon is about 47 percent. Humidity is higher at night, and the average at dawn is about 72 percent. The sun shines 85 percent of the time in summer and 42 percent in winter. The prevailing wind is from the north-northwest. Average windspeed is highest, 6.2 miles per hour, in April.

How This Survey Was Made

This survey was made in conjunction with the National Park Service's Soil Inventory and Monitoring Program to provide information about the soils and miscellaneous areas in Lassen Volcanic National Park. A scoping meeting was held in 2005 with park staff to identify their soil resource information needs and to relate those needs to the existing soil survey. Of particular importance to park staff was information regarding the relationship of soil types and plant communities to the wetlands and fens in the Warner Valley area of the park. Following the meeting, additional interviews were conducted to identify additional particular geographic areas of concern.

The soil survey of Lassen Volcanic National Park was initiated in 2005. Fieldwork for the project commenced in the summer of 2006. Fieldwork continued in the summer of 2008 and concentrated on looking at areas of concern pointed out by the park's staff. This involved establishing new series for broadly defined components.

During the soil survey, relationships between ecological sites and soil components were observed and soil-site correlation concepts were established to help in designing the map units. Soil and plant specialists tested the concepts during mapping and collected field documentation at numerous points across the landscape.

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

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

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

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units).

Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for

comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

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

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

After soil scientists located and identified the significant natural bodies of soil in the survey area, they delineated the boundaries of these bodies on digital imagery and identified each as a specific map unit.

This survey area was mapped at two levels of detail. At the more detailed level, map units are narrowly defined. Map unit boundaries were plotted and verified at closely spaced intervals. At the less detailed level, map units are broadly defined. Boundaries were plotted and verified at wider intervals.

General Soil Map Units

The general soil map in this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The components of one map unit can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Frigid Soils on Stream Terraces and Flood Plains

1. Humic Haploxerands, stream terraces-Aeric Endoaquents-Aquandic Humaquepts, flood plains

Very deep, nearly level to moderately steep, well drained to poorly drained soils that formed in alluvium

Setting

Landscape: Cascade Mountains

Slope range: 0 to 30 percent

Composition

Extent of the map unit in the survey area: 0.3 percent

Extent of the components in the map unit:

Haploxerands, stream terraces—43 percent

Aeric Endoaquents—21 percent

Aquandic Humaquepts, flood plains—20 percent

Minor components—16 percent

Soil Properties

Humic Haploxerands, stream terraces

Depth class: Very deep

Drainage class: Moderately well drained and well drained

Geomorphic position: Stream terraces

Parent material: Alluvium

Slope: 2 to 30 percent

Ecological site ID: F022B1120CA and F022B1110CA

Aeric Endoaquents

Depth class: Very deep

Drainage class: Somewhat poorly drained

Geomorphic position: Flood plains

Parent material: Alluvium

Slope: 2 to 10 percent

Ecological site ID: R022BI215CA

Aquandic Humaquepts, flood plains

Depth class: Very deep

Drainage class: Poorly drained

Geomorphic position: Flood plains

Parent material: Alluvium

Slope: 0 to 3 percent

Ecological site ID: R022BI210CA

Minor Components

- Typic Psammaquents on flood plains
- Riverwash on gravel bars along stream channels

Frigid Soils on Lake Terraces and Meadows

2. Humic Haploxerands, lake terrace-Humic Haploxerands, moist lake terrace-Histic Humaquepts, lake sediments-Typic Endoaquands

Moderately deep to very deep, nearly level to moderately steep, well drained to poorly drained soils that formed in lacustrine deposits, tephra over glaciolacustrine deposits, and alluvium

Setting

Landscape: Cascade Mountains

Slope range: 0 to 30 percent

Composition

Extent of the map unit in the survey area: 1.3 percent

Extent of the components in the map unit:

Humic Haploxerands, lake terrace—30 percent

Humic Haploxerands, moist lake terrace—16 percent

Histic Humaquepts, lake sediments—16 percent

Typic Endoaquands—11 percent

Minor components—27 percent

Soil Properties

Humic Haploxerands, lake terrace

Depth class: Moderately deep to very deep

Drainage class: Well drained

Geomorphic position: Lake terraces

Parent material: Lacustrine deposits

Slope: 1 to 30 percent

Ecological site ID: F022BI112CA

Humic Haploxerands, moist lake terrace

Depth class: Moderately deep and deep

Drainage class: Moderately well drained

Geomorphic position: Lake terraces

Parent material: Tephra over glaciolacustrine deposits

Slope: 0 to 15 percent

Ecological site ID: F022B1125CA

Histic Humaquepts, lake sediments

Depth class: Very deep

Drainage class: Poorly drained

Geomorphic position: Meadows in relict glacial lakes

Parent material: Tephra over glaciolacustrine deposits

Slope: 0 to 3 percent

Ecological site ID: R022B1217CA

Typic Endoaquands

Depth class: Deep and very deep

Drainage class: Poorly drained

Geomorphic position: Lake terraces

Parent material: Tephra over glaciolacustrine deposits

Slope: 0 to 30 percent

Ecological site ID: F022B1108CA

Minor Components

- Histic Humaquepts, frequently flooded along channels in meadows
- Beaches around lakes
- Aquandic Humaquepts in meadows on stream terraces
- Histic Humaquepts in meadows on stream terraces
- Aquandic Endoaquepts on bars in meadows on stream terraces
- Terric Haplohemists in fens on stream terraces

Frigid Soils in Glacial Valleys

3. Kingsiron–Dittmar–Rock outcrop–Humic Haploxerands, strath terrace

Very deep to shallow, gently sloping to very steep, well drained soils that formed in tephra over colluvium and residuum and in alluvium over residuum

Setting

Landscape: Cascade Mountains

Slope range: 5 to 80 percent

Composition

Extent of the map unit in the survey area: 3.6 percent

Extent of the components in the map unit:

Kingsiron soils—32 percent

Dittmar soils—14 percent

Rock outcrop—11 percent

Humic Haploxerands, strath terrace—9 percent

Minor components—34 percent

Soil Properties

Kingsiron

Depth class: Very deep

Drainage class: Well drained

Geomorphic position: Glacial-valley walls

Parent material: Tephra over colluvium

Slope: 20 to 80 percent

Ecological site ID: F022B1110CA

Dittmar

Depth class: Shallow

Drainage class: Well drained

Geomorphic position: Glacial-valley walls

Parent material: Tephra over residuum

Slope: 20 to 80 percent

Ecological site ID: F022B1121CA

Rock outcrop

Geomorphic position: Glacial-valley walls

Slope: 20 to 80 percent

Humic Haploxerands, strath terrace

Depth class: Moderately deep and deep

Drainage class: Well drained

Geomorphic position: Strath terraces

Parent material: Alluvium over residuum

Slope: 5 to 50 percent

Ecological site ID: F022B1110CA

Minor Components

- Humic Haploxerands, colluvium on colluvial aprons
- Aquic Haploxerands on outwash terraces
- Humic Haploxerands, outwash terrace on outwash terraces
- Aquepts in seeps on glacial-valley floors

Lava Flows and Frigid Soils on Tephra Deposits

4. Lava flows—Typic Xerorthents, tephra—Typic Xerorthents

Very deep, nearly level to steep, excessively drained soils that formed in tephra and tephra over till, outwash, or lacustrine deposits

Setting

Landscape: Cascade Mountains

Slope range: 1 to 50 percent

Composition

Extent of the map unit in the survey area: 2.4 percent

Extent of the components in the map unit:

Lava flows—66 percent

Typic Xerorthents, tephra—13 percent

Typic Xerorthents—11 percent
Minor components—10 percent

Soil Properties

Lava flows

Geomorphic position: Lava flows from Cinder Cone

Slope: 0 to 150 percent

Typic Xerorthents, tephra

Depth class: Very deep

Drainage class: Excessively drained

Geomorphic position: Moraines, outwash plains, lake terraces, and lava flows

Parent material: Tephra from Cinder Cone

Slope: 2 to 50 percent

Ecological site ID: R022BI201CA and R022BI201CA

Typic Xerorthents

Depth class: Very deep

Drainage class: Excessively drained

Geomorphic position: Moraines, outwash plains, and lake terraces

Parent material: Tephra from Cinder Cone over till, outwash, or lacustrine deposits

Slope: 1 to 20 percent

Ecological site ID: F022BI100CA

Minor Components

- Cinder land on Cinder Cone
- Typic Xerorthents, welded on knolls on lava flows

Frigid Soils on Outwash Plains

5. Buttewash–Badgerwash–Cragwash–Vitrixerands– Vitrixerands, low elevation

Moderately deep and deep, nearly level to strongly sloping, well drained soils that formed in tephra over outwash and in glaciolacustrine deposits over outwash

Setting

Landscape: Cascade Mountains

Slope range: 0 to 15 percent

Composition

Extent of the map unit in the survey area: 5.3 percent

Extent of the components in the map unit:

Buttewash soils—29 percent

Badgerwash soils—19 percent

Cragwash soils—10 percent

Vitrixerands—10 percent

Vitrixerands, low elevation—7 percent

Minor components—25 percent

Soil Properties

Buttewash

Depth class: Deep

Drainage class: Well drained
Geomorphic position: Outwash plains
Parent material: Tephra over outwash
Slope: 0 to 15 percent
Ecological site ID: F022B1100CA

Badgerwash

Depth class: Moderately deep
Drainage class: Well drained
Geomorphic position: Outwash plains
Parent material: Tephra over outwash
Slope: 2 to 15 percent
Ecological site ID: F022B1125CA

Cragwash

Depth class: Deep
Drainage class: Well drained
Geomorphic position: Outwash plains
Parent material: Tephra over outwash
Slope: 2 to 15 percent
Ecological site ID: F022B1103CA

Vitrikerands

Depth class: Moderately deep and deep
Drainage class: Well drained
Geomorphic position: Outwash plains
Parent material: Glaciolacustrine deposits over outwash
Slope: 1 to 15 percent
Ecological site ID: F022B1117CA

Vitrikerands, low elevation

Depth class: Moderately deep and deep
Drainage class: Well drained
Geomorphic position: Outwash plains
Parent material: Tephra over outwash
Slope: 1 to 15 percent
Ecological site ID: F022B1123CA

Minor Components

- Andic Durixerents on high outwash terraces
- Duric Vitraquands on outwash plains
- Humic Haploxerands, outwash on outwash plains
- Typic Endoaquands on stream terraces and lake terraces
- Aquandic Cryaquents along stream channels in relict glacial lakes

Frigid Soils on Moraines

6. Buttelake–Sueredo–Badgerflat

Moderately deep to very deep, gently sloping to very steep, well drained soils that formed in tephra over till

Setting

Landscape: Cascade Mountains
Slope range: 1 to 80 percent

Composition

Extent of the map unit in the survey area: 13.2 percent

Extent of the components in the map unit:

- Buttelake soils—26 percent
- Sueredo soils—25 percent
- Badgerflat soils—20 percent
- Minor components—29 percent

Soil Properties

Buttelake

Depth class: Deep

Drainage class: Well drained

Geomorphic position: Moraines

Parent material: Tephra over till

Slope: 3 to 70 percent

Ecological site ID: F022B1100CA and F022B1119CA

Sueredo

Depth class: Very deep

Drainage class: Well drained

Geomorphic position: Moraines

Parent material: Tephra over till

Slope: 2 to 80 percent

Ecological site ID: F022B1103CA

Badgerflat

Depth class: Moderately deep

Drainage class: Well drained

Geomorphic position: Moraines

Parent material: Tephra over till

Slope: 1 to 30 percent

Ecological site ID: F022B1126CA

Minor Components

- Summertown soils on moraines
- Cascadesprings soils on moraines
- Typic Vitrixerands on moraines
- Typic Vitrixerands, very deep on glaciated lava flows
- Vitrandic Xerorthents, moraine on moraines
- Sunhoff soils on moraines
- Talved soils on scoured glacial-valley walls

Frigid Soils on Glaciated Uplands and Moraines

7. Scoured–Juniperlake–Rock outcrop

Moderately deep and deep, gently sloping to very steep, well drained soils that formed in tephra over colluvium and residuum and in tephra over till

Setting

Landscape: Cascade Mountains

Slope range: 2 to 90 percent

Composition

Extent of the map unit in the survey area: 21.2 percent

Extent of the components in the map unit:

- Scoured soils—47 percent
- Juniperlake soils—32 percent
- Rock outcrop—10 percent
- Minor components—11 percent

Soil Properties

Scoured

Depth class: Moderately deep

Drainage class: Well drained

Geomorphic position: Scoured ridges and glacial headlands

Parent material: Tephra over colluvium over residuum

Slope: 2 to 90 percent

Ecological site ID: F022B1102CA

Juniperlake

Depth class: Deep

Drainage class: Well drained

Geomorphic position: Moraines

Parent material: Tephra over till

Slope: 2 to 40 percent

Ecological site ID: F022B1112CA

Rock outcrop

Geomorphic position: Scoured ridges and glacial headlands

Slope: 2 to 90 percent

Minor Components

- Juniperlake, bouldery soils on moraines
- Dittmar soils on glacial-valley walls
- Humic Haploxerands, lake terrace on lake terraces

Frigid Soils on Glaciated Lava Plateaus

8. Cenplat–Badgerflat–Rock outcrop

Moderately deep, nearly level to steep, well drained soils that formed in tephra over residuum and tephra over till

Setting

Landscape: Cascade Mountains

Slope range: 0 to 60 percent

Composition

Extent of the map unit in the survey area: 12.2 percent

Extent of the components in the map unit:

- Cenplat soils—55 percent
- Badgerflat soils—21 percent
- Rock outcrop—9 percent
- Minor components—15 percent

Soil Properties

Cenplat

Depth class: Moderately deep

Drainage class: Well drained

Geomorphic position: Glacially scoured lava plateaus

Parent material: Tephra over residuum

Slope: 0 to 60 percent

Ecological site ID: F022B1115CA and F022B1107CA

Badgerflat

Depth class: Moderately deep

Drainage class: Well drained

Geomorphic position: Moraines on side slopes of lava plateaus

Parent material: Tephra over till

Slope: 10 to 60 percent

Ecological site ID: F022B1107CA

Rock outcrop

Geomorphic position: Glacially scoured lava plateaus

Slope: 0 to 60 percent

Minor Components

- Cascadesprings soils on moraines
- Sunhoff soils on moraines
- Badgerwash soils in pockets of outwash
- Juniperlake soils on moraines
- Buttelake soils on moraines
- Buttewash soils in pockets of outwash

Frigid Soils on Volcanoes

9. Bearrubble–Prospectpeak–Rubble land–Ashbutte–Humic Haploxerands

Very deep and deep, strongly sloping to very steep, well drained to somewhat excessively drained soils that formed in tephra over residuum and in tephra and colluvium

Setting

Landscape: Cascade Mountains

Slope range: 5 to 70 percent

Composition

Extent of the map unit in the survey area: 10.2 percent

Extent of the components in the map unit:

Bearrubble soils—22 percent

Prospectpeak soils—17 percent

Rubble land—16 percent

Ashbutte soils—9 percent

Humic Haploxerands—4 percent

Minor components—32 percent

Soil Properties

Bearrubble

Depth class: Very deep

Drainage class: Well drained

Geomorphic position: Shield volcanoes

Parent material: Tephra over residuum

Slope: 5 to 40 percent

Ecological site ID: F022B1114CA and F022B1103CA

Prospectpeak

Depth class: Deep

Drainage class: Well drained

Geomorphic position: Shield volcanoes

Parent material: Tephra over residuum

Slope: 10 to 30 percent

Ecological site ID: F022B1109CA

Rubble land

Geomorphic position: Shield volcanoes

Slope: 5 to 70 percent

Ashbutte

Depth class: Very deep

Drainage class: Somewhat excessively drained

Geomorphic position: Cinder cones

Parent material: Tephra

Slope: 15 to 70 percent

Ecological site ID: F022B1109CA

Humic Haploxerands

Depth class: Very deep

Drainage class: Well drained

Geomorphic position: Shield volcanoes

Parent material: Colluvium

Slope: 5 to 40 percent

Ecological site ID: F022B1103CA

Minor Components

- Typic Vitrixerands, bouldery on volcanic domes
- Typic Haploxerands on shield volcanoes
- Typic Vitrixerands, tephra over colluvium on volcanic domes
- Vitrandic Xerorthents on cinder cones
- Sueredo soils on moraines
- Rock outcrop on volcanoes
- Typic Vitrixerands, unglaciated on lava flows
- Scoured soils on glaciated volcanoes

Frigid Soils on Hydrothermally Altered Volcanoes

10. Diamondpeak–Brokeoff-Typic Dystroxerepts, landslides–Endoaquepts-Aquic Dystroxerepts, debris flows-Typic Dystroxerepts

Very deep to shallow, strongly sloping to very steep, well drained to poorly drained soils that formed in tephra over colluvium over residuum, tephra and colluvium over residuum, colluvium, slope alluvium over colluvium over till, debris flows, and colluvium and residuum

Setting

Landscape: Cascade Mountains
Slope range: 10 to 80 percent

Composition

Extent of the map unit in the survey area: 3.2 percent

Extent of the components in the map unit:

- Diamondpeak soils—24 percent
- Brokeoff soils—21 percent
- Typic Dystroxerepts, landslides—19 percent
- Endoaquepts—12 percent
- Aquic Dystroxerepts, debris flows—9 percent
- Typic Dystroxerepts—8 percent
- Minor components—7 percent

Soil Properties

Diamondpeak

Depth class: Very deep

Drainage class: Well drained

Geomorphic position: Mountain side slopes in hydrothermally altered areas

Parent material: Tephra over colluvium over residuum

Slope: 10 to 80 percent

Ecological site ID: F022B1113CA

Brokeoff

Depth class: Moderately deep

Drainage class: Well drained

Geomorphic position: Mountain side slopes in hydrothermally altered areas

Parent material: Tephra and colluvium over residuum

Slope: 10 to 80 percent

Ecological site ID: R022B1203CA

Typic Dystroxerepts, landslides

Depth class: Very deep

Drainage class: Well drained

Geomorphic position: Landslides in hydrothermally altered areas

Parent material: Colluvium

Slope: 10 to 50 percent

Ecological site ID: F022B1118CA

Endoaquepts

Depth class: Very deep

Drainage class: Poorly drained

Geomorphic position: Springs and seeps in hydrothermally altered areas

Parent material: Slope alluvium

Slope: 10 to 80 percent

Ecological site ID: R022BI209CA

Aquic Dystroxerepts, debris flows

Depth class: Very deep

Drainage class: Poorly drained

Geomorphic position: Debris flows in hydrothermally altered areas

Parent material: Debris flows

Slope: 10 to 80 percent

Ecological site ID: R022BI216CA

Typic Dystroxerepts

Depth class: Shallow to deep

Drainage class: Well drained

Geomorphic position: Actively eroding mountain slopes in hydrothermally altered areas

Parent material: Colluvium and residuum

Slope: 10 to 80 percent

Ecological site ID: R022BI216CA

Minor Components

- Rock outcrop
- Badlands

Frigid Soils on Rock Fall Avalanches

11. Chaos

Very deep, gently sloping to moderately steep, somewhat excessively drained soils that formed in colluvium from rock fall avalanches

Setting

Landscape: Cascade Mountains

Slope range: 2 to 30 percent

Composition

Extent of the map unit in the survey area: 1.5 percent

Extent of the components in the map unit:

Chaos—85 percent

Minor components—15 percent

Soil Properties

Chaos

Depth class: Very deep

Drainage class: Somewhat excessively drained

Geomorphic position: Rock fall avalanches

Parent material: Rock fall avalanche deposits

Slope: 2 to 30 percent
Ecological site ID: F022B1122CA

Minor Components

- Rubble land on rock fall avalanche deposits
- Aquepts on rock fall avalanche deposits

Frigid and Cryic Soils in Seeps on Glacial-Valley Walls and Floors

12. Aquepts—Typic Petraquepts, bedrock

Very deep to shallow, gently sloping to steep, poorly drained soils that formed in slope alluvium and colluvium

Setting

Landscape: Cascade Mountains
Slope range: 2 to 50 percent

Composition

Extent of the map unit in the survey area: 1 percent
Extent of the components in the map unit:
Aquepts—47 percent
Typic Petraquepts, bedrock—33 percent
Minor components—20 percent

Soil Properties

Aquepts

Depth class: Deep and very deep
Drainage class: Poorly drained
Geomorphic position: Seeps on glacial-valley walls and floors
Parent material: Slope alluvium over colluvium
Slope: 2 to 50 percent
Ecological site ID: R022B1211CA

Typic Petraquepts, bedrock

Depth class: Shallow to moderately deep
Drainage class: Poorly drained
Geomorphic position: Seeps on glacial-valley walls and floors
Parent material: Colluvium
Slope: 2 to 45 percent
Ecological site ID: R022B1211CA

Minor Components

- Aquic Haploxerands on outwash terraces
- Typic Petraquepts in geothermal seeps
- Endoaquepts in seeps
- Typic Endoaquands on stream terraces

Cryic Soils in Meadows

13. Vitrandic Cryofluvents–Aquandic Cryaquents

Very deep, nearly level to gently sloping, poorly drained and very poorly drained soils that formed in glaciolacustrine deposits

Setting

Landscape: Cascade Mountains

Slope range: 0 to 8 percent

Composition

Extent of the map unit in the survey area: 0.3 percent

Extent of the components in the map unit:

Vitrandic Cryofluvents—65 percent

Aquandic Cryaquents—30 percent

Minor components—5 percent

Soil Properties

Vitrandic Cryofluvents

Depth class: Very deep

Drainage class: Poorly drained

Geomorphic position: Meadows in relict glacial lakes

Parent material: Glaciolacustrine deposits

Slope: 0 to 8 percent

Ecological site ID: R022BI206CA

Aquandic Cryaquents

Depth class: Very deep

Drainage class: Very poorly drained

Geomorphic position: Meadows in relict glacial lakes

Parent material: Glaciolacustrine deposits

Slope: 0 to 8 percent

Ecological site ID: R022BI206CA

Minor Components

- Typic Endoaquands on lake terraces
- Aquepts on lake terraces
- Duric Vitraquands on outwash plains
- Typic Endoaquents on flood plains

Frigid and Cryic Soils on Recent Eruptive Debris

14. Vitrandic Cryorthents, debris flows–Vitrandic Xerorthents, debris fan–Vitrandic Cryorthents, debris flows, high elevation–Vitrandic Xerofluvents, debris flows

Very deep to moderately deep, nearly level to very steep, well drained to somewhat poorly drained soils that formed in pyroclastic and debris flows over till, debris flows, and debris flows over alluvium

Setting

Landscape: Cascade Mountains

Slope range: 0 to 95 percent

Composition

Extent of the map unit in the survey area: 2 percent

Extent of the components in the map unit:

Vitrandic Cryorthents, debris flows—25 percent

Vitrandic Xerorthents, debris fan—24 percent

Vitrandic Cryorthents, debris flows, high elevation—17 percent

Vitrandic Xerofluvents, debris flows—16 percent

Minor components—18 percent

Soil Properties

Vitrandic Cryorthents, debris flows

Depth class: Moderately deep to very deep

Drainage class: Moderately well drained and well drained

Geomorphic position: Moraines

Parent material: Debris flows and pyroclastic flows over till

Slope: 10 to 95 percent

Ecological site ID: F022B1115CA

Vitrandic Xerorthents, debris fan

Depth class: Moderately deep to very deep

Drainage class: Well drained

Geomorphic position: Debris flows

Parent material: Debris flow deposits

Slope: 2 to 30 percent

Ecological site ID: F022B1106CA

Vitrandic Cryorthents, debris flows, high elevation

Depth class: Very deep

Drainage class: Well drained

Geomorphic position: Debris flows

Parent material: Debris flow and pyroclastic flow deposits

Slope: 10 to 95 percent

Ecological site ID: R022B1207CA

Vitrandic Xerofluvents, debris flows

Depth class: Very deep

Drainage class: Somewhat poorly drained

Geomorphic position: Low stream terraces

Parent material: Debris flow deposits over alluvium

Slope: 0 to 8 percent

Ecological site ID: F022B1105CA

Minor Components

- Typic Endoaquents on flood plains
- Vitrandic Xerofluvents on debris flows
- Rubble land on volcanic domes
- Rock outcrop on volcanic domes

Cryic Soils on Glaciated Valleys, Lava Flows, and Moraines

15. Terracelake–Shadowlake–Rock outcrop–Acroph

Deep to shallow, nearly level to very steep, well drained soils that formed in tephra over colluvium and residuum, tephra over till, and tephra over residuum

Setting

Landscape: Cascade Mountains

Slope range: 1 to 90 percent

Composition

Extent of the map unit in the survey area: 12.6 percent

Extent of the components in the map unit:

Terracelake soils—29 percent

Shadowlake soils—21 percent

Rock outcrop—12 percent

Acroph soils—12 percent

Minor components—26 percent

Soil Properties

Terracelake

Depth class: Moderately deep

Drainage class: Well drained

Geomorphic position: Glacial-valley walls and floors and glaciated lava flows

Parent material: Tephra over colluvium and residuum

Slope: 2 to 90 percent

Ecological site ID: F022B1104CA, F022B1111CA, and F022B1115CA

Shadowlake

Depth class: Deep

Drainage class: Well drained

Geomorphic position: Moraines on glacial-valley walls and floors

Parent material: Tephra over till

Slope: 2 to 80 percent

Ecological site ID: F022B1111CA and F022B1115CA

Rock outcrop

Geomorphic position: Scoured glacial-valley walls and floors

Slope: 1 to 80 percent

Acroph

Depth class: Shallow

Drainage class: Well drained

Geomorphic position: Glacial-valley walls and floors and glaciated lava flows

Parent material: Tephra over residuum

Slope: 1 to 80 percent

Ecological site ID: R022BI204CA

Minor Components

- Xeric Vitricryands, cirque floor on cirque floors
- Xeric Vitricryands, tephra over till on moraines on lava flows
- Vitrandic Cryorthents on pyroclastic flows in hanging valleys
- Humic Xeric Vitricryands on moraines
- Rubble land on colluvial aprons
- Readingpeak soils on roche moutonnées
- Xeric Vitricryands on moraines on lava flows

Cryic Soils on Volcanoes

16. Emeraldlake–Terracelake–Readingpeak–Rock outcrop–Rubble land

Very deep to moderately deep, moderately steep to very steep, well drained soils that formed in tephra and colluvium and in tephra over colluvium and residuum

Setting

Landscape: Cascade Mountains

Slope range: 15 to 150 percent

Composition

Extent of the map unit in the survey area: 7.8 percent

Extent of the components in the map unit:

- Emeraldlake soils—23 percent
- Terracelake soils—19 percent
- Readingpeak soils—17 percent
- Rock outcrop—17 percent
- Rubble land—11 percent
- Minor components—13 percent

Soil Properties

Emeraldlake

Depth class: Very deep

Drainage class: Somewhat excessively drained

Geomorphic position: Cirque walls, volcanic domes, colluvial aprons, and mountain slopes

Parent material: Tephra and colluvium

Slope: 15 to 95 percent

Ecological site ID: F022BI115CA and R022BI207CA

Terracelake

Depth class: Moderately deep

Drainage class: Well drained

Geomorphic position: Volcanic domes and glaciated mountain slopes

Parent material: Tephra over colluvium and residuum

Slope: 15 to 95 percent

Ecological site ID: R022BI207CA and R022BI204CA

Readingpeak

Depth class: Deep

Drainage class: Well drained

Geomorphic position: Volcanic domes and glaciated mountain slopes

Parent material: Tephra over colluvium and residuum

Slope: 15 to 95 percent

Ecological site ID: F022BI115CA, F022BI124CA, and R022BI207CA

Rock outcrop

Geomorphic position: Volcanic domes and glaciated mountain slopes

Slope: 15 to 150 percent

Rubble land

Geomorphic position: Volcanic domes, cirque walls, and floors and colluvial aprons

Slope: 15 to 95 percent

Minor Components

- Xeric Vitricryands, colluvium on cinder cones and nunataks
- Xeric Vitricryands, ash over cinders on cinder cones and nunataks
- Xeric Vitricryands, bedrock on cinder cones and nunataks

17. Water

Composition

Extent of the map unit in the survey area: 1.9 percent

General Ecological Site Map Units

The general ecological site map in this publication shows broad areas that have similar vegetation or similar plant assemblages. Each unit on the map occurs on one or more unique landforms dominated by one or two ecological sites. An ecological site is associated with a specific soil component. The ecological site associated with the dominant soil component was used to generate this map. The site is named after its potential natural plant community.

Because of its small scale, the map is not suitable for planning the management of forest practices, fire modeling, or any other detailed projects. The vegetation in any one map unit is actually quite varied and is an assemblage of many plant communities.

Following is a legend for the general ecological site units, including the associated ecological site numbers and names. For a brief summary of the individual ecological sites, please refer to the section "Ecological Sites in Lassen Volcanic National Park." For the complete ecological site description (ESD), please go to <http://esis.sc.egov.usda.gov/Welcome/pgESDWelcome.aspx> and view approved reports by ESD number.

1. Jeffrey Pine-White Fir Forest Types

F022BI100CA, *Pinus jeffreyi*-*Abies concolor*/*Achnatherum occidentale* ssp.
occidentale-*Elymus elymoides*

F022BI121CA, *Pinus jeffreyi*/*Arctostaphylos patula*

F022BI126CA, *Pinus jeffreyi*-*Pinus contorta* var. *murrayana*/*Monardella odoratissima*

F022BI106CA, *Pinus jeffreyi*-*Abies*/*Achnatherum*-*Lupinus*

F022BI122CA, *Pinus jeffreyi*-*Abies concolor*/*Holodiscus microphyllus*

2. White Fir-Mixed Conifer Forest Types

F022BI103CA, *Abies concolor*-*Pinus jeffreyi*/*Arctostaphylos patula*-*Chrysolepis*
sempervirens

F022BI110CA, *Abies concolor*-*Calocedrus decurrens*/*Ceanothus cordulatus*/
Achnatherum

F022BI119CA, *Abies concolor*-*Pinus jeffreyi*/*Elymus elymoides*

F022BI120CA, *Abies concolor*-*Pinus contorta* var. *murrayana*/*Elymus glaucus*

F022BI123CA, *Abies concolor*-*Pinus contorta* var. *murrayana*/*Achnatherum*
occidentale

3. Open California Red Fir Forest Types

F022BI102CA, *Abies magnifica*/*Arctostaphylos nevadensis*/*Carex rossii*-*Penstemon*
gracilentus

F022BI113CA, *Abies magnifica*/*Monardella odoratissima*-*Phlox diffusa*

F022BI114CA, *Abies magnifica*-*Pinus monticola*/*Arctostaphylos nevadensis*-*Chrysolepis sempervirens*/*Angelica breweri*
F022BI115CA, *Abies magnifica*-*Pinus monticola*/*Arctostaphylos nevadensis*/*Achnatherum occidentale*

4. Dense California Red Fir Forest Types

F022BI107CA, *Abies magnifica*-*Abies concolor*/*Chrysolepis sempervirens*
F022BI109CA, *Abies magnifica*-*Pinus jeffreyi*/*Arctostaphylos nevadensis*/*Achnatherum occidentale*
F022BI112CA, *Abies magnifica*/*Penstemon gracilentus*-*Lupinus arbustus*
F022BI117CA, *Abies magnifica*-*Pinus contorta* var. *murrayana*/*Elymus elymoides*
F022BI118CA, *Abies magnifica*/*Carex*-*Hieracium albiflorum*

5. Subalpine Forest Types

F022BI104CA, *Tsuga mertensiana*/*Lupinus obtusilobus*-*Cistanthe umbellata* var. *umbellata*
F022BI111CA, *Tsuga mertensiana*-*Abies magnifica*/*Lupinus obtusilobus*-*Eriogonum marifolium*

6. Sierra Lodgepole Pine Forest Types

F022BI105CA, *Pinus contorta* var. *murrayana*-*Populus tremuloides*/*Elymus glaucus*
F022BI125CA, *Pinus contorta* var. *murrayana*/*Elymus elymoides*

7. Tephra Rangeland Sites

R022BI201CA, Bedded tephra deposits

8. Cryic Upland Rangeland Sites

R022BI205CA, Cirque floor
R022BI207CA, Alpine slopes
R022BI208CA, Cryic pyroclastic cones
R022BI212CA, Windy peak
R022BI214CA, Pyroclastic flow
R022BI204CA, Glaciated mountain slopes

9. Meadow, Seep, and Spring Rangeland Sites

R022BI202CA, Frigid alluvial flat
R022BI206CA, Cryic lucustrine flat
R022BI211CA, Spring complex
R022BI217CA, Frigid lucustrine flat
R022BI218CA, Thermal seeps

10. Stream Corridor Rangeland Sites

R022BI210CA, Loamy flood plains

R022BI213CA, Sandy flood plains
R022BI215CA, Gravelly flood plains

11. Water

12. Miscellaneous Land Types

Detailed Soil Map Units

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

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

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

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

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. All the soils of a series have major horizons that are similar in composition, thickness, and arrangement. The soils of a given series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For

example, Cenplat ashy loamy sand, 0 to 15 percent slopes, is a phase of the Cenplat series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes or associations.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Scoured-Juniper-Rock outcrop complex, 3 to 40 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Rubble land-Rock outcrop, cliffs-Emeraldlake association, 25 to 150 percent slopes, is an example.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Cinder land and Lava flows are examples.

Some soils are inextensive or have more variability than a soil series. These soils are named at a higher taxonomic level than a soil series. These higher category soils have complete descriptions and data, but the ranges in characteristics may be broader than those of a soil series.

Table 4 shows the component name and the map unit symbol or symbols in which the component occurs. It also shows the local phase, the component kind, and the ecosite ID to which the component is correlated per soil map unit symbol. The intent of this table is to help the reader understand the legend and data structure of this soil survey and the specific correlations between soil components and ecological site descriptions. By cross referencing the soil maps with this table, the reader can ascertain the geographic locations of soil components mentioned in the section "Formation of the Soils."

Table 5 gives the acreage and proportionate extent of each map unit. Other tables give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

Figure 3 shows the location of figures 4 to 6 (Block Diagrams 1 to 3). The block diagrams were produced from the detailed soil maps. Figures 4 to 6 illustrate the relationships of the detailed soil map units in the survey area to the geography, topography, geology, and climate in the area. The vertical scale of the diagrams is exaggerated 2 times in relation to the horizontal scale. This exaggeration helps to more clearly illustrate the topography of the area. The sidewalls of the diagrams are not to scale and are idealized to help illustrate the soil characteristics, soil parent material, and geology. The block diagrams are not intended to replace the detailed maps.

Figure 4 is Block Diagram 1. This diagram shows a north-flowing glacial valley in the Manzanita Creek drainage. Multiple glacial episodes and ice levels shaped this valley, leaving traces of features such as glacial-valley walls and floors, scoured lava flows, moraines, and outwash plains. The more recent glaciations were generally less extensive and cut into and deposited over preexisting glacial features. Moraines and outwash plains formed as the gradient flattened beyond the confining bedrock of Lassen Peak and Loomis Peak. The active colluvial nature of Lassen Peak has shed many of the glacial features that were formed on it. Chaos Crags erupted and was emplaced after glaciations, obliterating any glacial features that existed there prior to the eruption. Thick deposits of tephra were deposited around the vent of dome A of Chaos Crags and covered a large area of the northern part of the park with thinner

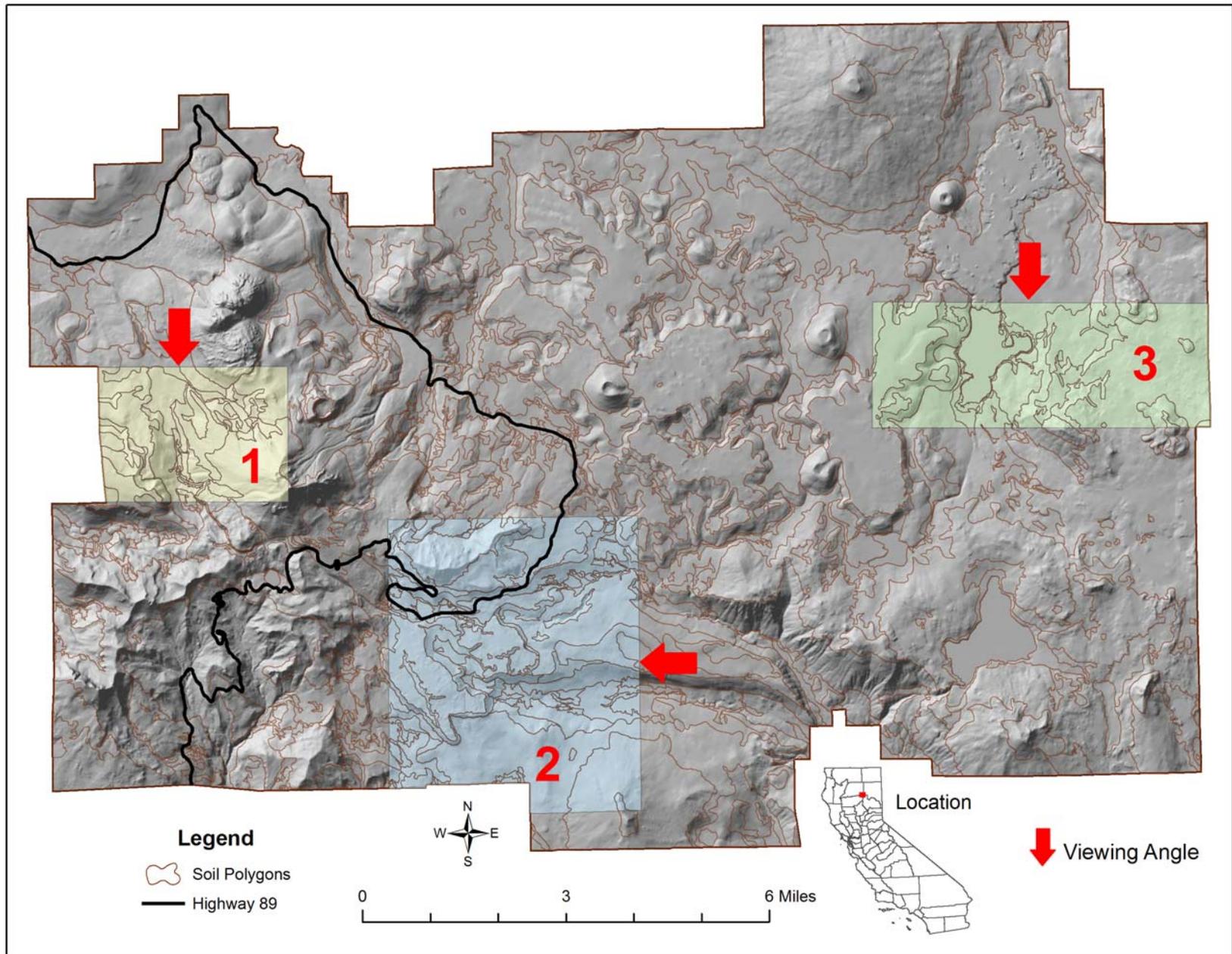
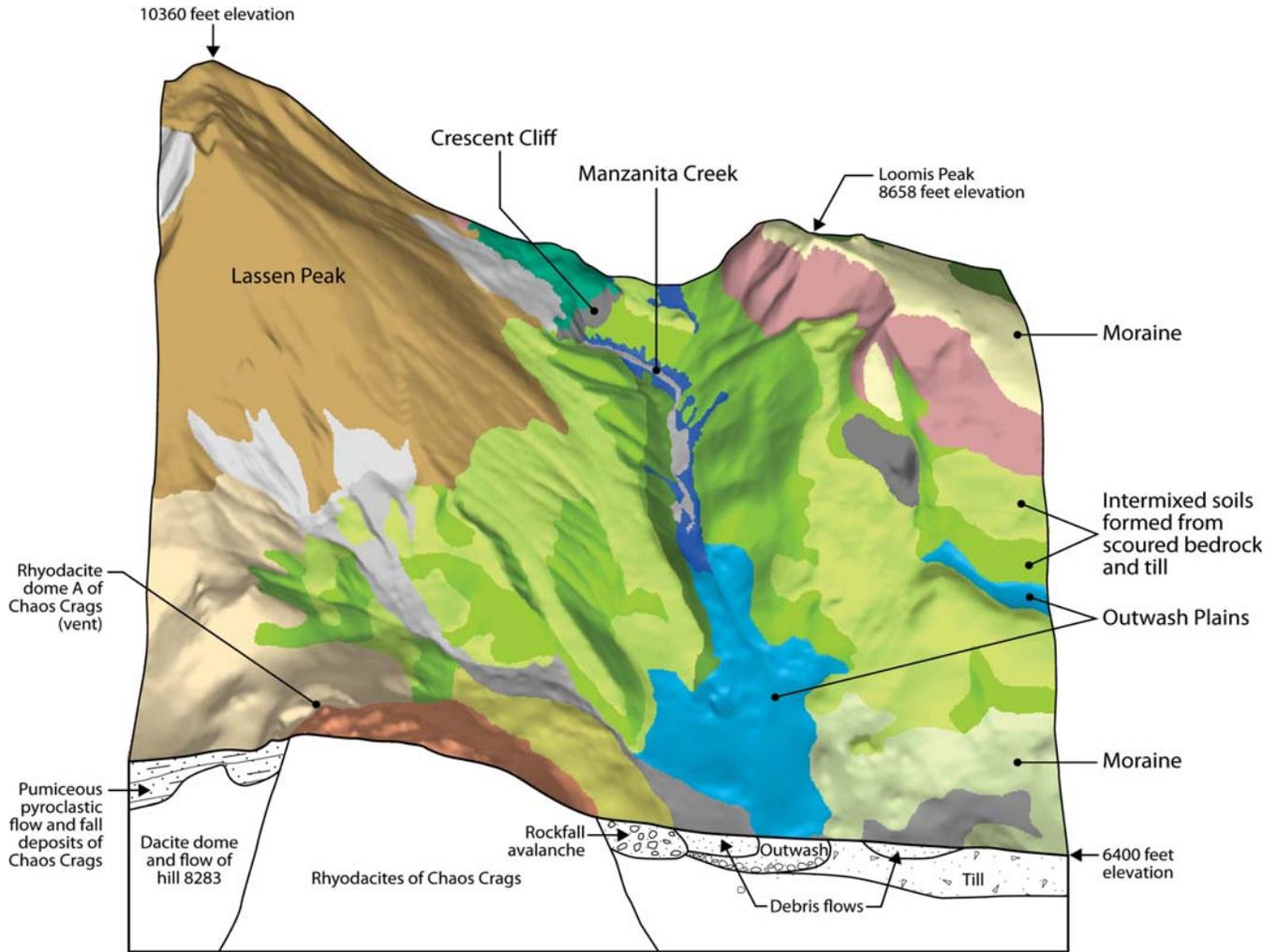


Figure 3.—Index for block diagrams of detailed soil mapping in Lassen Volcanic National Park, California. (See figures 4 to 6.)

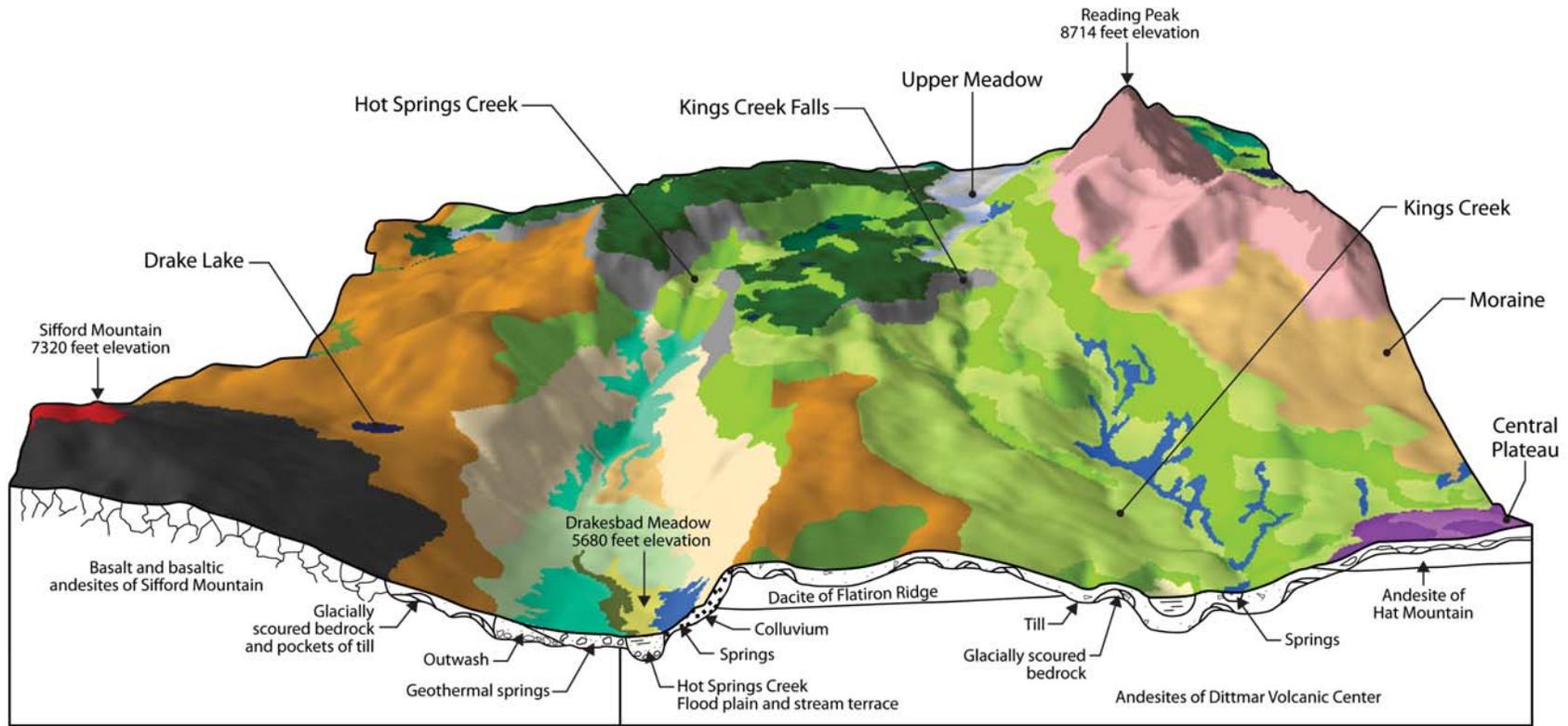
Soil Survey of Lassen Volcanic National Park, California



- 111 Vitrandic Xerorthents, debris fan, 2 to 30 percent slopes
- 114 Emeraldlake-Terracelake-Readingpeak-Rock outcrop-Rubble land complex, 20 to 95 percent slopes
- 116 Xeric Vitricryands, tephra over till-Terracelake-Rock outcrop-Xeric Vitricryands, cirque floor, complex, 5 to 35 percent slopes
- 132 Vitrandic Cryorthents, debris flows, 10 to 80 percent slopes
- 134 Chaos extremely gravelly ashy coarse sand, 2 to 30 percent slopes
- 137 Xeric Vitricryands-Rock outcrop complex, 10 to 45 percent slopes
- 142 Cragwash ashy loamy coarse sand, 1 to 30 percent slopes
- 145 Sueredo bouldery ashy loamy coarse sand, 2 to 30 percent slopes
- 149 Rubble land-Rock outcrop, cliffs-Emeraldlake association, 35 to 150 percent slopes
- 150 Shadowlake-Terracelake-Acroph-Rock outcrop complex, 15 to 80 percent slopes
- 151 Terracelake-Acroph-Rock outcrop-Shadowlake complex, 15 to 80 percent slopes
- 152 Terracelake-Shadowlake-Acroph-Rock outcrop complex, 5 to 35 percent slopes
- 167 Emeraldlake-Readingpeak-Terracelake-Rock outcrop complex, 30 to 95 percent slopes
- 170 Rock outcrop-Emeraldlake-Rubble land-Readingpeak complex, 20 to 150 percent slopes
- 171 Aquepts-Typic Petraquepts, bedrock complex, 2 to 45 percent slopes
- 174 Vitrandic Cryorthents-Readingpeak-Rock outcrop complex, 5 to 150 percent slopes
- 177 Vitrandic Cryorthents, debris flows, high elevation, 15 to 95 percent slopes

Geologic formations are conceptual, for illustrative purposes only, and are not to scale.

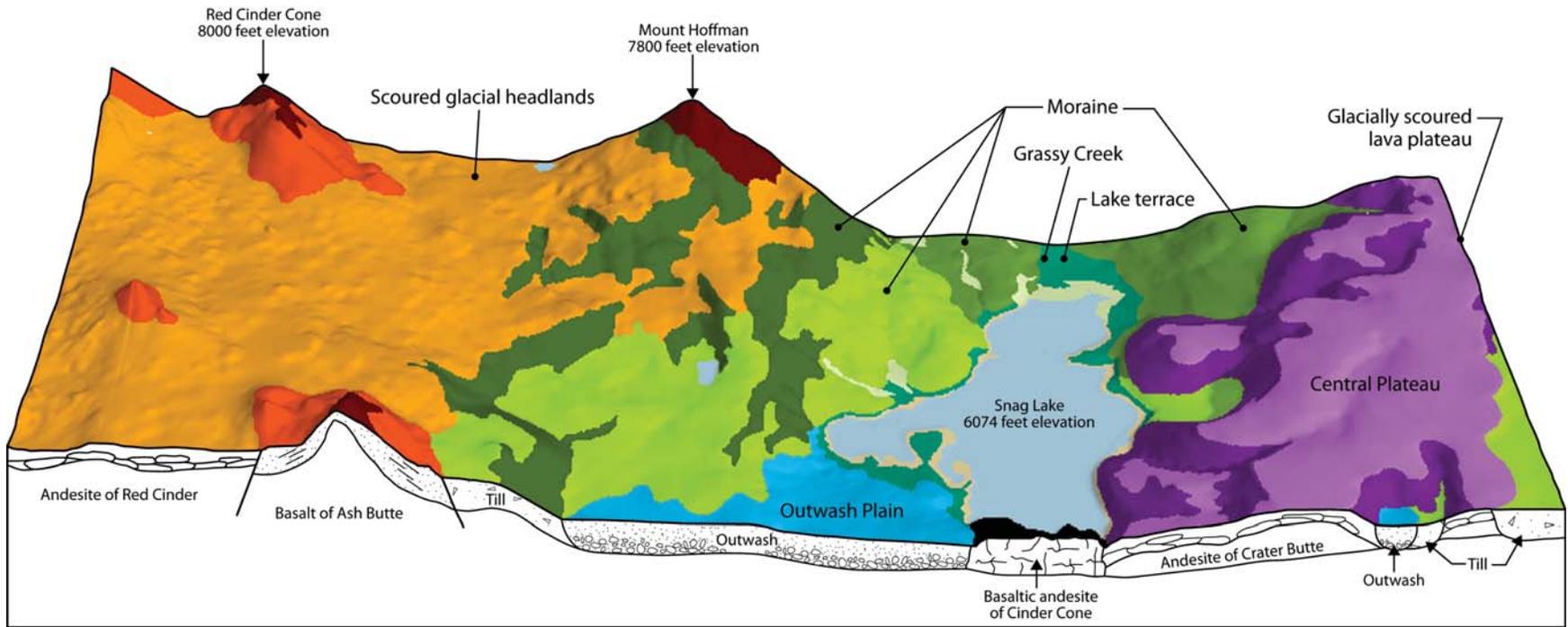
Figure 4.—Block Diagram 1.



- | | |
|--|---|
| <ul style="list-style-type: none"> 104 Scoured-Juniperlake-Rock outcrop complex, 3 to 40 percent slopes 105 Juniperlake gravelly medial sandy loam, 2 to 35 percent slopes 106 Cenplat ashy loamy sand, 0 to 15 percent slopes 107 Badgerflat-Cenplat complex, 10 to 60 percent slopes 110 Bearrubble-Rubble land complex, 8 to 40 percent slopes 112 Cascadesprings gravelly ashy loamy coarse sand, 5 to 30 percent slopes 113 Terracelake-Emeraldlake-Readingpeak-Rock outcrop complex, 15 to 65 percent slopes 114 Emeraldlake-Terracelake-Readingpeak-Rock outcrop-Rubble land complex, 20 to 95 percent slopes 115 Shadowlake gravelly ashy sandy loam, 2 to 30 percent slopes 116 Xeric Vitricryands, tephra over till-Terracelake-Rock outcrop-Xeric Vitricryands, cirque floor, complex, 5 to 35 percent slopes 122 Xeric Vitricryands complex, 10 to 80 percent slopes 125 Humic Haploxerands, stream terraces-Aquandic Humaquepts, flood plains, complex, 0 to 15 percent slopes 126 Kingsiron-Dittmar-Rock outcrop complex, 20 to 80 percent slopes 127 Humic Haploxerands, strath terrace-Aquepts complex, 5 to 50 percent slopes | <ul style="list-style-type: none"> 130 Histic Humaquepts, lake sediments-Histic Humaquepts, frequently flooded-Typic Endoaquands complex, 0 to 15 percent slopes 136 Terracelake-Rock outcrop-Xeric Vitricryands, cirque floor, complex, 1 to 30 percent slopes 144 Xeric Vitricryands, cirque floor-Humic Xeric Vitricryands complex, 1 to 35 percent slopes 149 Rubble land-Rock outcrop, cliffs-Emeraldlake association, 35 to 150 percent slopes 151 Terracelake-Acroph-Rock outcrop-Shadowlake complex, 15 to 80 percent slopes 152 Terracelake-Shadowlake-Acroph-Rock outcrop complex, 5 to 35 percent slopes 163 Vitrandic Cryofluvents-Aquandic Cryaquepts complex, 0 to 8 percent slopes 164 Aquepts-Typic Petraquepts, bedrock-Aquic Haploxerands-Typic Petraquepts complex, 4 to 30 percent slopes 165 Aquandic Humaquepts-Histic Humaquepts-Aquandic Endoaquepts-Terric Haplohemists complex, 1 to 5 percent slopes 166 Aquic Haploxerands-Humic Haploxerands, outwash terrace, complex, 2 to 30 percent slopes 171 Aquepts-Typic Petraquepts, bedrock complex, 2 to 45 percent slopes 175 Shadowlake-Vitrandic Cryofluvents complex, 2 to 30 percent slopes W Water |
|--|---|

Geologic formations are conceptual, for illustrative purposes only, and are not to scale.

Figure 5.—Block Diagram 2.



- 100 Buttelake ashy sand, 3 to 35 percent slopes
- 101 Buttewash ashy coarse sand, 0 to 15 percent slopes
- 102 Ashbutte-Vitrandic Xerorthents complex, 15 to 60 percent slopes
- 103 Scoured very bouldery medial loamy sand, 2 to 30 percent slopes
- 105 Juniperlake gravelly medial sandy loam, 2 to 35 percent slopes
- 106 Cenplat ashy loamy sand, 0 to 15 percent slopes
- 107 Badgerflat-Cenplat complex, 10 to 60 percent slopes
- 120 Buttelake-Sunhoff-Talved complex, 20 to 65 percent slopes
- 122 Xeric Vitricryands complex, 10 to 80 percent slopes
- 130 Histic Humaquepts, lake sediments-Histic Humaquepts, frequently flooded-Typic Endoaquands complex, 0 to 15 percent slopes
- 148 Humic Haploxerands, lake terrace-Typic Endoaquands complex, 1 to 30 percent slopes
- 201 Lava flows
- 205 Beaches
- W Water

Geologic formations are conceptual, for illustrative purposes only, and are not to scale.

Figure 6.—Block Diagram 3.

deposits. A rockfall avalanche formed at the base of the unstable volcanic dome of Chaos Crags. Debris flows from eruptions of Lassen Peak flowed off of the peak and were deposited in flat valley bottoms.

Figure 5 is Block Diagram 2. This diagram shows the east-flowing valleys of Hot Springs Creek and Kings Creek drainages. Multiple glacial episodes and ice levels shaped the valleys and the surrounding terrain and formed glacial-valley walls and floors, scoured lava plateaus, glaciated volcanic domes, moraines, and outwash plains. Ice level fluctuations caused glaciers to override the drainage divide between the valleys as well as exist as confined valley glaciers within the individual valleys. Outwash was deposited in the flat bottom of the U-shaped valley along Hot Springs Creek. Spring activity and stream channel migration have partially replaced the outwash plain. Today, Kings Creek has a larger watershed that originates at a higher elevation than Hot Springs Creek. The valley along Hot Springs Creek has a more pronounced U-shaped form than the valley along the larger Kings Creek drainage at this cross section. This perceived contradiction could be due to faulting and the presence of geothermal springs along Hot Springs Creek and the associated differences in the hardness and integrity of the bedrock. The complex nature of landscape evolution in this dynamic area is driven by the formation and destruction of volcanoes in conjunction with glacial fluctuations, and relict features from previous landscapes could have influenced today's features.

Figure 6 is Block Diagram 3. This diagram shows a north-flowing glacial valley in the Grassy Creek drainage and the surrounding glacially scoured uplands. Unconfined glaciers scoured the lava flows on the uplands and deposited till in the valley below as they merged into partially confined north-flowing glaciers. The glaciers did not completely cover Red Cinder Cone, Ash Butte, and Mount Hoffman. Red Cinder Cone and Ash Butte retained much of their cinder cone shape and composition, and Mount Hoffman formed a nunatak composed of remnants of the Dittmar Volcanic Center. Outwash was deposited in the lower flatter reach of the valley. The lake terraces are likely remnants of the fluctuations of a glacial lake. The lava flows from Cinder Cone obstructed the drainage to form Snag Lake.

100—Buttelake ashy sand, 3 to 35 percent slopes

General location: Glacial valley in the northeast area of the park

Landscape: Mountains

Elevation: 5,850 to 6,960 feet (1,784 to 2,121 meters)

Mean annual precipitation: 23 to 43 inches (584 to 1,092 millimeters)

Mean annual air temperature: 42 to 44 degrees F (6 to 7 degrees C)

Frost-free period: 60 to 85 days

Map Unit Composition

Buttelake component: 85 percent

Minor components: 15 percent

Characteristics of Buttelake

Setting

Landform: Ground moraines on glacial-valley floors, ground moraines on lava plateaus

Landform position (two-dimensional): Footslope

Landform position (three-dimensional): Mountainbase

Slope range and aspect: 3 to 35 percent, southwest to southeast aspects

Parent material: Tephra over till derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 0 to 5 percent subangular gravel, 0 to 3 percent subangular cobbles

Depth to a restrictive feature: 40 to 60 inches to dense material

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Moderately low to very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 2.7 inches)

Land capability class and subclass (nonirrigated): 6e

Hydric soil: No

Hydrologic soil group: A

Vegetation

Ecological site: *Pinus jeffreyi*-*Abies concolor*/*Achnatherum occidentale* ssp. *occidentale*-*Elymus elymoides* (F022BI100CA)

Typical vegetation: Jeffrey pine, white fir, western needlegrass, rubber rabbitbrush

Typical Profile

Oi—0 to 0.4 inch; slightly decomposed plant material

A—0.4 inch to 3 inches; ashy sand

C1—3 to 11 inches; ashy coarse sand

C2—11 to 13 inches; very gravelly ashy coarse sand

2Ab—13 to 19 inches; very gravelly medial loamy coarse sand

2Bwb1—19 to 31 inches; very gravelly medial coarse sandy loam

2Bwb2—31 to 40 inches; extremely cobbly medial sandy loam

2Cdqb1—40 to 53 inches; extremely gravelly loamy coarse sand

2Cdqb2—53 to 63 inches; gravel

Minor Components

Sunhoff

Composition: 5 percent

Landform: Ground moraines on glacial-valley walls

Slope range and aspect: 3 to 35 percent, southwest to southeast aspects

Hydric soil: No

Buttewash

Composition: 3 percent

Landform: Outwash plains

Slope range and aspect: 3 to 35 percent, southwest to southeast aspects

Hydric soil: No

Rock outcrop

Composition: 2 percent

Landform: Shoulders on glacially scoured lava plateaus

Slope range and aspect: 3 to 60 percent, southwest to southeast aspects

Hydric soil: No

Badgerflat

Composition: 2 percent

Landform: Ground moraines

Slope range and aspect: 3 to 35 percent, southwest to southeast aspects

Hydric soil: No

Typic Xerorthents

Composition: 2 percent

Landform: Tephra-covered moraines

Slope range and aspect: 3 to 35 percent, southwest to southeast aspects

Hydric soil: No

Talved

Composition: 1 percent

Landform: Scoured glacial-valley walls

Slope range and aspect: 3 to 35 percent, southwest to southeast aspects

Hydric soil: No

101—Buttewash ashy coarse sand, 0 to 15 percent slopes

General location: Glacial-valley floor in the northeast area of the park

Landscape: Mountains

Elevation: 5,850 to 6,530 feet (1,783 to 1,989 meters)

Mean annual precipitation: 23 to 43 inches (584 to 1,092 millimeters)

Mean annual air temperature: 42 to 44 degrees F (6 to 7 degrees C)

Frost-free period: 60 to 85 days

Map Unit Composition

Buttewash component: 85 percent

Minor components: 15 percent

Characteristics of Buttewash

Setting

Landform: Outwash plains

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Mountainbase

Slope range and aspect: 0 to 15 percent, southwest to northeast aspects

Parent material: Tephra over outwash derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 0 to 50 percent subangular gravel, 0 to 5 percent subangular cobbles, 0 to 2 percent subangular stones

Depth to a restrictive feature: 40 to 60 inches to weakly cemented duripan

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Moderately low to very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Low (about 4.2 inches)

Land capability class and subclass (nonirrigated): 6e

Hydric soil: No

Hydrologic soil group: A

Vegetation

Ecological site: *Pinus jeffreyi*-*Abies concolor*/*Achnatherum occidentale* ssp. *occidentale*-*Elymus elymoides* (F022B1100CA)

Typical vegetation: Jeffrey pine, white fir, squirreltail, mountain monardella

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
A1—1 to 2 inches; ashy coarse sand
A2—2 to 7 inches; ashy coarse sand
C—7 to 12 inches; ashy coarse sand
2Ab—12 to 20 inches; gravelly medial coarse sandy loam
2Bwb1—20 to 27 inches; medial sandy loam
2Bwb2—27 to 45 inches; cobbly medial loam
2Bqmb—45 to 57 inches; cemented extremely gravelly coarse sandy loam
2Bqb—57 to 66 inches; extremely gravelly loamy coarse sand
2B'qmb—66 to 74 inches; cemented extremely gravelly loamy coarse sand

Minor Components

Badgerwash

Composition: 8 percent
Landform: Outwash plains
Slope range and aspect: 0 to 15 percent, southwest to northeast aspects
Hydric soil: No

Buttelake

Composition: 5 percent
Landform: Ground moraines on glacial-valley floors
Slope range and aspect: 3 to 15 percent, southwest to northeast aspects
Hydric soil: No

Humic Haploxerands, moist lake terrace

Composition: 2 percent
Landform: Lake terraces
Slope range and aspect: 0 to 1 percent, southwest to northeast aspects
Hydric soil: No

102—Ashbutte-Vitrandid Xerorthents complex, 15 to 60 percent slopes

General location: Hat Mountain, Fairfield Peak, Crater Butte, Red Cinder Cone, Ash Butte, Sunrise Peak, and unnamed cinder cones in the Cluster Lakes area (fig. 7)
Landscape: Mountains
Elevation: 6,240 to 8,200 feet (1,902 to 2,499 meters)
Mean annual precipitation: 27 to 57 inches (686 to 1,448 millimeters)
Mean annual air temperature: 41 to 43 degrees F (5 to 6 degrees C)
Frost-free period: 50 to 85 days

Map Unit Composition

Ashbutte component: 65 percent
Vitrandid Xerorthents component: 25 percent
Minor components: 10 percent

Characteristics of Ashbutte

Setting

Landform: Cinder cones
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Slope range and aspect: 15 to 60 percent, north aspects
Parent material: Tephra from cinder cones



Figure 7.—Map unit 102 in a burned area on Ash Butte.

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 5 to 80 percent subangular gravel, 0 to 50 percent subangular cobbles, 0 to 20 percent subangular stones

Depth to a restrictive feature: None within 60 inches

Drainage class: Somewhat excessively drained

Capacity to transmit water (K_{sat}): Very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 1.4 inches)

Land capability class and subclass (nonirrigated): 6e

Hydric soil: No

Hydrologic soil group: A

Vegetation

Ecological site: *Abies magnifica*-*Pinus jeffreyi*/*Arctostaphylos nevadensis*-*Achnatherum occidentale* (F022B1109CA)

Typical vegetation: California red fir, pinemat manzanita, bush chinquapin, Jeffrey pine

Typical Profile

Oi—0 to 2 inches; slightly decomposed plant material

A1—2 to 6 inches; very gravelly ashy coarse sand

A2—6 to 11 inches; gravelly ashy coarse sand

C1—11 to 15 inches; gravelly ashy loamy coarse sand

C2—15 to 24 inches; gravelly ashy loamy coarse sand

C3—24 to 36 inches; extremely cobbly medial sandy loam
C4—36 to 60 inches; gravel

Characteristics of Vitrandic Xerorthents

Setting

Landform: Cinder cones

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Mountainflank

Slope range and aspect: 15 to 60 percent, north aspects

Parent material: Ash over colluvium over residuum weathered from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 10 to 20 percent subangular gravel, 5 to 15 percent subangular cobbles, 0 to 5 percent subangular stones

Depth to a restrictive feature: None within 60 inches

Drainage class: Somewhat excessively drained

Capacity to transmit water (K_{sat}): High or very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 0.9 inch)

Land capability class (nonirrigated): 8

Hydric soil: No

Hydrologic soil group: A

Vegetation

Ecological site: *Abies magnifica*-*Pinus monticola*/*Arctostaphylos nevadensis*-*Chrysolepis sempervirens*/*Angelica breweri* (F022BI114CA)

Typical vegetation: Greenleaf manzanita, bush chinquapin, snowbrush ceanothus, California red fir

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

A—1 to 5 inches; very gravelly ashy loamy sand

2Bw1—5 to 10 inches; extremely gravelly ashy loamy sand

2Bw2—10 to 26 inches; extremely cobbly ashy loamy sand

3Bw3—26 to 34 inches; extremely gravelly ashy coarse sand

3C1—34 to 46 inches; gravel

3C2—46 to 61 inches; stones

Minor Components

Prospectpeak

Composition: 6 percent

Landform: Summits on cinder cones

Slope range and aspect: 15 to 60 percent, north aspects

Hydric soil: No

Rock outcrop

Composition: 2 percent

Landform: Lava flows on cinder cones

Slope range and aspect: 15 to 60 percent, north aspects

Hydric soil: No

Rubble land

Composition: 2 percent

Landform: Lava flows on cinder cones

Slope range and aspect: 15 to 60 percent, north aspects

Hydric soil: No

103—Scoured very bouldery medial loamy sand, 2 to 30 percent slopes

General location: Glaciated plateau on the eastern edge of the park

Landscape: Mountains

Elevation: 6,340 to 8,070 feet (1,931 to 2,459 meters)

Mean annual precipitation: 33 to 53 inches (838 to 1,346 millimeters)

Mean annual air temperature: 41 to 42 degrees F (5 to 6 degrees C)

Frost-free period: 60 to 85 days

Map Unit Composition

Scoured component: 75 percent

Minor components: 25 percent

Characteristics of Scoured

Setting

Landform: Glacial headlands

Landform position (two-dimensional): Summit

Landform position (three-dimensional): Mountaintop

Slope range and aspect: 2 to 30 percent, south to northeast aspects

Parent material: Tephra over colluvium and/or residuum weathered from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 3 to 40 percent subangular gravel, 3 to 10 percent subangular cobbles, 3 to 10 percent subangular stones, 0 to 10 percent subrounded boulders

Depth to a restrictive feature: 20 to 40 inches to lithic bedrock

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Very low to very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 0.6 inch)

Land capability class (nonirrigated): 8

Hydric soil: No

Hydrologic soil group: B

Vegetation

Ecological site: *Abies magnifica*/*Arctostaphylos nevadensis*/*Carex rossii*-*Penstemon gracilentus* (F022B1102CA)

Typical vegetation: Pinemat manzanita, California red fir, western white pine, longspur lupine

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

A—1 to 4 inches; very bouldery medial loamy sand

AB—4 to 10 inches; very bouldery medial sandy loam

2Bw—10 to 17 inches; very bouldery medial fine sandy loam

2C—17 to 30 inches; boulders
2R—30 to 39 inches; bedrock

Minor Components

Rock outcrop

Composition: 10 percent

Landform: Shoulders of glacially scoured lava plateaus on glacial headlands

Slope range and aspect: 2 to 30 percent, south to northeast aspects

Hydric soil: No

Juniperlake

Composition: 10 percent

Landform: Ground moraines on glacial headlands

Slope range and aspect: 2 to 30 percent, south to northeast aspects

Hydric soil: No

Sunhoff

Composition: 3 percent

Landform: Ground moraines on glacial headlands

Slope range and aspect: 2 to 30 percent, south to northeast aspects

Hydric soil: No

Typic Endoaquands

Composition: 2 percent

Landform: Lake terraces

Slope range and aspect: 2 to 8 percent, south to northeast aspects

Hydric soil: Yes

104—Scoured-Juniperlake-Rock outcrop complex, 3 to 40 percent slopes

General location: Glaciated uplands in the southeastern and southern areas of the park (fig. 8)

Landscape: Mountains

Elevation: 5,500 to 8,190 feet (1,675 to 2,497 meters)

Mean annual precipitation: 43 to 109 inches (1,092 to 2,769 millimeters)

Mean annual air temperature: 38 to 43 degrees F (4 to 6 degrees C)

Frost-free period: 60 to 85 days

Map Unit Composition

Scoured component: 55 percent

Juniperlake component: 20 percent

Rock outcrop: 15 percent

Minor components: 10 percent

Characteristics of Scoured

Setting

Landform: Glacially scoured ridges

Landform position (two-dimensional): Backslope, summit

Landform position (three-dimensional): Mountainbase, mountaintop

Slope range and aspect: 3 to 40 percent, northwest to west aspects

Parent material: Tephra over colluvium and/or residuum weathered from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 3 to 40 percent subangular



Figure 8.—Map unit 104 near the Juniper Lake Road.

gravel, 3 to 10 percent subangular cobbles, 3 to 10 percent subangular stones, 0 to 10 percent subrounded boulders

Depth to a restrictive feature: 20 to 40 inches to lithic bedrock

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Very low to very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 0.6 inch)

Land capability class (nonirrigated): 8

Hydric soil: No

Hydrologic soil group: B

Vegetation

Ecological site: *Abies magnifica*/*Arctostaphylos nevadensis*/*Carex rossii*-*Penstemon gracilentus* (F022BI102CA)

Typical vegetation: Pinemat manzanita, California red fir, Sierra lodgepole pine, western white pine

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

A—1 to 4 inches; very bouldery medial loamy sand

AB—4 to 10 inches; very bouldery medial sandy loam

2Bw—10 to 17 inches; very bouldery medial fine sandy loam
2C—17 to 30 inches; boulders
2R—30 to 39 inches; bedrock

Characteristics of Juniperlake

Setting

Landform: Ground moraines
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Mountainbase
Slope range and aspect: 3 to 40 percent, northwest to west aspects
Parent material: Tephra and till derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 5 to 30 percent subangular gravel, 2 to 5 percent subangular cobbles, 2 to 10 percent subangular stones, 2 to 15 percent subangular boulders
Depth to a restrictive feature: 35 to 60 inches to dense material
Drainage class: Well drained
Capacity to transmit water (K_{sat}): Moderately low to very high (See table on physical properties)
Annual flooding frequency: None
Annual ponding frequency: None
Minimum depth of seasonal high water table: More than 72 inches
Salinity maximum: Not saline
Sodicity maximum: Not sodic
Available water capacity (entire profile): Low (about 3.3 inches)
Land capability class and subclass (nonirrigated): 6e
Hydric soil: No
Hydrologic soil group: A

Vegetation

Ecological site: *Abies magnifica*/*Penstemon gracilentus*-*Lupinus arbustus* (F022BI112CA)
Typical vegetation: California red fir, longspur lupine, western needlegrass, slender penstemon

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
A1—1 to 4 inches; gravelly medial sandy loam
A2—4 to 10 inches; gravelly medial sandy loam
AB—10 to 21 inches; very cobbly medial coarse sandy loam
Bw1—21 to 30 inches; very cobbly medial sandy loam
Bw2—30 to 47 inches; very gravelly medial sandy loam
Cdq—47 to 56 inches; extremely gravelly coarse sandy loam

Characteristics of Rock Outcrop

Setting

Landform: Glacially scoured ridges
Slope range and aspect: 3 to 40 percent, northwest to west aspects
Definition: Rock outcrop consists of exposures of bare bedrock that have no soil

Component Properties and Qualities

Land capability class (nonirrigated): 8
Hydric soil: No



Figure 9.—Map unit 105 viewed from Mount Hoffman. Cameron Meadows, in the center, is in map unit 130.

Minor Components

Dittmar

Composition: 5 percent

Landform: Glacially scoured ridges

Slope range and aspect: 3 to 40 percent, northwest to west aspects

Hydric soil: No

Rubble land

Composition: 3 percent

Landform: Glacially scoured ridges

Slope range and aspect: 3 to 40 percent, northwest to west aspects

Hydric soil: No

Typic Endoaquands

Composition: 2 percent

Landform: Lake terraces

Slope range and aspect: 2 to 8 percent, northwest to west aspects

Hydric soil: Yes

105—Juniperlake gravelly medial sandy loam, 2 to 35 percent slopes

General location: Glaciated drainages and ridges in the the southeastern and southern areas of the park (fig. 9)

Landscape: Mountains

Elevation: 6,000 to 7,780 feet (1,830 to 2,372 meters)
Mean annual precipitation: 39 to 109 inches (991 to 2,769 millimeters)
Mean annual air temperature: 38 to 43 degrees F (4 to 6 degrees C)
Frost-free period: 60 to 85 days

Map Unit Composition

Juniperlake component: 85 percent
Minor components: 15 percent

Characteristics of Juniperlake

Setting

Landform: Ground moraines
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Mountainbase
Slope range and aspect: 2 to 35 percent, south to east aspects
Parent material: Tephra and till derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 5 to 30 percent subangular gravel, 2 to 5 percent subangular cobbles, 2 to 10 percent subangular stones, 2 to 15 percent subangular boulders
Depth to a restrictive feature: 35 to 60 inches to dense material
Drainage class: Well drained
Capacity to transmit water (K_{sat}): Moderately low to very high (See table on physical properties)
Annual flooding frequency: None
Annual ponding frequency: None
Minimum depth of seasonal high water table: More than 72 inches
Salinity maximum: Not saline
Sodicity maximum: Not sodic
Available water capacity (entire profile): Low (about 3.3 inches)
Land capability class and subclass (nonirrigated): 6e
Hydric soil: No
Hydrologic soil group: A

Vegetation

Ecological site: *Abies magnifica*/*Penstemon gracilentus*-*Lupinus arbustus* (F022BI112CA)
Typical vegetation: California red fir, longspur lupine, western needlegrass, slender penstemon

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
A1—1 to 4 inches; gravelly medial sandy loam
A2—4 to 10 inches; gravelly medial sandy loam
AB—10 to 21 inches; very cobbly medial coarse sandy loam
Bw1—21 to 30 inches; very cobbly medial sandy loam
Bw2—30 to 47 inches; very gravelly medial sandy loam
Cdq—47 to 56 inches; extremely gravelly coarse sandy loam

Minor Components

Scoured

Composition: 5 percent
Landform: Glacially scoured ridges
Slope range and aspect: 2 to 35 percent, south to east aspects
Hydric soil: No

Humic Haploxerands, lake terrace

Composition: 4 percent

Landform: Lake terraces

Slope range and aspect: 2 to 8 percent, south to east aspects

Hydric soil: No

Rock outcrop

Composition: 3 percent

Landform: Glacially scoured ridges

Slope range and aspect: 2 to 35 percent, south to east aspects

Hydric soil: No

Typic Endoaquands

Composition: 2 percent

Landform: Lake terraces

Slope range and aspect: 2 to 8 percent, south to east aspects

Hydric soil: Yes

Histic Humaquepts, lake sediments

Composition: 1 percent

Landform: Meadows in glacial lakes (relict)

Slope range and aspect: 0 to 8 percent, south to east aspects

Hydric soil: Yes

106—Cenplat ashy loamy sand, 0 to 15 percent slopes

General location: The top of the Central Plateau

Landscape: Mountains

Elevation: 6,200 to 7,370 feet (1,891 to 2,247 meters)

Mean annual precipitation: 35 to 59 inches (889 to 1,499 millimeters)

Mean annual air temperature: 41 to 43 degrees F (5 to 6 degrees C)

Frost-free period: 60 to 85 days

Map Unit Composition

Cenplat component: 70 percent

Minor components: 30 percent

Characteristics of Cenplat

Setting

Landform: Glacially scoured lava plateaus

Landform position (two-dimensional): Summit

Landform position (three-dimensional): Mountaintop

Slope range and aspect: 0 to 15 percent, south to east aspects

Parent material: Tephra over residuum weathered from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 5 to 45 percent subangular gravel, 0 to 5 percent subangular cobbles, 3 to 10 percent subangular stones, 3 to 10 percent subangular boulders

Depth to a restrictive feature: 20 to 40 inches to lithic bedrock

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Very low to very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Soil Survey of Lassen Volcanic National Park, California

Salinity maximum: Not saline
Sodicity maximum: Not sodic
Available water capacity (entire profile): Very low (about 1.0 inch)
Land capability class and subclass (nonirrigated): 7e
Hydric soil: No
Hydrologic soil group: B

Vegetation

Ecological site: *Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale* (F022B115CA)
Typical vegetation: Pinemat manzanita, California red fir, western white pine, western needlegrass

Typical Profile

Oi—0 to 0.4 inch; slightly decomposed plant material
A—0.4 inch to 2 inches; ashy loamy sand
C1—2 to 5 inches; ashy sand
C2—5 to 8 inches; extremely cobbly ashy coarse sand
2Bwb1—8 to 17 inches; extremely cobbly medial sandy loam
2Bwb2—17 to 24 inches; extremely cobbly medial sandy loam
2Bwb3—24 to 31 inches; extremely gravelly medial sandy loam
2R—31 inches; bedrock

Minor Components

Rock outcrop

Composition: 8 percent
Landform: Glacially scoured lava plateaus
Slope range and aspect: 0 to 15 percent, south to east aspects
Hydric soil: No

Badgerflat

Composition: 7 percent
Landform: Ground moraines on lava plateaus
Slope range and aspect: 0 to 15 percent, south to east aspects
Hydric soil: No

Sunhoff

Composition: 5 percent
Landform: Ground moraines on lava plateaus
Slope range and aspect: 0 to 15 percent, south to east aspects
Hydric soil: No

Cascadesprings

Composition: 5 percent
Landform: Ground moraines on lava plateaus
Slope range and aspect: 0 to 15 percent, south to east aspects
Hydric soil: No

Buttelake

Composition: 2 percent
Landform: Ground moraines on lava plateaus
Slope range and aspect: 0 to 15 percent, south to east aspects
Hydric soil: No

Buttewash

Composition: 1 percent
Landform: Outwash plains on lava plateaus

Slope range and aspect: 0 to 15 percent, south to east aspects
Hydric soil: No

Badgerwash

Composition: 1 percent
Landform: Outwash plains on lava plateaus
Slope range and aspect: 0 to 15 percent, south to east aspects
Hydric soil: No

Rubble land

Composition: 1 percent
Landform: Lava flows on lava plateaus
Slope range and aspect: 0 to 15 percent, south to east aspects
Hydric soil: No

107—Badgerflat-Cenplat complex, 10 to 60 percent slopes

General location: The sides of the Central Plateau
Landscape: Mountains
Elevation: 6,080 to 7,330 feet (1,853 to 2,235 meters)
Mean annual precipitation: 35 to 65 inches (889 to 1,651 millimeters)
Mean annual air temperature: 41 to 43 degrees F (5 to 6 degrees C)
Frost-free period: 60 to 85 days

Map Unit Composition

Badgerflat component: 40 percent
Cenplat component: 35 percent
Minor components: 25 percent

Characteristics of Badgerflat

Setting

Landform: Ground moraines on side slopes on lava plateaus
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Slope range and aspect: 10 to 60 percent, north aspects
Parent material: Tephra over till derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 15 to 65 percent subangular gravel, 2 to 10 percent subangular cobbles, 3 to 10 percent subangular stones, 0 to 10 percent subangular boulders
Depth to a restrictive feature: 20 to 40 inches to dense material
Drainage class: Well drained
Capacity to transmit water (K_{sat}): Moderately low to very high (See table on physical properties)
Annual flooding frequency: None
Annual ponding frequency: None
Minimum depth of seasonal high water table: More than 72 inches
Salinity maximum: Not saline
Sodicity maximum: Not sodic
Available water capacity (entire profile): Very low (about 1.3 inches)
Land capability class and subclass (nonirrigated): 7e
Hydric soil: No
Hydrologic soil group: B

Vegetation

Ecological site: Abies magnifica-Abies concolor/Chrysolepis sempervirens
(F022BI107CA)

Typical vegetation: Pinemat manzanita, California red fir, greenleaf manzanita, bush chinquapin

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
A1—1 to 4 inches; very gravelly ashy sandy loam
A2—4 to 7 inches; gravelly ashy sandy loam
2Bwb1—7 to 11 inches; extremely stony ashy loamy sand
2Bwb2—11 to 23 inches; extremely stony ashy loamy sand
2BCb—23 to 33 inches; extremely stony ashy loamy sand
2Cd—33 to 43 inches; extremely gravelly ashy loamy coarse sand

Characteristics of Cenplat

Setting

Landform: Side slopes on glacially scoured lava plateaus
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Mountainflank
Slope range and aspect: 10 to 60 percent, north aspects
Parent material: Tephra over residuum weathered from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 5 to 45 percent subangular gravel, 0 to 5 percent subangular cobbles, 3 to 10 percent subangular stones, 3 to 10 percent subangular boulders
Depth to a restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity to transmit water (K_{sat}): Very low to very high (See table on physical properties)
Annual flooding frequency: None
Annual ponding frequency: None
Minimum depth of seasonal high water table: More than 72 inches
Salinity maximum: Not saline
Sodicity maximum: Not sodic
Available water capacity (entire profile): Very low (about 1.5 inches)
Land capability class and subclass (nonirrigated): 7e
Hydric soil: No
Hydrologic soil group: B

Vegetation

Ecological site: Abies magnifica-Abies concolor/Chrysolepis sempervirens
(F022BI107CA)

Typical vegetation: White fir, California red fir, bush chinquapin, greenleaf manzanita

Typical Profile

A1—0 to 2 inches; very gravelly ashy loamy sand
A2—2 to 6 inches; very gravelly ashy loamy sand
AB—6 to 12 inches; very gravelly ashy loamy coarse sand
Bw1—12 to 21 inches; extremely gravelly medial sandy loam
Bw2—21 to 39 inches; extremely stony medial loamy sand
R—39 inches; bedrock

Minor Components

Rock outcrop

Composition: 10 percent

Landform: Shoulder slopes on glacially scoured lava plateaus

Slope range and aspect: 10 to 60 percent, north aspects

Hydric soil: No

Scoured

Composition: 3 percent

Landform: Side slopes on glacially scoured lava plateaus

Slope range and aspect: 10 to 60 percent, north aspects

Hydric soil: No

Buttelake

Composition: 3 percent

Landform: Ground moraines on side slopes on lava plateaus

Slope range and aspect: 10 to 60 percent, north aspects

Hydric soil: No

Juniperlake

Composition: 3 percent

Landform: Ground moraines on side slopes on lava plateaus

Slope range and aspect: 10 to 60 percent, north aspects

Hydric soil: No

Dittmar

Composition: 3 percent

Landform: Side slopes on glacially scoured lava plateaus

Slope range and aspect: 10 to 60 percent, north aspects

Hydric soil: No

Sunhoff

Composition: 2 percent

Landform: Ground moraines on side slopes on lava plateaus

Slope range and aspect: 10 to 60 percent, north aspects

Hydric soil: No

Rubble land

Composition: 1 percent

Landform: Side slopes on glacially scoured lava plateaus

Slope range and aspect: 10 to 60 percent, north aspects

Hydric soil: No

108—Typic Xerorthents very gravelly ashy sand, 1 to 20 percent slopes

General location: Glacial-valley bottom northeast of Cinder Cone

Landscape: Mountains

Elevation: 6,040 to 6,350 feet (1,842 to 1,934 meters)

Mean annual precipitation: 27 to 37 inches (686 to 940 millimeters)

Mean annual air temperature: 42 to 44 degrees F (6 to 7 degrees C)

Frost-free period: 60 to 85 days

Map Unit Composition

Typic Xerorthents component: 80 percent

Minor components: 20 percent

Characteristics of Typic Xerorthents

Setting

Landform: Tephra-covered lake terraces, tephra-covered moraines, tephra-covered outwash plains

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Mountainbase, tread

Slope range and aspect: 1 to 20 percent, north to southeast aspects

Parent material: Tephra over till and/or outwash and/or glaciolacustrine deposits derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 0 to 100 percent subangular gravel

Depth to a restrictive feature: None within 60 inches

Drainage class: Excessively drained

Capacity to transmit water (K_{sat}): High or very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 2.5 inches)

Land capability class and subclass (nonirrigated): 6s

Hydric soil: No

Hydrologic soil group: A

Vegetation

Ecological site: *Pinus jeffreyi*-*Abies concolor*/*Achnatherum occidentale* ssp. *occidentale*-*Elymus elymoides* (F022B1100CA)

Typical vegetation: Jeffrey pine, squirreltail, white fir, rockcress

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

A—1 to 4 inches; very gravelly sand

C1—4 to 33 inches; very gravelly sand

C2—33 to 46 inches; extremely gravelly coarse sand

C3—46 to 50 inches; gravelly coarse sand

C4—50 to 55 inches; very gravelly coarse sand

2Ab—55 to 59 inches; very gravelly ashy sandy loam

Minor Components

Buttewash

Composition: 10 percent

Landform: Outwash plains

Slope range and aspect: 1 to 10 percent, north to southeast aspects

Hydric soil: No

Typic Xerorthents, tephra

Composition: 5 percent

Landform: Tephra-covered moraines, tephra-covered outwash plains, tephra-covered lake terraces

Slope range and aspect: 1 to 20 percent, north to southeast aspects

Hydric soil: No

Humic Haploxerands, moist lake terrace

Composition: 3 percent

Landform: Lake terraces

Slope range and aspect: 1 to 3 percent, north to southeast aspects

Hydric soil: No

Buttelake

Composition: 2 percent

Landform: Ground moraines on glacial-valley floors

Slope range and aspect: 1 to 20 percent, north to southeast aspects

Hydric soil: No

109—Prospectpeak ashy coarse sand, 10 to 30 percent slopes

General location: Prospect Peak

Landscape: Mountains

Elevation: 6,450 to 7,990 feet (1,965 to 2,436 meters)

Mean annual precipitation: 31 to 43 inches (787 to 1,092 millimeters)

Mean annual air temperature: 43 to 44 degrees F (6 degrees C)

Frost-free period: 50 to 90 days

Map Unit Composition

Prospectpeak component: 85 percent

Minor components: 15 percent

Characteristics of Prospectpeak

Setting

Landform: Unglaciaded shield volcanoes

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Mountainflank

Slope range and aspect: 10 to 30 percent, north to southwest aspects

Parent material: Tephra over residuum weathered from andesite

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 3 to 8 percent subangular gravel, 0 to 8 percent subangular cobbles, 3 to 15 percent subangular stones, 2 to 20 percent subangular boulders

Depth to a restrictive feature: 40 to 63 inches to lithic bedrock

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Moderately low to very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 0.7 inch)

Land capability class (nonirrigated): 8

Hydric soil: No

Hydrologic soil group: A

Vegetation

Ecological site: *Abies magnifica*-*Pinus jeffreyi*/*Arctostaphylos nevadensis*-*Achnatherum occidentale* (F022B1109CA)

Typical vegetation: California red fir, Jeffrey pine, pinemat manzanita, bush chinquapin

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 3 inches; ashy coarse sand
C1—3 to 7 inches; gravelly coarse sand
C2—7 to 9 inches; extremely gravelly ashy coarse sand
2Ab—9 to 14 inches; extremely stony ashy coarse sand
2Bwb1—14 to 22 inches; extremely stony ashy coarse sandy loam
2Bwb2—22 to 50 inches; medial stones
2R—50 inches; bedrock

Minor Components

Bearrubble

Composition: 10 percent
Landform: Unglaciaded shield volcanoes
Slope range and aspect: 10 to 30 percent, north to southwest aspects
Hydric soil: No

Rubble land

Composition: 3 percent
Landform: Unglaciaded shield volcanoes
Slope range and aspect: 10 to 30 percent, north to southwest aspects
Hydric soil: No

Rock outcrop

Composition: 2 percent
Landform: Unglaciaded shield volcanoes
Slope range and aspect: 10 to 30 percent, north to southwest aspects
Hydric soil: No

110—Bearrubble-Rubble land complex, 8 to 40 percent slopes

General location: Prospect Peak, Mount Harkness, and Sifford Mountain
Landscape: Mountains
Elevation: 6,040 to 8,050 feet (1,842 to 2,455 meters)
Mean annual precipitation: 33 to 83 inches (838 to 2,108 millimeters)
Mean annual air temperature: 41 to 44 degrees F (5 to 7 degrees C)
Frost-free period: 50 to 90 days

Map Unit Composition

Bearrubble component: 50 percent
Rubble land: 35 percent
Minor components: 15 percent

Characteristics of Bearrubble

Setting

Landform: Shield volcanoes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Slope range and aspect: 8 to 40 percent, southeast to northeast aspects
Parent material: Tephra over residuum weathered from basalt and/or basaltic andesite

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 0 to 5 percent subangular

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gravel, 0 to 10 percent subangular cobbles, 15 to 25 percent subangular stones, 10 to 30 percent subangular boulders
Depth to a restrictive feature: None within 60 inches
Drainage class: Well drained
Capacity to transmit water (K_{sat}): Moderately high to very high (See table on physical properties)
Annual flooding frequency: None
Annual ponding frequency: None
Minimum depth of seasonal high water table: More than 72 inches
Salinity maximum: Not saline
Sodicity maximum: Not sodic
Available water capacity (entire profile): Low (about 3.4 inches)
Land capability class and subclass (nonirrigated): 4e
Hydric soil: No
Hydrologic soil group: A

Vegetation

Ecological site: *Abies magnifica*-*Pinus monticola*/*Arctostaphylos nevadensis*-*Chrysolepis sempervirens*/*Angelica breweri* (F022BI114CA)
Typical vegetation: Pinemat manzanita, California red fir, bush chinquapin, western white pine

Typical Profile

O_i—0 to 3 inches; slightly decomposed plant material
A—3 to 6 inches; ashy fine sand
C—6 to 13 inches; extremely cobbly loamy coarse sand
2Bwb1—13 to 19 inches; extremely cobbly ashy sandy loam
2Bwb2—19 to 35 inches; extremely stony medial sandy loam
2Bwb3—35 to 49 inches; very stony medial fine sandy loam
2Bwb4—49 to 60 inches; very stony medial fine sandy loam

Characteristics of Rubble Land

Setting

Landform: Shield volcanoes
Slope range and aspect: 8 to 40 percent, southeast to northeast aspects
Definition: Rubble land consists of areas of cobbles, stones, and boulders and has little or no soil

Component Properties and Qualities

Land capability class (nonirrigated): 8
Hydric soil: No

Minor Components

Rock outcrop

Composition: 10 percent
Landform: Shield volcanoes
Slope range and aspect: 8 to 40 percent, southeast to northeast aspects
Hydric soil: No

Scoured

Composition: 3 percent
Landform: Glacially scoured shield volcanoes
Slope range and aspect: 5 to 40 percent, southeast to northeast aspects
Hydric soil: No

Prospectpeak

Composition: 2 percent

Landform: Shield volcanoes

Slope range and aspect: 5 to 40 percent, southeast to northeast aspects

Hydric soil: No

111—Vitrandic Xerorthents, debris fan, 2 to 30 percent slopes

General location: The base of Lassen Peak, in Lost Creek and Manzanita Creek drainages

Landscape: Mountains

Elevation: 5,880 to 7,210 feet (1,792 to 2,197 meters)

Mean annual precipitation: 45 to 95 inches (1,143 to 2,413 millimeters)

Mean annual air temperature: 40 to 41 degrees F (4 to 5 degrees C)

Frost-free period: 60 to 85 days

Map Unit Composition

Vitrandic Xerorthents, debris fan component: 95 percent

Minor components: 5 percent

Characteristics of Vitrandic Xerorthents, Debris Fan

Setting

Landform: Debris flows

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Mountainbase

Slope range and aspect: 2 to 30 percent, south to northeast aspects

Parent material: Debris flow deposits derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 5 to 75 percent subangular gravel, 3 to 25 percent subangular cobbles, 0 to 15 percent subangular stones, 0 to 10 percent subangular boulders

Depth to a restrictive feature: 20 to 80 inches to dense material

Drainage class: Well drained

Capacity to transmit water (K_{sat}): High or very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 1.2 inches)

Land capability class and subclass (nonirrigated): 7e

Hydric soil: No

Hydrologic soil group: A

Vegetation

Ecological site: *Pinus jeffreyi*-*Abies/Achnatherum-Lupinus* (F022B1106CA)

Typical vegetation: California red fir, Jeffrey pine, Sierra lodgepole pine, western needlegrass

Typical Profile

C1—0 to 4 inches; very gravelly ashy loamy coarse sand

C2—4 to 14 inches; extremely gravelly ashy loamy coarse sand

C3—14 to 31 inches; extremely gravelly ashy loamy coarse sand

Cd1—31 to 42 inches; extremely gravelly ashy loamy coarse sand

Cd2—42 to 60 inches; extremely cobbly ashy loamy coarse sand

Minor Components

Typic Endoaquents

Composition: 5 percent

Landform: Flood plains

Slope range and aspect: 2 to 30 percent, south to northeast aspects

Hydric soil: Yes

112—Cascadesprings gravelly ashy loamy coarse sand, 5 to 30 percent slopes

General location: The eastern and northeastern bases of Reading Peak

Landscape: Mountains

Elevation: 6,500 to 7,600 feet (1,982 to 2,318 meters)

Mean annual precipitation: 59 to 83 inches (1,499 to 2,108 millimeters)

Mean annual air temperature: 41 to 43 degrees F (5 to 6 degrees C)

Frost-free period: 60 to 85 days

Map Unit Composition

Cascadesprings component: 85 percent

Minor components: 15 percent

Characteristics of Cascadesprings

Setting

Landform: Ground moraines

Landform position (two-dimensional): Footslope

Landform position (three-dimensional): Mountainbase

Slope range and aspect: 5 to 30 percent, northwest to east aspects

Parent material: Tephra over till derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 3 to 35 percent subangular gravel, 5 to 10 percent subangular cobbles, 2 to 8 percent subangular stones, 0 to 3 percent subangular boulders

Depth to a restrictive feature: 20 to 40 inches to dense material

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Moderately low to very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 1.7 inches)

Land capability class and subclass (nonirrigated): 7e

Hydric soil: No

Hydrologic soil group: B

Vegetation

Ecological site: *Abies magnifica*-*Pinus monticola*/*Arctostaphylos nevadensis*/*Achnatherum occidentale* (F022B115CA)

Typical vegetation: Pinemat manzanita, California red fir, western white pine, Sierra lodgepole pine

Typical Profile

Oi—0 to 0.4 inch; slightly decomposed plant material
A1—0.4 inch to 2 inches; gravelly ashy loamy coarse sand
A2—2 to 9 inches; gravelly ashy loamy coarse sand
2Bwb1—9 to 17 inches; very gravelly medial coarse sandy loam
2Bwb2—17 to 27 inches; very stony medial loamy coarse sand
2Cd—27 to 33 inches; very cobbly ashy sandy loam

Minor Components

Terracelake

Composition: 13 percent
Landform: Glaciated volcanic domes
Slope range and aspect: 5 to 30 percent, northwest to east aspects
Hydric soil: No

Emeraldlake

Composition: 2 percent
Landform: Glaciated volcanic domes
Slope range and aspect: 5 to 30 percent, northwest to east aspects
Hydric soil: No

113—Terracelake-Emeraldlake-Readingpeak-Rock outcrop complex, 15 to 65 percent slopes

General location: Reading Peak
Landscape: Mountains
Elevation: 7,130 to 8,320 feet (2,173 to 2,537 meters)
Mean annual precipitation: 69 to 105 inches (1,753 to 2,667 millimeters)
Mean annual air temperature: 38 to 41 degrees F (4 to 5 degrees C)
Frost-free period: 50 to 85 days

Map Unit Composition

Terracelake component: 35 percent
Emeraldlake component: 25 percent
Readingpeak component: 20 percent
Rock outcrop: 10 percent
Minor components: 10 percent

Characteristics of Terracelake

Setting

Landform: Glaciated volcanic domes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Slope range and aspect: 15 to 65 percent, north to south aspects
Parent material: Tephra over colluvium and residuum weathered from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 0 to 75 percent subangular gravel, 3 to 30 percent subangular cobbles, 0 to 25 percent subangular stones, 0 to 20 percent subangular boulders
Depth to a restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained

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Capacity to transmit water (K_{sat}): Very low to very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 2.6 inches)

Land capability class and subclass (nonirrigated): 6e

Hydric soil: No

Hydrologic soil group: B

Vegetation

Ecological site: Glaciated mountain slopes (R022BI204CA)

Typical vegetation: Pinemat manzanita, California red fir, western white pine, bush chinquapin

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

A—1 to 3 inches; gravelly ashy sandy loam

2Ab—3 to 7 inches; gravelly ashy sandy loam

2Bwb1—7 to 19 inches; very gravelly ashy fine sandy loam

2Bwb2—19 to 24 inches; extremely gravelly ashy fine sandy loam

2Bqb—24 to 37 inches; extremely stony ashy sandy loam

2R—37 inches; bedrock

Characteristics of Emeraldlake

Setting

Landform: Cirque walls on volcanic domes

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Mountainflank

Slope range and aspect: 15 to 65 percent, north to south aspects

Parent material: Tephra mixed with colluvium derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 10 to 45 percent subangular gravel, 5 to 45 percent subangular cobbles, 5 to 20 percent subangular stones, 3 to 15 percent subangular boulders

Depth to a restrictive feature: None within 60 inches

Drainage class: Somewhat excessively drained

Capacity to transmit water (K_{sat}): High or very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 1.6 inches)

Land capability class and subclass (nonirrigated): 7e

Hydric soil: No

Hydrologic soil group: A

Vegetation

Ecological site: *Abies magnifica*-*Pinus monticola*/*Arctostaphylos nevadensis*/*Achnatherum occidentale* (F022BI115CA)

Typical vegetation: Pinemat manzanita, California red fir, bush chinquapin, western white pine

Typical Profile

A1—0 to 1 inch; extremely gravelly ashy fine sandy loam
A2—1 to 5 inches; extremely gravelly ashy loamy sand
A3—5 to 14 inches; extremely gravelly ashy loamy sand
Bw1—14 to 25 inches; extremely gravelly ashy loamy coarse sand
Bw2—25 to 35 inches; extremely gravelly ashy loamy coarse sand
Bw3—35 to 51 inches; ashy boulders
Bw4—51 to 60 inches; ashy boulders

Characteristics of Readingpeak

Setting

Landform: Glaciated volcanic domes

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Mountainflank

Slope range and aspect: 15 to 65 percent, north to south aspects

Parent material: Tephra over colluvium and residuum weathered from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 20 to 30 percent angular gravel, 25 to 35 percent angular cobbles, 15 to 30 percent angular stones, 0 to 15 percent angular boulders

Depth to a restrictive feature: 40 to 60 inches to lithic bedrock

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Very low to very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 0.9 inch)

Land capability class and subclass (nonirrigated): 7s

Hydric soil: No

Hydrologic soil group: A

Vegetation

Ecological site: *Abies magnifica*-*Pinus monticola*/*Arctostaphylos nevadensis*/*Achnatherum occidentale* (F022B115CA)

Typical vegetation: Pinemat manzanita, California red fir, bush chinquapin, western white pine

Typical Profile

A1—0 to 2 inches; very gravelly ashy sandy loam
A2—2 to 7 inches; very gravelly ashy sandy loam
2Bq1—7 to 14 inches; extremely gravelly ashy loamy sand
2Bq2—14 to 26 inches; extremely cobbly ashy loamy coarse sand
2Bq3—26 to 35 inches; extremely cobbly ashy loamy sand
2Bq4—35 to 50 inches; extremely stony ashy loamy sand
2R—50 inches; bedrock

Characteristics of Rock Outcrop

Setting

Landform: Glaciated volcanic domes

Slope range and aspect: 15 to 65 percent, north to south aspects

Definition: Rock outcrop consists of exposures of bare bedrock that have no soil

Component Properties and Qualities

Land capability class (nonirrigated): 8

Hydric soil: No

Minor Components

Rubble land

Composition: 5 percent

Landform: Glaciated volcanic domes

Slope range and aspect: 15 to 65 percent, north to south aspects

Hydric soil: No

Acroph

Composition: 3 percent

Landform: Glaciated volcanic domes

Slope range and aspect: 15 to 65 percent, north to south aspects

Hydric soil: No

Cascadesprings

Composition: 2 percent

Landform: Ground moraines

Slope range and aspect: 15 to 65 percent, north to south aspects

Hydric soil: No

114—Emeraldlake-Terracelake-Readingpeak-Rock outcrop-Rubble land complex, 20 to 95 percent slopes

General location: High elevation ridges in the southwest area of the park

Landscape: Mountains

Elevation: 6,730 to 9,230 feet (2,050 to 2,813 meters)

Mean annual precipitation: 73 to 119 inches (1,854 to 3,023 millimeters)

Mean annual air temperature: 38 to 41 degrees F (4 to 5 degrees C)

Frost-free period: 50 to 85 days

Map Unit Composition

Emeraldlake component: 25 percent

Terracelake component: 23 percent

Readingpeak component: 20 percent

Rock outcrop: 15 percent

Rubble land: 12 percent

Minor components: 5 percent

Characteristics of Emeraldlake

Setting

Landform: Cirque walls on mountain slopes, cirque walls on volcanic domes

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Mountainflank

Slope range and aspect: 20 to 95 percent, west to south aspects

Parent material: Tephra mixed with colluvium derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 10 to 45 percent subangular gravel, 5 to 45 percent subangular cobbles, 5 to 20 percent subangular stones, 3 to 15 percent subangular boulders

Depth to a restrictive feature: None within 60 inches

Drainage class: Somewhat excessively drained

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Capacity to transmit water (K_{sat}): High or very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 1.6 inches)

Land capability class and subclass (nonirrigated): 7e

Hydric soil: No

Hydrologic soil group: A

Vegetation

Ecological site: Alpine slopes (R022BI207CA)

Typical vegetation: Bluntlobe lupine, mountain hemlock, Parry's rush, sedge

Typical Profile

A1—0 to 1 inch; extremely gravelly ashy fine sandy loam

A2—1 to 5 inches; extremely gravelly ashy loamy sand

A3—5 to 14 inches; extremely gravelly ashy loamy sand

Bw1—14 to 25 inches; extremely gravelly ashy loamy coarse sand

Bw2—25 to 35 inches; extremely gravelly ashy loamy coarse sand

Bw3—35 to 51 inches; ashy boulders

Bw4—51 to 60 inches; ashy boulders

Characteristics of Terracelake

Setting

Landform: Glaciated volcanic domes, glaciated mountain slopes

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Mountainflank

Slope range and aspect: 20 to 95 percent, west to south aspects

Parent material: Tephra over colluvium and residuum weathered from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 0 to 75 percent subangular gravel, 3 to 30 percent subangular cobbles, 0 to 25 percent subangular stones, 0 to 20 percent subangular boulders

Depth to a restrictive feature: 20 to 40 inches to lithic bedrock

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Very low to very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 2.6 inches)

Land capability class and subclass (nonirrigated): 7e

Hydric soil: No

Hydrologic soil group: B

Vegetation

Ecological site: Alpine slopes (R022BI207CA)

Typical vegetation: Mountain hemlock, mountain pride, spike trisetum, pioneer rockcross

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

A—1 to 3 inches; gravelly ashy sandy loam
2Ab—3 to 7 inches; gravelly ashy sandy loam
2Bwb1—7 to 19 inches; very gravelly ashy fine sandy loam
2Bwb2—19 to 24 inches; extremely gravelly ashy fine sandy loam
2Bqb—24 to 37 inches; extremely stony ashy sandy loam
2R—37 inches; bedrock

Characteristics of Readingpeak

Setting

Landform: Glaciated volcanic domes, glaciated mountain slopes

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Mountainflank

Slope range and aspect: 20 to 95 percent, west to south aspects

Parent material: Tephra over colluvium and residuum weathered from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 20 to 30 percent angular gravel, 25 to 35 percent angular cobbles, 15 to 30 percent angular stones, 0 to 15 percent angular boulders

Depth to a restrictive feature: 40 to 60 inches to lithic bedrock

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Very low to very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 0.9 inch)

Land capability class and subclass (nonirrigated): 7s

Hydric soil: No

Hydrologic soil group: A

Vegetation

Ecological site: *Tsuga mertensiana-Pinus albicaulis/Holodiscus discolor/Lupinus obtusilobus-Polygonum davisiae* (F022B1124CA)

Typical vegetation: Bluntlobe lupine, mountain hemlock, Davis' knotweed, oceanspray

Typical Profile

A1—0 to 2 inches; very gravelly ashy sandy loam

A2—2 to 7 inches; very gravelly ashy sandy loam

2Bq1—7 to 14 inches; extremely gravelly ashy loamy sand

2Bq2—14 to 26 inches; extremely cobbly ashy loamy coarse sand

2Bq3—26 to 35 inches; extremely cobbly ashy loamy sand

2Bq4—35 to 50 inches; extremely stony ashy loamy sand

2R—50 inches; bedrock

Characteristics of Rock Outcrop

Setting

Landform: Glaciated mountain slopes, glaciated volcanic domes

Slope range and aspect: 20 to 200 percent, west to south aspects

Definition: Rock outcrop consists of exposures of bare bedrock that have no soil

Component Properties and Qualities

Land capability class (nonirrigated): 8

Hydric soil: No

Characteristics of Rubble Land

Setting

Landform: Glaciated mountain slopes, glaciated volcanic domes

Slope range and aspect: 20 to 95 percent, west to south aspects

Definition: Rubble land consists of areas of cobbles, stones, and boulders and has little or no soil

Component Properties and Qualities

Land capability class (nonirrigated): 8

Hydric soil: No

Minor Components

Acroph

Composition: 3 percent

Landform: Glaciated mountain slopes, glaciated volcanic domes

Slope range and aspect: 20 to 95 percent, west to south aspects

Hydric soil: No

Xeric Vitricryands, cirque floor

Composition: 2 percent

Landform: Ground moraines on cirque floors

Slope range and aspect: 20 to 30 percent, west to south aspects

Hydric soil: No

115—Shadowlake gravelly ashy sandy loam, 2 to 30 percent slopes

General location: Glacial-valley floors in the upper reaches of East Fork Hat Creek and Rice Creek drainages

Landscape: Mountains

Elevation: 6,950 to 7,620 feet (2,117 to 2,322 meters)

Mean annual precipitation: 67 to 111 inches (1,702 to 2,819 millimeters)

Mean annual air temperature: 38 to 41 degrees F (4 to 5 degrees C)

Frost-free period: 50 to 85 days

Map Unit Composition

Shadowlake component: 85 percent

Minor components: 15 percent

Characteristics of Shadowlake

Setting

Landform: Ground moraines

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Mountainbase

Slope range and aspect: 2 to 30 percent, northwest to southeast aspects

Parent material: Tephra over or mixed with till derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 7 to 40 percent subangular gravel, 3 to 5 percent subangular cobbles, 1 to 10 percent subangular stones, 0 to 10 percent subangular boulders

Depth to a restrictive feature: 35 to 60 inches to dense material

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Moderately low to very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Low (about 4.1 inches)

Land capability class and subclass (nonirrigated): 4e

Hydric soil: No

Hydrologic soil group: A

Vegetation

Ecological site: *Tsuga mertensiana-Abies magnifica/Lupinus obtusilobus-Eriogonum marifolium* (F022B111CA)

Typical vegetation: California red fir, bluntlobe lupine, western needlegrass, marumleaf buckwheat

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

A—1 to 2 inches; gravelly ashy sandy loam

Bw1—2 to 6 inches; gravelly ashy sandy loam

Bw2—6 to 13 inches; gravelly ashy sandy loam

Bw3—13 to 23 inches; very gravelly ashy sandy loam

Bq—23 to 41 inches; extremely gravelly ashy coarse sandy loam

Cdq—41 to 51 inches; loam

Minor Components

Terracelake

Composition: 10 percent

Landform: Glacially scoured ridges

Slope range and aspect: 2 to 30 percent, northwest to southeast aspects

Hydric soil: No

Xeric Vitricryands, cirque floor

Composition: 5 percent

Landform: Ground moraines on cirque floors

Slope range and aspect: 2 to 30 percent, northwest to southeast aspects

Hydric soil: No

116—Xeric Vitricryands, tephra over till-Terracelake-Rock outcrop-Xeric Vitricryands, cirque floor, complex, 5 to 35 percent slopes

General location: High elevation lava flows in the southwest area of the park

Landscape: Mountains

Elevation: 7,040 to 8,920 feet (2,145 to 2,720 meters)

Mean annual precipitation: 81 to 113 inches (2,057 to 2,870 millimeters)

Mean annual air temperature: 38 to 41 degrees F (4 to 5 degrees C)

Frost-free period: 50 to 85 days

Map Unit Composition

Xeric Vitricryands, tephra over till component: 30 percent

Terracelake component: 25 percent

Rock outcrop: 15 percent

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Xeric Vitricryands, cirque floor component: 15 percent
Minor components: 15 percent

Characteristics of Xeric Vitricryands, Tephra Over Till

Setting

Landform: Moraines on lava flows

Landform position (two-dimensional): Footslope

Landform position (three-dimensional): Mountainbase

Slope range and aspect: 5 to 35 percent, northwest to southwest aspects

Parent material: Tephra over till derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 0 to 50 percent subangular gravel, 5 to 25 percent subangular cobbles, 5 to 15 percent subangular stones, 5 to 10 percent subangular boulders

Depth to a restrictive feature: 20 to 80 inches to dense material

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Moderately high to very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 2.1 inches)

Land capability class and subclass (nonirrigated): 6e

Hydric soil: No

Hydrologic soil group: A

Vegetation

Ecological site: *Tsuga mertensiana/Lupinus obtusilobus-Cistanthe umbellata* var. *umbellata* (F022BI104CA)

Typical vegetation: Mountain hemlock, bluntlobe lupine, sedge, western needlegrass

Typical Profile

Oi—0 to 0.4 inch; slightly decomposed plant material

Oe—0.4 inch to 2 inches; moderately decomposed plant material

A1—2 to 3 inches; stony medial loamy sand

A2—3 to 4 inches; stony ashy loamy sand

C1—4 to 5 inches; stony ashy coarse sand

C2—5 to 8 inches; very stony ashy coarse sand

2Ab—8 to 10 inches; stony ashy loamy sand

2Bwb1—10 to 16 inches; very stony ashy loamy coarse sand

2Bwb2—16 to 19 inches; very gravelly ashy coarse sand

2Bwb3—19 to 39 inches; very gravelly ashy loamy coarse sand

2C—39 to 60 inches; extremely stony ashy coarse sand

Characteristics of Terracelake

Setting

Landform: Glaciated lava flows

Landform position (two-dimensional): Summit

Landform position (three-dimensional): Mountainbase

Slope range and aspect: 5 to 35 percent, northwest to southwest aspects

Parent material: Tephra over colluvium and residuum weathered from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 0 to 75 percent subangular gravel, 3 to 30 percent subangular cobbles, 0 to 25 percent subangular stones, 0 to 20 percent subangular boulders

Depth to a restrictive feature: 20 to 40 inches to lithic bedrock

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Very low to very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 2.6 inches)

Land capability class and subclass (nonirrigated): 4e

Hydric soil: No

Hydrologic soil group: B

Vegetation

Ecological site: *Tsuga mertensiana/Lupinus obtusilobus-Cistanthe umbellata* var. *umbellata* (F022BI104CA)

Typical vegetation: Mountain hemlock, bluntlobe lupine, sedge, spike trisetum

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

A—1 to 3 inches; gravelly ashy sandy loam

2Ab—3 to 7 inches; gravelly ashy sandy loam

2Bwb1—7 to 19 inches; very gravelly ashy fine sandy loam

2Bwb2—19 to 24 inches; extremely gravelly ashy fine sandy loam

2Bqb—24 to 37 inches; extremely stony ashy sandy loam

2R—37 inches; bedrock

Characteristics of Rock Outcrop

Setting

Landform: Glaciated lava flows

Slope range and aspect: 5 to 35 percent, northwest to southwest aspects

Definition: Rock outcrop consists of exposures of bare bedrock that have no soil

Component Properties and Qualities

Land capability class (nonirrigated): 8

Hydric soil: No

Characteristics of Xeric Vitricryands, Cirque Floor

Setting

Landform: Ground moraines on cirque floors on lava flows

Landform position (two-dimensional): Footslope, toeslope

Landform position (three-dimensional): Mountainbase

Slope range and aspect: 5 to 35 percent, northwest to southwest aspects

Parent material: Subglacial till derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 20 to 80 percent subangular gravel, 5 to 15 percent subangular cobbles, 3 to 10 percent subangular stones, 3 to 10 percent subangular boulders

Depth to a restrictive feature: 20 to 40 inches to dense material

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Moderately low to high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Low (about 3.5 inches)

Land capability class and subclass (nonirrigated): 6e

Hydric soil: No

Hydrologic soil group: B

Vegetation

Ecological site: Cirque floor (R022BI205CA)

Typical vegetation: Bluntlobe lupine, mountain hemlock, Brewer's sedge, Shasta sedge

Typical Profile

A—0 to 2 inches; gravelly ashy sandy loam

Bw1—2 to 5 inches; very gravelly ashy sandy loam

Bw2—5 to 13 inches; gravelly ashy sandy loam

C1—13 to 26 inches; gravelly ashy sandy loam

C2—26 to 36 inches; gravelly ashy sandy loam

Cd—36 to 46 inches; gravelly sandy loam

Minor Components

Humic Xeric Vitricryands

Composition: 10 percent

Landform: Ground moraines on lava flows

Slope range and aspect: 5 to 35 percent, northwest to southwest aspects

Hydric soil: No

Acroph

Composition: 5 percent

Landform: Glaciated lava flows

Slope range and aspect: 5 to 35 percent, northwest to southwest aspects

Hydric soil: No

117—Humic Haploxerands, moist lake terrace, 0 to 15 percent slopes

General location: Lake terraces in the northeast area of the park

Landscape: Mountains

Elevation: 5,850 to 6,360 feet (1,784 to 1,938 meters)

Mean annual precipitation: 23 to 43 inches (584 to 1,092 millimeters)

Mean annual air temperature: 43 to 44 degrees F (6 to 7 degrees C)

Frost-free period: 60 to 85 days

Map Unit Composition

Humic Haploxerands, moist lake terrace component: 90 percent

Minor components: 10 percent

Characteristics of Humic Haploxerands, Moist Lake Terrace

Setting

Landform: Lake terraces

Soil Survey of Lassen Volcanic National Park, California

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Tread

Slope range and aspect: 0 to 15 percent, south to east aspects

Parent material: Tephra over glaciolacustrine deposits derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 5 to 15 percent subangular gravel

Depth to a restrictive feature: 20 to 60 inches to strongly cemented duripan

Drainage class: Moderately well drained

Capacity to transmit water (K_{sat}): Moderately low to very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: About 19 to 60 inches (See table on water features)

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 1.9 inches)

Land capability class and subclass (nonirrigated): 7e

Hydric soil: No

Hydrologic soil group: C

Vegetation

Ecological site: *Pinus contorta* var. *murrayana*/*Elymus elymoides* (F022B1125CA)

Typical vegetation: Sierra lodgepole pine, Jeffrey pine, wax currant, woolly mule-ears

Typical Profile

Oi—0 to 0.4 inch; slightly decomposed plant material

A1—0.4 inch to 2 inches; ashy coarse sand

A2—2 to 5 inches; ashy coarse sand

C—5 to 7 inches; gravelly ashy coarse sand

2Ab—7 to 19 inches; very stony medial sandy loam

2Bwb—19 to 30 inches; very stony medial fine sandy loam

2Bqmb—30 to 35 inches; cemented extremely gravelly medial sandy loam

Minor Components

Typic Endoaquands

Composition: 5 percent

Landform: Lake terraces

Slope range and aspect: 0 to 15 percent, south to east aspects

Hydric soil: Yes

Buttewash

Composition: 3 percent

Landform: Outwash plains

Slope range and aspect: 0 to 15 percent, south to east aspects

Hydric soil: No

Badgerwash

Composition: 2 percent

Landform: Outwash plains

Slope range and aspect: 0 to 15 percent, south to east aspects

Hydric soil: No



Figure 10.—Map units 118 and 119 viewed from Mount Conard. Map unit 118 is in the two large thickly forested areas on the left and in the lower center. Map unit 119 is in the surrounding area with the more variable vegetation pattern. Map unit 114 is on the alpine ridge on the horizon, where Brokeoff Mountain, Mount Diller, and Pilot Pinnacle are visible.

118—Typic Dystroxerepts, landslides, 10 to 50 percent slopes

General location: Landslides in the core of Brokeoff Volcano

Landscape: Mountains (fig. 10)

Elevation: 5,830 to 8,100 feet (1,776 to 2,470 meters)

Mean annual precipitation: 99 to 113 inches (2,515 to 2,870 millimeters)

Mean annual air temperature: 39 degrees F (4 degrees C)

Frost-free period: 60 to 85 days

Map Unit Composition

Typic Dystroxerepts, landslides component: 90 percent

Minor components: 10 percent

Characteristics of Typic Dystroxerepts, Landslides

Setting

Landform: Landslides

Landform position (two-dimensional): Footslope, toeslope

Landform position (three-dimensional): Mountainbase

Slope range and aspect: 10 to 50 percent, northeast to south aspects

Parent material: Colluvium derived from hydrothermally altered volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 8 to 20 percent subangular gravel, 5 to 15 percent subangular cobbles, 2 to 20 percent subangular stones, 5 to 20 percent subangular boulders

Depth to a restrictive feature: None within 60 inches

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Moderately high or high (See table on physical properties)

Annual flooding frequency: None
Annual ponding frequency: None
Minimum depth of seasonal high water table: More than 72 inches
Salinity maximum: Not saline
Sodicity maximum: Not sodic
Available water capacity (entire profile): Low (about 5.0 inches)
Land capability class and subclass (nonirrigated): 7e
Hydric soil: No
Hydrologic soil group: A

Vegetation

Ecological site: *Abies magnifica/Carex-Hieracium albiflorum* (F022BI118CA)
Typical vegetation: California red fir, mountain hemlock, sedge

Typical Profile

Oi—0 to 2 inches; slightly decomposed plant material
A—2 to 5 inches; ashy fine sandy loam
Bw1—5 to 15 inches; very stony sandy clay loam
Bw2—15 to 23 inches; very stony sandy clay loam
Bw3—23 to 41 inches; very stony sandy clay loam
BC—41 to 60 inches; very stony sandy clay loam

Minor Components

Endoaquepts

Composition: 5 percent
Landform: Seeps on landslides
Slope range and aspect: 10 to 50 percent, northeast to south aspects
Hydric soil: Yes

Brokeoff

Composition: 5 percent
Landform: Mountain slopes
Slope range and aspect: 10 to 50 percent, northeast to south aspects
Hydric soil: No

119—Diamondpeak-Brokeoff-Endoaquepts-Aquic Dystroxerepts, debris flows-Typic Dystroxerepts complex, 10 to 80 percent slopes

General location: The core of Brokeoff Volcano and areas in the Mill Creek drainage
(fig. 11)

Landscape: Mountains

Elevation: 5,680 to 8,570 feet (1,730 to 2,611 meters)

Mean annual precipitation: 63 to 119 inches (1,600 to 3,023 millimeters)

Mean annual air temperature: 38 to 42 degrees F (4 to 5 degrees C)

Frost-free period: 60 to 85 days

Map Unit Composition

Diamondpeak component: 30 percent
Brokeoff component: 25 percent
Endoaquepts component: 14 percent
Aquic Dystroxerepts, debris flows component: 11 percent
Typic Dystroxerepts component: 10 percent
Minor components: 10 percent



Figure 11.—Aquic Dystrocherepts, debris flows (in center) and Typic Dystrocherepts (on eroding slopes on both sides of debris flow) in map unit 119.

Characteristics of Diamondpeak

Setting

Landform: Mountain slopes

Landform position (two-dimensional): Summit, shoulder, footslope, backslope

Landform position (three-dimensional): Mountainflank

Slope range and aspect: 10 to 80 percent, northeast to southwest aspects

Soil Survey of Lassen Volcanic National Park, California

Parent material: Tephra over colluvium and/or residuum weathered from hydrothermally altered volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 10 to 20 percent subangular gravel, 0 to 5 percent subangular cobbles, 0 to 2 percent subangular stones

Depth to a restrictive feature: None within 60 inches

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Moderately low to high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): High (about 10.4 inches)

Land capability class and subclass (nonirrigated): 6e

Hydric soil: No

Hydrologic soil group: B

Vegetation

Ecological site: *Abies magnifica/Monardella odoratissima-Phlox diffusa* (F022BI113CA)

Typical vegetation: California red fir, mountain monardella, bluntlobe lupine, spreading phlox

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

A—1 to 3 inches; ashy loam

2Bwb1—3 to 10 inches; very paragravelly clay loam

2Bwb2—10 to 31 inches; very paragravelly sandy clay loam

2Bwb3—31 to 49 inches; extremely paragravelly loam

2Cr/Bwb4—49 to 60 inches; extremely paragravelly loam

Characteristics of Brokeoff

Setting

Landform: Mountain slopes

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Mountainflank

Slope range and aspect: 10 to 80 percent, northeast to southwest aspects

Parent material: Tephra and colluvium over residuum weathered from hydrothermally altered volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 35 to 45 percent angular gravel, 5 to 15 percent angular cobbles, 1 to 5 percent angular stones

Depth to a restrictive feature: 20 to 40 inches to lithic bedrock

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Very low to high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 1.5 inches)

Land capability class and subclass (nonirrigated): 7e

Hydric soil: No

Hydrologic soil group: B

Vegetation

Ecological site: Moderately deep fragmental slopes (R022BI203CA)

Typical vegetation: Woolly mule-ears, California red fir, squirreltail, bluntlobe lupine

Typical Profile

A1—0 to 2 inches; gravelly ashy loam

A2—2 to 4 inches; gravelly ashy loam

Bw1—4 to 7 inches; very gravelly clay loam

Bw2—7 to 15 inches; extremely gravelly loam

Cr—15 to 37 inches; cobbles

R—37 inches; bedrock

Characteristics of Endoaquepts

Setting

Landform: Seeps on mountain slopes

Landform position (two-dimensional): Toeslope, backslope, footslope

Landform position (three-dimensional): Mountainflank

Slope range and aspect: 10 to 80 percent, northeast to southwest aspects

Parent material: Slope alluvium over colluvium over till derived from hydrothermally altered volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 0 to 10 percent subangular gravel, 0 to 3 percent subangular cobbles, 0 to 3 percent subangular stones, 0 to 2 percent subangular boulders

Depth to a restrictive feature: None within 60 inches

Drainage class: Poorly drained

Capacity to transmit water (K_{sat}): Moderately low to high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: About 0 to 80 inches (See table on water features)

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Moderate (about 7.4 inches)

Land capability class and subclass (nonirrigated): 6e

Hydric soil: Yes

Hydrologic soil group: C

Vegetation

Ecological site: Loamy seeps (R022BI209CA)

Typical vegetation: Thinleaf alder, arrowleaf ragwort, blue wildrye, California false hellebore

Typical Profile

Oi—0 to 2 inches; slightly decomposed plant material

A1—2 to 4 inches; gravelly mucky fine sandy loam

2A2—4 to 6 inches; gravelly loam

2A3—6 to 9 inches; very gravelly loam

3AB—9 to 18 inches; silty clay loam

3Bw—18 to 30 inches; cobbly silty clay loam

3Bg1—30 to 41 inches; stony silty clay loam

3Bg2—41 to 50 inches; very stony clay
3Bg3—50 to 62 inches; gravelly clay loam

Characteristics of Aquic Dystrochrepts, Debris Flows

Setting

Landform: Debris flows

Landform position (two-dimensional): Footslope

Landform position (three-dimensional): Mountainbase

Slope range and aspect: 10 to 80 percent, northeast to southwest aspects

Parent material: Debris flow deposits derived from hydrothermally altered volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 2 to 12 percent subangular gravel, 0 to 8 percent subangular cobbles, 0 to 4 percent subangular stones

Depth to a restrictive feature: None within 60 inches

Drainage class: Poorly drained

Capacity to transmit water (K_{sat}): Moderately high or high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: About 0 to 80 inches (See table on water features)

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Low (about 4.5 inches)

Land capability class and subclass (nonirrigated): 6e

Hydric soil: Yes

Hydrologic soil group: C

Vegetation

Ecological site: Active hydrothermal areas (R022BI216CA)

Typical vegetation: Hairy brackenfern, mountain hemlock, California red fir, sedge

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

Oe—1 to 2 inches; moderately decomposed plant material

A—2 to 5 inches; clay loam

Bw1—5 to 9 inches; clay loam

Bw2—9 to 24 inches; very gravelly clay loam

Ab—24 to 30 inches; very gravelly clay loam

Bwb1—30 to 48 inches; extremely gravelly clay loam

Bwb2—48 to 60 inches; very gravelly clay loam

Characteristics of Typic Dystrochrepts

Setting

Landform: Actively eroding mountain slopes

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Mountainflank

Slope range and aspect: 10 to 80 percent, northeast to southwest aspects

Parent material: Colluvium and residuum derived from hydrothermally altered volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 15 to 30 percent subangular gravel, 0 to 8 percent subangular cobbles, 0 to 5 percent subangular stones

Depth to a restrictive feature: 10 to 60 inches to paralithic bedrock
Drainage class: Well drained
Capacity to transmit water (K_{sat}): Very low to high (See table on physical properties)
Annual flooding frequency: None
Annual ponding frequency: None
Minimum depth of seasonal high water table: More than 72 inches
Salinity maximum: Not saline
Sodicity maximum: Not sodic
Available water capacity (entire profile): Very low (about 2.7 inches)
Land capability class and subclass (nonirrigated): 7e
Hydric soil: No
Hydrologic soil group: B

Vegetation

Ecological site: Active hydrothermal areas (R022BI216CA)
Typical vegetation: Pinemat manzanita, California red fir, mountain hemlock, western white pine

Typical Profile

A—0 to 1 inch; gravelly sandy loam
Bw1—1 to 4 inches; very gravelly loam
Bw2—4 to 11 inches; extremely paragravelly clay loam
BC—11 to 16 inches; very paragravelly loam
C—16 to 20 inches; extremely paragravelly sandy loam
Cr—20 inches; bedrock

Minor Components

Badland

Composition: 5 percent
Landform: Free faces
Slope range and aspect: 10 to 150 percent, northeast to southwest aspects
Hydric soil: No

Rock outcrop

Composition: 5 percent
Landform: Mountain slopes
Slope range and aspect: 10 to 80 percent, northeast to southwest aspects
Hydric soil: No

120—Buttelake-Sunhoff-Talved complex, 20 to 65 percent slopes

General location: Glacial-valley walls in the northeast area of the park
Landscape: Mountains
Elevation: 5,980 to 7,600 feet (1,823 to 2,318 meters)
Mean annual precipitation: 25 to 45 inches (635 to 1,143 millimeters)
Mean annual air temperature: 42 to 44 degrees F (6 to 7 degrees C)
Frost-free period: 60 to 85 days

Map Unit Composition

Buttelake component: 65 percent
Sunhoff component: 15 percent
Talved component: 10 percent
Minor components: 10 percent

Characteristics of Buttelake

Setting

Landform: Ground moraines on glacial-valley walls

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Mountainflank

Slope range and aspect: 20 to 65 percent, south to northwest aspects

Parent material: Tephra over till derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 0 to 5 percent subangular gravel, 0 to 3 percent subangular cobbles

Depth to a restrictive feature: 40 to 60 inches to dense material

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Moderately low to very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 2.7 inches)

Land capability class and subclass (nonirrigated): 6e

Hydric soil: No

Hydrologic soil group: A

Vegetation

Ecological site: *Abies concolor*-*Pinus jeffreyi*/*Elymus elymoides* (F022BI119CA)

Typical vegetation: Jeffrey pine, white fir, bush chinquapin

Typical Profile

Oi—0 to 0.4 inch; slightly decomposed plant material

A—0.4 inch to 3 inches; ashy sand

C1—3 to 11 inches; ashy coarse sand

C2—11 to 13 inches; very gravelly ashy coarse sand

2Ab—13 to 19 inches; very gravelly medial loamy coarse sand

2Bwb1—19 to 31 inches; very gravelly medial coarse sandy loam

2Bwb2—31 to 40 inches; extremely cobbly medial sandy loam

2Cdqb1—40 to 53 inches; extremely gravelly loamy coarse sand

2Cdqb2—53 to 63 inches; gravel

Characteristics of Sunhoff

Setting

Landform: Ground moraines on glacial-valley walls

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Mountainflank

Slope range and aspect: 20 to 65 percent, south to northwest aspects

Parent material: Tephra over till derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 0 to 20 percent subangular gravel, 0 to 10 percent subangular cobbles, 0 to 10 percent subangular stones, 0 to 10 percent subangular boulders

Depth to a restrictive feature: 20 to 40 inches to dense material

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Moderately low to very high (See table on physical properties)

Annual flooding frequency: None
Annual ponding frequency: None
Minimum depth of seasonal high water table: More than 72 inches
Salinity maximum: Not saline
Sodicity maximum: Not sodic
Available water capacity (entire profile): Very low (about 1.2 inches)
Land capability class and subclass (nonirrigated): 6e
Hydric soil: No
Hydrologic soil group: B

Vegetation

Ecological site: *Abies magnifica-Abies concolor/Chrysolepis sempervirens*
(F022BI107CA)
Typical vegetation: White fir, Jeffrey pine, bush chinquapin, California red fir

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 6 inches; ashy loamy sand
2Ab—6 to 9 inches; gravelly medial loamy coarse sand
2Bwb—9 to 29 inches; extremely cobbly medial loamy sand
2Cd—29 to 39 inches; extremely gravelly ashy sandy loam

Characteristics of Talved

Setting

Landform: Scoured glacial-valley walls
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Slope range and aspect: 20 to 65 percent, south to northwest aspects
Parent material: Tephra over colluvium derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 10 to 30 percent angular gravel,
15 to 30 percent angular cobbles, 25 to 60 percent angular stones, 20 to 40
percent angular boulders
Depth to a restrictive feature: None within 60 inches
Drainage class: Excessively drained
Capacity to transmit water (K_{sat}): High or very high (See table on physical properties)
Annual flooding frequency: None
Annual ponding frequency: None
Minimum depth of seasonal high water table: More than 72 inches
Salinity maximum: Not saline
Sodicity maximum: Not sodic
Available water capacity (entire profile): Very low (about 0.6 inch)
Land capability class (nonirrigated): 8
Hydric soil: No
Hydrologic soil group: A

Vegetation

Ecological site: Talus slope (R022BI200CA)
Typical vegetation: Bush chinquapin, oceanspray, Jeffrey pine, prickly hawkweed

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 5 inches; extremely cobbly ashy loamy coarse sand
2Ab—5 to 13 inches; extremely bouldery medial coarse sand
2Bwb1—13 to 26 inches; extremely bouldery medial coarse sandy loam

2Bwb2—26 to 39 inches; medial stones

2Bwb3—39 to 60 inches; extremely bouldery medial sandy loam

Minor Components

Scoured

Composition: 5 percent

Landform: Scoured glacial-valley walls

Slope range and aspect: 20 to 65 percent, south to northwest aspects

Hydric soil: No

Rock outcrop

Composition: 3 percent

Landform: Scoured glacial-valley walls

Slope range and aspect: 20 to 65 percent, south to northwest aspects

Hydric soil: No

Rubble land

Composition: 2 percent

Landform: Scoured glacial-valley walls

Slope range and aspect: 20 to 65 percent, south to northwest aspects

Hydric soil: No

122—Xeric Vitricryands complex, 10 to 80 percent slopes

General location: Cinder cones on the tops of Prospect Peak, Ash Butte, Red Cinder Cone, Mount Harkness (fig. 12), and Sifford Mountain; nunataks on Saddle Mountain, Mount Hoffman, and Bonte Peak

Landscape: Mountains

Elevation: 6,960 to 8,330 feet (2,122 to 2,539 meters)

Mean annual precipitation: 37 to 81 inches (940 to 2,057 millimeters)

Mean annual air temperature: 41 to 43 degrees F (5 to 6 degrees C)

Frost-free period: 50 to 85 days

Map Unit Composition

Xeric Vitricryands, colluvium component: 35 percent

Xeric Vitricryands, ash over cinders component: 30 percent

Xeric Vitricryands, bedrock component: 20 percent

Minor components: 15 percent

Characteristics of Xeric Vitricryands, Colluvium

Setting

Landform: Nunataks, cinder cones

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Mountaintop

Slope range and aspect: 10 to 80 percent, north aspects

Parent material: Colluvium derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 55 to 65 percent subangular gravel, 5 to 10 percent subangular cobbles, 0 to 5 percent subangular stones

Depth to a restrictive feature: None within 60 inches

Drainage class: Well drained

Capacity to transmit water (K_{sat}): High or very high (See table on physical properties)

Annual flooding frequency: None

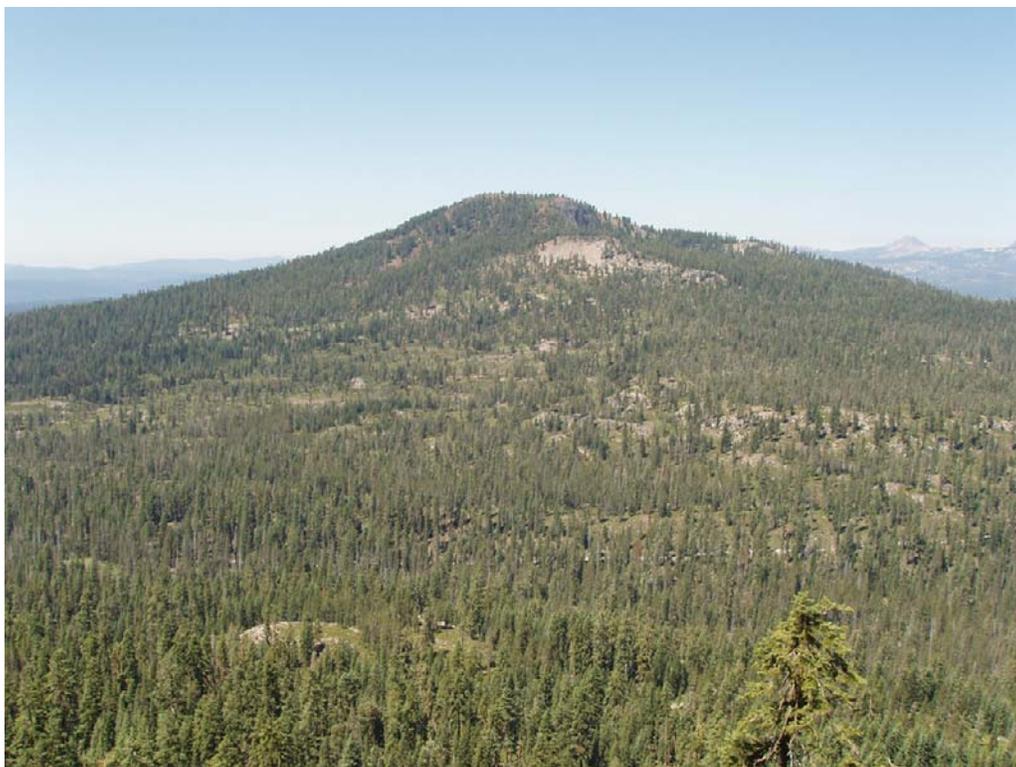


Figure 12.—Map unit 122 on the top of Mount Harkness. Map units 104 and 105 are below the summit.

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Low (about 3.5 inches)

Land capability class and subclass (nonirrigated): 7e

Hydric soil: No

Hydrologic soil group: A

Vegetation

Ecological site: *Tsuga mertensiana/Lupinus obtusilobus-Cistanthe umbellata* var. *umbellata* (F022BI104CA)

Typical vegetation: Bluntlobe lupine, mountain hemlock, western needlegrass, mountain monardella

Typical Profile

A—0 to 3 inches; very gravelly ashy fine sandy loam

Ab—3 to 7 inches; very gravelly ashy fine sandy loam

Bwb1—7 to 11 inches; very gravelly ashy fine sandy loam

Bwb2—11 to 24 inches; very gravelly ashy fine sandy loam

Bwb3—24 to 33 inches; extremely gravelly ashy fine sandy loam

Bwb4—33 to 39 inches; extremely gravelly ashy fine sandy loam

BC—39 to 42 inches; extremely gravelly ashy loamy coarse sand

C—42 to 60 inches; extremely gravelly ashy loamy coarse sand

Characteristics of Xeric Vitricryands, Ash Over Cinders

Setting

Landform: Nunataks, cinder cones

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Mountaintop

Slope range and aspect: 10 to 80 percent, north aspects

Parent material: Volcanic ash over colluvium derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 3 to 25 percent subangular gravel, 5 to 15 percent subangular cobbles, 5 to 20 percent subangular stones, 5 to 20 percent subangular boulders

Depth to a restrictive feature: None within 60 inches

Drainage class: Well drained

Capacity to transmit water (K_{sat}): High or very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 2.5 inches)

Land capability class and subclass (nonirrigated): 7e

Hydric soil: No

Hydrologic soil group: A

Vegetation

Ecological site: *Tsuga mertensiana*-*Abies magnifica*/*Lupinus obtusilobus*-*Eriogonum marifolium* (F022B1111CA)

Typical vegetation: California red fir, bush chinquapin, mountain hemlock, western white pine

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

A—1 to 2 inches; ashy sandy loam

AC—2 to 6 inches; gravelly ashy sandy loam

2Bwb1—6 to 16 inches; very gravelly ashy sandy loam

2Bwb2—16 to 24 inches; very gravelly ashy sandy loam

2C—24 to 30 inches; very gravelly ashy loamy sand

2Cq1—30 to 45 inches; very gravelly sand

2Cq2—45 to 60 inches; very gravelly sand

Characteristics of Xeric Vitricryands, Bedrock

Setting

Landform: Cinder cones, nunataks

Landform position (two-dimensional): Shoulder

Landform position (three-dimensional): Mountaintop

Slope range and aspect: 10 to 80 percent, north aspects

Parent material: Tephra over residuum weathered from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 5 to 20 percent subangular gravel, 0 to 5 percent subangular cobbles, 10 to 20 percent subangular stones, 15 to 25 percent subangular boulders

Depth to a restrictive feature: 10 to 40 inches to lithic bedrock

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Very low to very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 1.1 inches)

Land capability class and subclass (nonirrigated): 7e

Hydric soil: No

Hydrologic soil group: B

Vegetation

Ecological site: Cryic pyroclastic cones (R022BI208CA)

Typical vegetation: Bush chinquapin, oceanspray, rubber rabbitbrush, western needlegrass

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

A1—1 to 4 inches; stony ashy loamy sand

A2—4 to 9 inches; stony ashy loamy sand

2Ab—9 to 16 inches; extremely stony ashy sandy loam

2Bwb—16 to 21 inches; very stony medial very fine sandy loam

2R—21 inches; bedrock

Minor Components

Rock outcrop

Composition: 10 percent

Landform: Nunataks, cinder cones

Slope range and aspect: 10 to 150 percent, north aspects

Hydric soil: No

Rubble land

Composition: 5 percent

Landform: Cinder cones, nunataks

Slope range and aspect: 10 to 80 percent, north aspects

Hydric soil: No

125—Humic Haploxerands, stream terraces-Aquandic Humaquepts, flood plains, complex, 0 to 15 percent slopes

General location: Alluvial bottoms along Hot Springs Creek, Kings Creek, Warner Creek, and North Fork Bailey Creek

Landscape: Mountains

Elevation: 5,240 to 6,460 feet (1,596 to 1,970 meters)

Mean annual precipitation: 45 to 87 inches (1,143 to 2,210 millimeters)

Mean annual air temperature: 42 to 43 degrees F (5 to 6 degrees C)

Frost-free period: 70 to 90 days

Map Unit Composition

Humic Haploxerands, stream terraces component: 55 percent

Aquandic Humaquepts, flood plains component: 40 percent

Minor components: 5 percent

Characteristics of Humic Haploxerands, Stream Terraces

Setting

Landform: Stream terraces

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Tread

Slope range and aspect: 2 to 15 percent, north to southwest aspects

Parent material: Ash-influenced alluvium derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 3 to 35 percent subrounded gravel, 0 to 1 percent subrounded cobbles, 0 to 1 percent subrounded stones, 0 to 1 percent subrounded boulders

Depth to a restrictive feature: None within 60 inches

Drainage class: Moderately well drained

Capacity to transmit water (K_{sat}): High or very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: About 24 to 80 inches (See table on water features)

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 1.7 inches)

Land capability class and subclass (nonirrigated): 7e

Hydric soil: No

Hydrologic soil group: C

Vegetation

Ecological site: *Abies concolor*-*Pinus contorta* var. *murrayana*/*Elymus glaucus* (F022BI120CA)

Typical vegetation: Sierra lodgepole pine, red fescue, white fir, blue wildrye

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

A1—1 to 4 inches; gravelly medial sandy loam

A2—4 to 7 inches; gravelly medial sandy loam

Bw1—7 to 17 inches; gravelly medial coarse sandy loam

Bw2—17 to 28 inches; extremely stony medial coarse sandy loam

Bw3—28 to 48 inches; extremely stony medial loamy coarse sand

Bw4—48 to 68 inches; ashy stones

Bw5—68 to 84 inches; ashy stones

Characteristics of Aquandic Humaquepts, Flood Plains

Setting

Landform: Flood plains

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Tread

Slope range and aspect: 0 to 3 percent, north to southwest aspects

Parent material: Alluvium derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 0 to 5 percent subangular gravel

Depth to a restrictive feature: None within 60 inches

Drainage class: Poorly drained

Capacity to transmit water (K_{sat}): Moderately high or high (See table on physical properties)

Annual flooding frequency: Frequent (See table on water features)

Annual ponding frequency: None

Minimum depth of seasonal high water table: About 0 to 51 inches (See table on water features)

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Low (about 5.7 inches)

Land capability class and subclass (nonirrigated): 6w

Hydric soil: Yes

Hydrologic soil group: C

Vegetation

Ecological site: Loamy flood plains (R022B1210CA)

Typical vegetation: Widefruit sedge, Lemmon's willow, thinleaf alder, California false hellebore

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

A1—1 to 4 inches; stony ashy loam

A2—4 to 7 inches; stony ashy loam

Bg1—7 to 16 inches; stony ashy loam

Bg2—16 to 25 inches; very stony ashy loam

Bg3—25 to 31 inches; cobbly ashy loam

Bg4—31 to 47 inches; cobbly ashy loam

Cg—47 to 60 inches; extremely gravelly ashy sandy loam

Minor Components

Aeric Endoaquents

Composition: 3 percent

Landform: Flood plains

Slope range and aspect: 0 to 3 percent, north to southwest aspects

Hydric soil: No

Riverwash

Composition: 2 percent

Landform: Flood plains

Slope range and aspect: 0 to 3 percent, north to southwest aspects

Hydric soil: Yes

126—Kingsiron-Dittmar-Rock outcrop complex, 20 to 80 percent slopes

General location: Glacial-valley walls above lower Kings Creek, Hot Springs Creek, and Willow Creek

Landscape: Mountains

Elevation: 5,290 to 7,410 feet (1,613 to 2,258 meters)

Mean annual precipitation: 43 to 91 inches (1,092 to 2,311 millimeters)

Mean annual air temperature: 41 to 43 degrees F (5 to 6 degrees C)

Frost-free period: 70 to 90 days

Map Unit Composition

Kingsiron component: 45 percent

Dittmar component: 20 percent

Rock outcrop: 15 percent

Minor components: 20 percent

Characteristics of Kingsiron

Setting

Landform: Glacial-valley walls

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Mountainflank

Slope range and aspect: 20 to 80 percent, north to west aspects

Parent material: Ash mixed with colluvium derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 3 to 20 percent angular gravel, 5 to 30 percent angular cobbles, 10 to 15 percent angular stones, 0 to 10 percent angular boulders

Depth to a restrictive feature: None within 60 inches

Drainage class: Well drained

Capacity to transmit water (K_{sat}): High or very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 0.8 inch)

Land capability class (nonirrigated): 8

Hydric soil: No

Hydrologic soil group: A

Vegetation

Ecological site: *Abies concolor-Calocedrus decurrens/Ceanothus cordulatus/Achnatherum* (F022B1110CA)

Typical vegetation: White fir, huckleberry oak, sugar pine, incense cedar

Typical Profile

Oi—0 to 1 inch; stony slightly decomposed plant material

A1—1 to 3 inches; extremely gravelly medial fine sandy loam

A2—3 to 9 inches; extremely gravelly medial fine sandy loam

Bw1—9 to 28 inches; extremely gravelly medial sandy loam

Bw2—28 to 41 inches; extremely gravelly medial sandy loam

Bw3—41 to 63 inches; extremely gravelly medial sandy loam

Characteristics of Dittmar

Setting

Landform: Scoured glacial-valley walls

Landform position (two-dimensional): Shoulder

Landform position (three-dimensional): Upper third of mountainflank

Slope range and aspect: 20 to 80 percent, north to west aspects

Parent material: Tephra and residuum weathered from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 5 to 65 percent angular gravel, 3 to 45 percent angular cobbles, 3 to 15 percent angular stones

Depth to a restrictive feature: 10 to 20 inches to lithic bedrock

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Very low to high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic
Available water capacity (entire profile): Very low (about 1.0 inch)
Land capability class (nonirrigated): 8
Hydric soil: No
Hydrologic soil group: D

Vegetation

Ecological site: *Pinus jeffreyi/Arctostaphylos patula* (F022B1121CA)
Typical vegetation: Greenleaf manzanita, Jeffrey pine, huckleberry oak, bush chinquapin

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
A1—1 to 2 inches; very gravelly ashy sandy loam
A2—2 to 5 inches; very gravelly medial sandy loam
Bw1—5 to 7 inches; very gravelly medial fine sandy loam
Bw2—7 to 15 inches; extremely stony medial fine sandy loam
Bw3—15 to 19 inches; extremely stony medial fine sandy loam
R—19 inches; bedrock

Characteristics of Rock Outcrop

Setting

Landform: Scoured glacial-valley walls
Slope range and aspect: 20 to 80 percent, north to west aspects
Definition: Rock outcrop consists of exposures of bare bedrock that have no soil

Component Properties and Qualities

Land capability class (nonirrigated): 8
Hydric soil: No

Minor Components

Scoured

Composition: 10 percent
Landform: Scoured glacial-valley walls
Slope range and aspect: 20 to 80 percent, north to west aspects
Hydric soil: No

Rubble land

Composition: 5 percent
Landform: Scoured glacial-valley walls
Slope range and aspect: 20 to 80 percent, north to west aspects
Hydric soil: No

Bearrubble

Composition: 3 percent
Landform: Shield volcanoes
Slope range and aspect: 20 to 80 percent, north to west aspects
Hydric soil: No

Aquepts

Composition: 2 percent
Landform: Seeps on glacial-valley walls
Slope range and aspect: 20 to 80 percent, north to west aspects
Hydric soil: Yes

127—Humic Haploxerands, strath terrace-Aquepts complex, 5 to 50 percent slopes

General location: Glacial-valley floors in Hot Springs Creek and lower Kings Creek drainages

Landscape: Mountains

Elevation: 5,290 to 6,130 feet (1,611 to 1,868 meters)

Mean annual precipitation: 51 to 79 inches (1,295 to 2,007 millimeters)

Mean annual air temperature: 41 to 42 degrees F (5 to 6 degrees C)

Frost-free period: 70 to 90 days

Map Unit Composition

Humic Haploxerands, strath terrace component: 65 percent

Aquepts component: 15 percent

Minor components: 20 percent

Characteristics of Humic Haploxerands, Strath Terrace

Setting

Landform: Strath terraces

Landform position (two-dimensional): Footslope

Landform position (three-dimensional): Mountainbase

Slope range and aspect: 5 to 50 percent, north to southwest aspects

Parent material: Alluvium derived from andesite over residuum weathered from andesite

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 5 to 20 percent subangular gravel

Depth to a restrictive feature: 20 to 60 inches to lithic bedrock

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Very low to high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 1.5 inches)

Land capability class and subclass (nonirrigated): 7e

Hydric soil: No

Hydrologic soil group: B

Vegetation

Ecological site: *Abies concolor-Calocedrus decurrens/Ceanothus cordulatus/Achnatherum* (F022B1110CA)

Typical vegetation: White fir, blue wildrye, Columbia needlegrass, whitethorn ceanothus

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

A1—1 to 4 inches; gravelly ashy sandy loam

A2—4 to 9 inches; gravelly medial coarse sandy loam

Bw1—9 to 16 inches; gravelly medial sandy loam

2Bw2—16 to 20 inches; gravelly medial sandy loam

2Bw3—20 to 28 inches; medial cobbles

2R—28 inches; bedrock

Characteristics of Aquepts

Setting

Landform: Seeps on glacial-valley floors

Landform position (two-dimensional): Footslope

Landform position (three-dimensional): Mountainbase

Slope range and aspect: 5 to 50 percent, north to southwest aspects

Parent material: Alluvium derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 5 to 25 percent subrounded stones, 0 to 15 percent subrounded boulders

Depth to a restrictive feature: 40 to 80 inches to lithic bedrock

Drainage class: Poorly drained

Capacity to transmit water (K_{sat}): High (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: About 0 to 11 inches (See table on water features)

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 1.0 inch)

Land capability class and subclass (nonirrigated): 6e

Hydric soil: Yes

Hydrologic soil group: C

Vegetation

Ecological site: Spring complex (R022BI211CA)

Typical vegetation: Thinleaf alder, blue wildrye, common cowparsnip, Kentucky bluegrass

Typical Profile

Oi—0 to 2 inches; slightly decomposed plant material

Ag—2 to 6 inches; very bouldery mucky ashy sandy loam

2Agb—6 to 11 inches; extremely bouldery ashy sandy loam

2Cg—11 to 16 inches; extremely bouldery ashy sandy loam

2A'gb—16 to 26 inches; extremely cobbly ashy sandy loam

2C'g—26 to 45 inches; extremely stony ashy sandy loam

Minor Components

Rock outcrop

Composition: 5 percent

Landform: Glacial-valley floors

Slope range and aspect: 5 to 90 percent, north to southwest aspects

Hydric soil: No

Humic Haploxerands, colluvium

Composition: 5 percent

Landform: Colluvial aprons, landslides

Slope range and aspect: 5 to 50 percent, north to southwest aspects

Hydric soil: No

Dittmar

Composition: 5 percent

Landform: Strath terraces

Slope range and aspect: 5 to 50 percent, north to southwest aspects

Hydric soil: No

Aquandic Humaquepts, flood plains

Composition: 4 percent

Landform: Flood plains

Slope range and aspect: 5 to 15 percent, north to southwest aspects

Hydric soil: Yes

Endoaquepts

Composition: 1 percent

Landform: Seeps on glacial-valley floors

Slope range and aspect: 5 to 50 percent, north to southwest aspects

Hydric soil: Yes

129—Humic Haploxerands, colluvium, 10 to 40 percent slopes

General location: The bases of glacial-valley walls in Warner Creek, Hot Springs Creek, and lower Kings Creek drainages

Landscape: Mountains

Elevation: 5,260 to 5,790 feet (1,602 to 1,765 meters)

Mean annual precipitation: 43 to 63 inches (1,092 to 1,600 millimeters)

Mean annual air temperature: 42 to 43 degrees F (5 to 6 degrees C)

Frost-free period: 70 to 90 days

Map Unit Composition

Humic Haploxerands, colluvium component: 80 percent

Minor components: 20 percent

Characteristics of Humic Haploxerands, Colluvium

Setting

Landform: Landslides, colluvial aprons

Landform position (two-dimensional): Footslope

Landform position (three-dimensional): Mountainbase

Slope range and aspect: 10 to 40 percent, southeast to southwest aspects

Parent material: Ash mixed with colluvium over colluvium derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 5 to 50 percent angular gravel, 2 to 15 percent angular cobbles, 5 to 15 percent angular stones, 1 to 8 percent angular boulders

Depth to a restrictive feature: 20 to 80 inches to lithic bedrock

Drainage class: Well drained

Capacity to transmit water (K_{sat}): High (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 2.9 inches)

Land capability class and subclass (nonirrigated): 4e

Hydric soil: No

Hydrologic soil group: A

Vegetation

*Ecological site: Abies concolor-Calocedrus decurrens/Ceanothus cordulatus/
Achnatherum (F022BI110CA)*

Typical vegetation: White fir, California brome, incense cedar, whitethorn ceanothus

Typical Profile

Oi—0 to 1.6 inches; slightly decomposed plant material

Oe—1.6 to 2.4 inches; moderately decomposed plant material

A1—2.4 to 4 inches; gravelly medial sandy loam

A2—4 to 8 inches; gravelly medial sandy loam

Bw1—8 to 15 inches; very gravelly medial sandy loam

Bw2—15 to 22 inches; very gravelly medial sandy loam

2Bw3—22 to 34 inches; extremely gravelly medial sandy loam

2BC1—34 to 50 inches; extremely gravelly medial fine sandy loam

2BC2—50 to 61 inches; extremely gravelly medial sandy loam

Minor Components

Kingsiron

Composition: 10 percent

Landform: Glacial-valley walls

Slope range and aspect: 10 to 40 percent, southeast to southwest aspects

Hydric soil: No

Rubble land

Composition: 3 percent

Landform: Alluvial fans

Slope range and aspect: 10 to 40 percent, southeast to southwest aspects

Hydric soil: No

Rock outcrop

Composition: 3 percent

Landform: Glacial-valley walls

Slope range and aspect: 10 to 40 percent, southeast to southwest aspects

Hydric soil: No

Humic Haploxerands, strath terrace

Composition: 2 percent

Landform: Strath terraces

Slope range and aspect: 10 to 40 percent, southeast to southwest aspects

Hydric soil: No

Aquepts

Composition: 2 percent

Landform: Seeps on colluvial aprons

Slope range and aspect: 10 to 40 percent, southeast to southwest aspects

Hydric soil: Yes

130—Histic Humaquepts, lake sediments-Histic Humaquepts, frequently flooded-Typic Endoaquands complex, 0 to 15 percent slopes

General location: Meadows in the eastern half of the park (fig. 13)

Landscape: Mountains

Elevation: 5,960 to 6,760 feet (1,816 to 2,060 meters)

Mean annual precipitation: 37 to 65 inches (940 to 1,651 millimeters)



Figure 13.—Map unit 130 west of Horseshoe Lake. Map units 104 and 105 are in the background.

Mean annual air temperature: 41 to 44 degrees F (5 to 6 degrees C)

Frost-free period: 60 to 85 days

Map Unit Composition

Histic Humaquepts, lake sediments component: 55 percent

Histic Humaquepts, frequently flooded component: 30 percent

Typic Endoaquands component: 15 percent

Minor components: 0 percent

Characteristics of Histic Humaquepts, Lake Sediments

Setting

Landform: Meadows in glacial lakes (relict)

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Tread

Slope range and aspect: 0 to 3 percent, southwest to southeast aspects

Parent material: Ash over glaciolacustrine deposits derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: None noted

Depth to a restrictive feature: None within 60 inches

Drainage class: Poorly drained

Capacity to transmit water (K_{sat}): Moderately high to very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: Frequent (See table on water features)

Minimum depth of seasonal high water table: About 0 to 60 inches (See table on water features)

Salinity maximum: Not saline
Sodicity maximum: Not sodic
Available water capacity (entire profile): Moderate (about 6.1 inches)
Land capability class and subclass (nonirrigated): 5w
Hydric soil: Yes
Hydrologic soil group: C

Vegetation

Ecological site: Frigid lacustrine flat (R022BI217CA)
Typical vegetation: Nebraska sedge, Northwest Territory sedge, capitate sedge, tufted hairgrass

Typical Profile

Oi—0 to 6 inches; herbaceous mucky slightly decomposed plant material
Oa1—6 to 10 inches; herbaceous mucky highly decomposed plant material
2Oa2—10 to 14 inches; herbaceous mucky highly decomposed plant material
2Cg1—14 to 16 inches; ashy coarse sand
2Cg2—16 to 25.6 inches; ashy silt loam
2Oa—25.6 to 26.4 inches; muck
2Bg—26.4 to 35 inches; ashy silt loam
2Cg3—35 to 39 inches; ashy silt
2Cg4—39 to 44 inches; very gravelly ashy loamy coarse sand
2Cg5—44 to 49 inches; gravelly ashy loamy coarse sand
2Cg6—49 to 59 inches; ashy loamy sand

Characteristics of Histic Humaquepts, Frequently Flooded

Setting

Landform: Areas along channels in meadows in glacial lakes (relict)
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Slope range and aspect: 0 to 3 percent, southwest to southeast aspects
Parent material: Stream alluvium over glaciolacustrine deposits derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: None noted
Depth to a restrictive feature: None within 60 inches
Drainage class: Very poorly drained
Capacity to transmit water (K_{sat}): Moderately high to very high (See table on physical properties)
Annual flooding frequency: Frequent (See table on water features)
Annual ponding frequency: None
Minimum depth of seasonal high water table: About 0 to 60 inches (See table on water features)
Salinity maximum: Not saline
Sodicity maximum: Not sodic
Available water capacity (entire profile): Moderate (about 6.0 inches)
Land capability class and subclass (nonirrigated): 5w
Hydric soil: Yes
Hydrologic soil group: C

Vegetation

Ecological site: Frigid lacustrine flat (R022BI217CA)
Typical vegetation: Nebraska sedge, blister sedge, tundra aster, common rush

Typical Profile

Oi—0 to 2 inches; herbaceous peat

Oa1—2 to 5 inches; herbaceous muck
Oa2—5 to 9 inches; herbaceous muck
Cg1—9 to 13 inches; ashy coarse sand
2Agb—13 to 17 inches; mucky ashy silty clay loam
2Cg2—17 to 28 inches; ashy silt loam
2Bw—28 to 47 inches; gravelly ashy sandy clay loam
2Cg3—47 to 51 inches; ashy coarse sandy loam
2Cg4—51 to 55 inches; very gravelly ashy coarse sand

Characteristics of Typic Endoaquands

Setting

Landform: Lake terraces

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Tread

Slope range and aspect: 0 to 15 percent, southwest to southeast aspects

Parent material: Alluvium derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 0 to 5 percent subrounded gravel

Depth to a restrictive feature: 40 to 80 inches to weakly cemented duripan

Drainage class: Poorly drained

Capacity to transmit water (K_{sat}): Moderately high to very high (See table on physical properties)

Annual flooding frequency: Frequent (See table on water features)

Annual ponding frequency: None

Minimum depth of seasonal high water table: About 0 to 60 inches (See table on water features)

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Low (about 3.5 inches)

Land capability class and subclass (nonirrigated): 5w

Hydric soil: Yes

Hydrologic soil group: C

Vegetation

Ecological site: *Pinus contorta* var. *murrayana*/*Veratrum californicum* var. *californicum*-*Elymus glaucus* (F022B1108CA)

Typical vegetation: Sierra lodgepole pine, arrowleaf ragwort, blue wildrye, common yarrow

Typical Profile

Oi—0 to 2 inches; slightly decomposed plant material

Oa—2 to 3 inches; mucky highly decomposed plant material

A1—3 to 11 inches; gravelly medial sandy loam

A2—11 to 17 inches; gravelly medial sandy loam

Bw—17 to 29 inches; gravelly medial sandy loam

C1—29 to 52 inches; extremely gravelly medial coarse sandy loam

C2—52 to 57 inches; extremely gravelly medial loamy coarse sand

132—Vitrandic Cryorthents, debris flows, 10 to 80 percent slopes

General location: The base of Lassen Peak (fig. 14)

Landscape: Mountains



Figure 14.—The Devastated Area viewed from the top of Lassen Peak. Map unit 132 is in the middle segment, adjacent to Crescent Crater on the left. Map unit 174 is in the upper segment in the foreground. Map unit 111 is in the bottom segment of the Devastated Area, where the forest has more fully regenerated. This photo is the opposite view of the cover photo, which was taken from the rectangular bare area in the center portion of this photo.

Elevation: 6,290 to 8,700 feet (1,916 to 2,653 meters)

Mean annual precipitation: 73 to 115 inches (1,854 to 2,921 millimeters)

Mean annual air temperature: 40 degrees F (4 degrees C)

Frost-free period: 50 to 85 days

Map Unit Composition

Vitrandic Cryorthents, debris flows component: 90 percent

Minor components: 10 percent

Characteristics of Vitrandic Cryorthents, Debris Flows

Setting

Landform: Moraines

Landform position (two-dimensional): Footslope

Landform position (three-dimensional): Mountainbase

Slope range and aspect: 10 to 80 percent, west to east aspects

Parent material: Debris flow deposits and/or pyroclastic flow over till derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 70 to 90 percent subangular gravel, 5 to 15 percent subangular cobbles, 2 to 10 percent subangular stones, 0 to 10 percent subangular boulders

Depth to a restrictive feature: 20 to 60 inches to dense material

Drainage class: Moderately well drained

Capacity to transmit water (K_{sat}): Moderately low to very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 1.5 inches)

Land capability class and subclass (nonirrigated): 7e

Hydric soil: No

Hydrologic soil group: B

Vegetation

Ecological site: *Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/*

Achnatherum occidentale (F022B115CA)

Typical vegetation: Bluntlobe lupine, mountain monardella, rabbitbush, oceanspray

Typical Profile

A—0 to 4 inches; very gravelly ashy loamy coarse sand

C1—4 to 13 inches; very gravelly ashy loamy coarse sand

C2—13 to 19 inches; extremely gravelly ashy loamy coarse sand

2Bq—19 to 32 inches; extremely stony ashy loamy sand

2Cdq—32 to 41 inches; very cobbly ashy loamy sand

Minor Components

Xeric Vitricryands, pyroclastic surge

Composition: 3 percent

Landform: Lateral moraines

Slope range and aspect: 10 to 80 percent, west to east aspects

Hydric soil: No

Typic Endoaquents

Composition: 2 percent

Landform: Flood plains

Slope range and aspect: 2 to 30 percent, west to east aspects

Hydric soil: Yes

Vitrantic Xerorthents, moraine

Composition: 2 percent

Landform: Moraines

Slope range and aspect: 10 to 80 percent, west to east aspects

Hydric soil: No

Rock outcrop

Composition: 2 percent

Landform: Glacial-valley floors

Slope range and aspect: 10 to 80 percent, west to east aspects

Hydric soil: No

Typic Vitrixerands

Composition: 1 percent

Landform: Moraines

Slope range and aspect: 10 to 80 percent, west to east aspects

Hydric soil: No

133—Vitrandic Xerofluvents-Typic Endoaquents complex, 0 to 15 percent slopes

General location: Glacial-valley floor in Lost Creek drainage

Landscape: Mountains

Elevation: 6,040 to 6,330 feet (1,840 to 1,929 meters)

Mean annual precipitation: 51 to 75 inches (1,295 to 1,905 millimeters)

Mean annual air temperature: 40 to 42 degrees F (4 to 6 degrees C)

Frost-free period: 60 to 85 days

Map Unit Composition

Vitrandic Xerofluvents component: 55 percent

Typic Endoaquents component: 30 percent

Minor components: 15 percent

Characteristics of Vitrandic Xerofluvents

Setting

Landform: Debris flows

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Tread

Slope range and aspect: 0 to 15 percent, southwest to east aspects

Parent material: Debris flow deposits derived from volcanic rock over tephra derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 15 to 25 percent subangular gravel, 0 to 5 percent subangular cobbles, 0 to 3 percent subangular stones, 0 to 10 percent subangular boulders

Depth to a restrictive feature: None within 60 inches

Drainage class: Well drained

Capacity to transmit water (K_{sat}): High or very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Low (about 4.2 inches)

Land capability class and subclass (nonirrigated): 4e

Hydric soil: No

Hydrologic soil group: A

Vegetation

Ecological site: *Pinus jeffreyi-Abies/Achnatherum-Lupinus* (F022B1106CA)

Typical vegetation: Jeffrey pine, Sierra lodgepole pine, snowplant, white fir

Typical Profile

Oi—0 to 2 inches; slightly decomposed plant material

A1—2 to 4 inches; gravelly ashy loamy sand

A2—4 to 6 inches; gravelly ashy loamy sand

C1—6 to 12 inches; gravelly ashy loamy sand

C2—12 to 32 inches; very gravelly ashy loamy coarse sand

C3—32 to 34 inches; ashy sand

C4—34 to 50 inches; very gravelly ashy loamy sand

2Oe—50 to 51 inches; moderately decomposed plant material

2Ab—51 to 56 inches; gravelly ashy loamy sand

2C1—56 to 62 inches; gravelly ashy loamy sand
2C2—62 to 63 inches; very gravelly ashy sandy loam

Characteristics of Typic Endoaquents

Setting

Landform: Flood plains

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Tread

Slope range and aspect: 0 to 8 percent, southwest to east aspects

Parent material: Alluvium derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 70 to 80 percent subangular gravel, 10 to 20 percent subangular cobbles, 0 to 5 percent subangular stones

Depth to a restrictive feature: None within 60 inches

Drainage class: Poorly drained

Capacity to transmit water (K_{sat}): Very high (See table on physical properties)

Annual flooding frequency: Frequent (See table on water features)

Annual ponding frequency: None

Minimum depth of seasonal high water table: About 0 to 39 inches (See table on water features)

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 1.4 inches)

Land capability class and subclass (nonirrigated): 7w

Hydric soil: Yes

Hydrologic soil group: C

Vegetation

Ecological site: Sandy flood plains (R022BI213CA)

Typical vegetation: Sierra lodgepole pine, Lemmon's willow, Jeffrey pine, meadow barley

Typical Profile

C1—0 to 7 inches; extremely gravelly ashy sand

C2—7 to 14 inches; very gravelly ashy sand

C3—14 to 17 inches; ashy sand

C4—17 to 19 inches; very gravelly ashy sand

C5—19 to 26 inches; gravelly ashy sand

C6—26 to 31 inches; very gravelly ashy sand

C7—31 to 39 inches; extremely gravelly ashy coarse sand

Minor Components

Vitrandic Xerorthents, debris fan

Composition: 5 percent

Landform: Debris flows

Slope range and aspect: 0 to 15 percent, southwest to east aspects

Hydric soil: No

Vitrandic Xerofluvents, debris flows

Composition: 5 percent

Landform: Low stream terraces

Slope range and aspect: 0 to 15 percent, southwest to east aspects

Hydric soil: No

Vitrandic Xerofluvents

Composition: 5 percent



Figure 15.—Map unit 134 in Chaos Jumbles.

Landform: Risers on debris flows

Slope range and aspect: 15 to 50 percent, southwest to east aspects

Hydric soil: No

134—Chaos extremely gravelly ashy coarse sand, 2 to 30 percent slopes

General location: The base of Chaos Crags

Landscape: Mountains (fig. 15)

Elevation: 5,760 to 7,200 feet (1,755 to 2,195 meters)

Mean annual precipitation: 39 to 93 inches (991 to 2,362 millimeters)

Mean annual air temperature: 40 to 45 degrees F (4 to 7 degrees C)

Frost-free period: 60 to 90 days

Map Unit Composition

Chaos component: 85 percent

Minor components: 15 percent

Characteristics of Chaos

Setting

Landform: Rockfall avalanches

Landform position (two-dimensional): Footslope

Landform position (three-dimensional): Mountainbase

Slope range and aspect: 2 to 30 percent, south to northwest aspects

Parent material: Rockfall avalanche deposits derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 15 to 60 percent subangular gravel, 10 to 70 percent subangular cobbles, 2 to 50 percent subangular stones, 0 to 50 percent subangular boulders

Depth to a restrictive feature: None within 60 inches

Drainage class: Somewhat excessively drained

Capacity to transmit water (K_{sat}): High or very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Low (about 3.4 inches)

Land capability class and subclass (nonirrigated): 7s

Hydric soil: No

Hydrologic soil group: A

Vegetation

Ecological site: *Pinus jeffreyi*-*Abies concolor*/*Holodiscus discolor* (F022B1122CA)

Typical vegetation: Jeffrey pine, Sierra lodgepole pine, oceanspray, western white pine

Typical Profile

Oi—0 to 0.4 inch; slightly decomposed plant material

A—0.4 inch to 4 inches; extremely gravelly ashy coarse sand

AC—4 to 9 inches; gravel

C1—9 to 21 inches; extremely gravelly ashy coarse sand

C2—21 to 23 inches; gravelly ashy sandy loam

C3—23 to 27 inches; very gravelly ashy loamy coarse sand

C4—27 to 36 inches; gravelly ashy loamy coarse sand

C5—36 to 56 inches; very gravelly ashy loamy coarse sand

C6—56 to 75 inches; extremely gravelly ashy loamy coarse sand

C7—75 to 87 inches; very gravelly ashy loamy sand

Minor Components

Rubble land

Composition: 12 percent

Landform: Rockfall avalanches

Slope range and aspect: 2 to 30 percent, south to northwest aspects

Hydric soil: No

Aquepts

Composition: 3 percent

Landform: Rockfall avalanches

Slope range and aspect: 1 to 5 percent, south to northwest aspects

Hydric soil: Yes

136—Terracelake-Rock outcrop-Xeric Vitricryands, cirque floor, complex, 1 to 30 percent slopes

General location: Plateaus in upper Hot Springs Creek drainage

Landscape: Mountains

Elevation: 6,970 to 7,680 feet (2,126 to 2,342 meters)

Mean annual precipitation: 81 to 109 inches (2,057 to 2,769 millimeters)

Mean annual air temperature: 38 to 41 degrees F (4 to 5 degrees C)

Frost-free period: 50 to 80 days

Map Unit Composition

Terracelake component: 45 percent
Rock outcrop: 20 percent
Xeric Vitricryands, cirque floor component: 15 percent
Minor components: 20 percent

Characteristics of Terracelake

Setting

Landform: Glaciated lava plateaus
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Mountaintop
Slope range and aspect: 1 to 30 percent, north aspects
Parent material: Tephra over colluvium and residuum weathered from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 0 to 75 percent subangular gravel, 3 to 30 percent subangular cobbles, 0 to 25 percent subangular stones, 0 to 20 percent subangular boulders
Depth to a restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity to transmit water (K_{sat}): Very low to very high (See table on physical properties)
Annual flooding frequency: None
Annual ponding frequency: None
Minimum depth of seasonal high water table: More than 72 inches
Salinity maximum: Not saline
Sodicity maximum: Not sodic
Available water capacity (entire profile): Very low (about 2.6 inches)
Land capability class and subclass (nonirrigated): 4e
Hydric soil: No
Hydrologic soil group: B

Vegetation

Ecological site: *Tsuga mertensiana-Abies magnifica/Lupinus obtusilobus-Eriogonum marifolium* (F022B111CA)
Typical vegetation: Pinemat manzanita, mountain hemlock, mountain rush, bluntnose lupine

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 3 inches; gravelly ashy sandy loam
2Ab—3 to 7 inches; gravelly ashy sandy loam
2Bwb1—7 to 19 inches; very gravelly ashy fine sandy loam
2Bwb2—19 to 24 inches; extremely gravelly ashy fine sandy loam
2Bqb—24 to 37 inches; extremely stony ashy sandy loam
2R—37 inches; bedrock

Characteristics of Rock Outcrop

Setting

Landform: Glaciated lava plateaus
Slope range and aspect: 1 to 30 percent, north aspects
Definition: Rock outcrop consists of exposures of bare bedrock that have no soil

Component Properties and Qualities

Land capability class (nonirrigated): 8
Hydric soil: No

Characteristics of Xeric Vitricryands, Cirque Floor

Setting

Landform: Ground moraines on cirque floors on lava plateaus

Landform position (two-dimensional): Foothlope, toeslope

Landform position (three-dimensional): Mountaintop

Slope range and aspect: 1 to 30 percent, north aspects

Parent material: Subglacial till derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 20 to 80 percent subangular gravel, 5 to 15 percent subangular cobbles, 3 to 10 percent subangular stones, 3 to 10 percent subangular boulders

Depth to a restrictive feature: 20 to 40 inches to dense material

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Moderately low to high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Low (about 3.5 inches)

Land capability class and subclass (nonirrigated): 6e

Hydric soil: No

Hydrologic soil group: B

Vegetation

Ecological site: Cirque floor (R022BI205CA)

Typical vegetation: Bluntlobe lupine, marumleaf buckwheat, mountain hemlock, squirreltail

Typical Profile

A—0 to 2 inches; gravelly ashy sandy loam

Bw1—2 to 5 inches; very gravelly ashy sandy loam

Bw2—5 to 13 inches; gravelly ashy sandy loam

C1—13 to 26 inches; gravelly ashy sandy loam

C2—26 to 36 inches; gravelly ashy sandy loam

Cd—36 to 46 inches; gravelly sandy loam

Minor Components

Xeric Vitricryands, tephra over till

Composition: 10 percent

Landform: Moraines on lava plateaus

Slope range and aspect: 1 to 30 percent, north aspects

Hydric soil: No

Acroph

Composition: 10 percent

Landform: Glaciated lava plateaus

Slope range and aspect: 1 to 30 percent, north aspects

Hydric soil: No

137—Xeric Vitricryands-Rock outcrop complex, 10 to 45 percent slopes

General location: The top of Loomis Peak

Landscape: Mountains

Elevation: 7,740 to 8,650 feet (2,360 to 2,638 meters)

Mean annual precipitation: 81 to 99 inches (2,057 to 2,515 millimeters)

Mean annual air temperature: 40 degrees F (4 degrees C)

Frost-free period: 50 to 85 days

Map Unit Composition

Xeric Vitricryands component: 75 percent

Rock outcrop: 20 percent

Minor components: 5 percent

Characteristics of Xeric Vitricryands

Setting

Landform: Moraines on lava flows

Landform position (two-dimensional): Summit

Landform position (three-dimensional): Mountaintop

Slope range and aspect: 10 to 45 percent, southeast to northwest aspects

Parent material: Ash mixed with till derived from rhyodacite

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 15 to 60 percent subangular gravel, 3 to 15 percent subangular cobbles, 10 to 20 percent subangular stones, 5 to 25 percent subangular boulders

Depth to a restrictive feature: 40 to 80 inches to dense material

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Moderately low to very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Low (about 5.0 inches)

Land capability class and subclass (nonirrigated): 7e

Hydric soil: No

Hydrologic soil group: A

Vegetation

Ecological site: Windy peak (R022BI212CA)

Typical vegetation: Rubber rabbitbrush, oceanspray, squirreltail, granite prickly phlox

Typical Profile

A1—0 to 3 inches; stony ashy loamy sand

A2—3 to 9 inches; gravelly ashy loamy sand

A3—9 to 17 inches; very gravelly ashy fine sandy loam

AB—17 to 23 inches; gravelly ashy loamy sand

2Bw1—23 to 37 inches; very paragravelly ashy loamy sand

2Bw2—37 to 48 inches; very paragravelly ashy loamy sand

2Cd—48 to 59 inches; stony ashy loamy sand

Characteristics of Rock Outcrop

Setting

Landform: Lava flows

Slope range and aspect: 10 to 45 percent, southeast to northwest aspects

Definition: Rock outcrop consists of exposures of bare bedrock that have no soil

Component Properties and Qualities

Land capability class (nonirrigated): 8

Hydric soil: No

Minor Components

Acroph

Composition: 3 percent

Landform: Glaciated lava flows

Slope range and aspect: 10 to 45 percent, southeast to northwest aspects

Hydric soil: No

Terracelake

Composition: 2 percent

Landform: Glaciated lava flows

Slope range and aspect: 10 to 45 percent, southeast to northwest aspects

Hydric soil: No

138—Vitrandic Xerofluvents, debris flows-Typic Endoaquents complex, 0 to 8 percent slopes

General location: Valley bottom along Hat Creek

Landscape: Mountains

Elevation: 6,120 to 6,350 feet (1,866 to 1,937 meters)

Mean annual precipitation: 45 to 61 inches (1,143 to 1,549 millimeters)

Mean annual air temperature: 41 to 44 degrees F (5 to 6 degrees C)

Frost-free period: 60 to 85 days

Map Unit Composition

Vitrandic Xerofluvents, debris flows component: 80 percent

Typic Endoaquents component: 10 percent

Minor components: 10 percent

Characteristics of Vitrandic Xerofluvents, Debris Flows

Setting

Landform: Low stream terraces

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Tread

Slope range and aspect: 0 to 8 percent, west to southeast aspects

Parent material: Debris flow deposits over alluvium derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 0 to 20 percent subangular gravel, 0 to 10 percent subangular cobbles, 0 to 10 percent subangular stones, 0 to 10 percent subangular boulders

Depth to a restrictive feature: None within 60 inches

Drainage class: Somewhat poorly drained

Capacity to transmit water (K_{sat}): Moderately high to very high (See table on physical properties)

Soil Survey of Lassen Volcanic National Park, California

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: About 10 to 60 inches (See table on water features)

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Low (about 4.5 inches)

Land capability class and subclass (nonirrigated): 5w

Hydric soil: No

Hydrologic soil group: C

Vegetation

Ecological site: *Pinus contorta* var. *murrayana*-*Populus tremuloides*/*Elymus glaucus* (F022BI105CA)

Typical vegetation: Sierra lodgepole pine, blue wildrye, quaking aspen, sedge

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

Oe—1 to 3 inches; moderately decomposed plant material

C1—3 to 6 inches; ashy very fine sandy loam

C2—6 to 9 inches; ashy very fine sandy loam

C3—9 to 13 inches; ashy very fine sandy loam

C4—13 to 17 inches; ashy loamy coarse sand

C5—17 to 35 inches; very gravelly ashy loamy coarse sand

C6—35 to 50 inches; ashy extremely gravelly loamy coarse sand

2Ab1—50 to 55 inches; very gravelly ashy fine sandy loam

2Ab2—55 to 67 inches; very gravelly ashy fine sandy loam

Characteristics of Typic Endoaquents

Setting

Landform: Flood plains

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Tread

Slope range and aspect: 0 to 8 percent, west to southeast aspects

Parent material: Alluvium derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 70 to 80 percent subangular gravel, 10 to 20 percent subangular cobbles, 0 to 5 percent subangular stones

Depth to a restrictive feature: None within 60 inches

Drainage class: Poorly drained

Capacity to transmit water (K_{sat}): Very high (See table on physical properties)

Annual flooding frequency: Frequent (See table on water features)

Annual ponding frequency: None

Minimum depth of seasonal high water table: About 0 to 39 inches (See table on water features)

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 1.4 inches)

Land capability class and subclass (nonirrigated): 7w

Hydric soil: Yes

Hydrologic soil group: C

Vegetation

Ecological site: Sandy flood plains (R022BI213CA)

Typical vegetation: Sierra lodgepole pine, Lemmon's willow, Jeffrey pine, meadow barley

Typical Profile

C1—0 to 7 inches; extremely gravelly ashy sand
C2—7 to 14 inches; very gravelly ashy sand
C3—14 to 17 inches; ashy sand
C4—17 to 19 inches; very gravelly ashy sand
C5—19 to 26 inches; gravelly ashy sand
C6—26 to 31 inches; very gravelly ashy sand
C7—31 to 39 inches; extremely gravelly ashy coarse sand

Minor Components

Vitrixerands, low elevation

Composition: 9 percent
Landform: Outwash terraces
Slope range and aspect: 0 to 8 percent, west to southeast aspects
Hydric soil: No

Rock outcrop

Composition: 1 percent
Landform: Lava flows
Slope range and aspect: 0 to 8 percent, west to southeast aspects
Hydric soil: No

139—Duric Vitraquands-Typic Endoaquands-Aquandic Cryaquents complex, 0 to 8 percent slopes

General location: Valley bottom at Dersch Meadows
Landscape: Mountains
Elevation: 6,280 to 6,710 feet (1,915 to 2,044 meters)
Mean annual precipitation: 57 to 63 inches (1,448 to 1,600 millimeters)
Mean annual air temperature: 41 degrees F (5 degrees C)
Frost-free period: 50 to 85 days

Map Unit Composition

Duric Vitraquands component: 60 percent
Typic Endoaquands component: 20 percent
Aquandic Cryaquents component: 15 percent
Minor components: 5 percent

Characteristics of Duric Vitraquands

Setting

Landform: Outwash plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Mountainbase
Slope range and aspect: 0 to 8 percent, south to northeast aspects
Parent material: Volcanic ash over glaciolacustrine deposits over outwash derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: None noted
Depth to a restrictive feature: 40 to 60 inches to very weakly cemented duripan
Drainage class: Somewhat poorly drained

Soil Survey of Lassen Volcanic National Park, California

Capacity to transmit water (K_{sat}): Moderately low to very high (See table on physical properties)
Annual flooding frequency: None
Annual ponding frequency: None
Minimum depth of seasonal high water table: About 7 to 60 inches (See table on water features)
Salinity maximum: Not saline
Sodicity maximum: Not sodic
Available water capacity (entire profile): Very low (about 2.9 inches)
Land capability class and subclass (nonirrigated): 6w
Hydric soil: Yes
Hydrologic soil group: C

Vegetation

Ecological site: *Abies magnifica*-*Pinus contorta* var. *murrayana*/*Elymus elymoides* (F022BI117CA)
Typical vegetation: Sierra lodgepole pine, California red fir, squirreltail, white fir

Typical Profile

Oi—0 to 2 inches; slightly decomposed plant material
A—2 to 4 inches; gravelly ashy loamy coarse sand
2Ab1—4 to 7 inches; gravelly ashy loamy coarse sand
2Ab2—7 to 13 inches; gravelly ashy loamy coarse sand
3Ab3—13 to 17 inches; gravelly ashy coarse sandy loam
3Bwb—17 to 23 inches; gravelly ashy coarse sandy loam
3Bqb1—23 to 34 inches; very gravelly ashy loamy coarse sand
3Bqb2—34 to 44 inches; very gravelly ashy loamy coarse sand
3Bqmb—44 to 49 inches; cemented extremely gravelly ashy sandy loam

Characteristics of Typic Endoaquands

Setting

Landform: Stream terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Slope range and aspect: 0 to 8 percent, south to northeast aspects
Parent material: Alluvium derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 0 to 5 percent subrounded gravel
Depth to a restrictive feature: 40 to 80 inches to weakly cemented duripan
Drainage class: Poorly drained
Capacity to transmit water (K_{sat}): Moderately high to very high (See table on physical properties)
Annual flooding frequency: Frequent (See table on water features)
Annual ponding frequency: None
Minimum depth of seasonal high water table: About 0 to 60 inches (See table on water features)
Salinity maximum: Not saline
Sodicity maximum: Not sodic
Available water capacity (entire profile): Low (about 3.5 inches)
Land capability class and subclass (nonirrigated): 5w
Hydric soil: Yes
Hydrologic soil group: C

Vegetation

Ecological site: *Pinus contorta* var. *murrayana*/*Veratrum californicum* var. *californicum*-*Elymus glaucus* (F022BI108CA)

Typical vegetation: Sierra lodgepole pine, bluejoint, blue wildrye, common yarrow

Typical Profile

Oi—0 to 2 inches; slightly decomposed plant material

Oa—2 to 3 inches; mucky highly decomposed plant material

A1—3 to 11 inches; gravelly medial sandy loam

A2—11 to 17 inches; gravelly medial sandy loam

Bw—17 to 29 inches; gravelly medial sandy loam

C1—29 to 52 inches; extremely gravelly medial coarse sandy loam

C2—52 to 57 inches; extremely gravelly medial loamy coarse sand

Characteristics of Aquandic Cryaquents

Setting

Landform: Areas along channels in meadows in glacial lakes (relict)

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Tread

Slope range and aspect: 0 to 8 percent, south to northeast aspects

Parent material: Glaciolacustrine deposits derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: None noted

Depth to a restrictive feature: None within 60 inches

Drainage class: Very poorly drained

Capacity to transmit water (K_{sat}): Moderately high to very high (See table on physical properties)

Annual flooding frequency: Frequent (See table on water features)

Annual ponding frequency: None

Minimum depth of seasonal high water table: About 0 to 40 inches (See table on water features)

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Low (about 5.4 inches)

Land capability class and subclass (nonirrigated): 5w

Hydric soil: Yes

Hydrologic soil group: C

Vegetation

Ecological site: Cryic lacustrine flat (R022BI206CA)

Typical vegetation: Nebraska sedge, tundra aster, Northwest Territory sedge, tufted hairgrass

Typical Profile

Ag1—0 to 7 inches; silty clay loam

Ag2—7 to 12 inches; silty clay loam

Cg1—12 to 14 inches; ashy silt loam

Cg2—14 to 20 inches; very gravelly ashy coarse sand

Agb—20 to 28 inches; mucky silty clay loam

Cg3—28 to 34 inches; very gravelly ashy coarse sandy loam

Cg4—34 to 47 inches; very gravelly ashy coarse sand

Minor Components

Vitrandic Cryofluvents

Composition: 3 percent

Landform: Meadows in glacial lakes (relict)

Slope range and aspect: 0 to 8 percent, south to northeast aspects

Hydric soil: Yes

Vitrixerands

Composition: 1 percent

Landform: Outwash terraces

Slope range and aspect: 0 to 8 percent, south to northeast aspects

Hydric soil: No

Typic Endoaquents

Composition: 1 percent

Landform: Flood plains

Slope range and aspect: 0 to 8 percent, south to northeast aspects

Hydric soil: Yes

140—Vitrixerands gravelly ashy loamy coarse sand, 1 to 15 percent slopes

General location: Terrace above Dersch Meadows

Landscape: Mountains

Elevation: 6,430 to 6,800 feet (1,959 to 2,072 meters)

Mean annual precipitation: 57 to 61 inches (1,448 to 1,549 millimeters)

Mean annual air temperature: 41 degrees F (5 degrees C)

Frost-free period: 60 to 85 days

Map Unit Composition

Vitrixerands component: 90 percent

Minor components: 10 percent

Characteristics of Vitrixerands

Setting

Landform: Outwash terraces

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Tread

Slope range and aspect: 1 to 15 percent, south to east aspects

Parent material: Glaciolacustrine deposits over outwash derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 10 to 50 percent subangular gravel, 0 to 2 percent subangular cobbles, 0 to 2 percent subangular stones, 0 to 1 percent subangular boulders

Depth to a restrictive feature: 20 to 60 inches to strongly cemented duripan

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Moderately low to very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 2.2 inches)

Land capability class and subclass (nonirrigated): 6e

Hydric soil: No

Hydrologic soil group: B

Vegetation

Ecological site: *Abies magnifica-Pinus contorta* var. *murrayana/Elymus elymoides*
(F022BI117CA)

Typical vegetation: Sierra lodgepole pine, California red fir, squirreltail

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

A1—1 to 4 inches; gravelly ashy loamy coarse sand

A2—4 to 8 inches; gravelly ashy loamy coarse sand

A3—8 to 12 inches; gravelly ashy loamy coarse sand

2Ab—12 to 21 inches; gravelly ashy loamy sand

2Bwb—21 to 37 inches; very stony medial loamy sand

2Bqmb—37 to 46 inches; cemented duripan

Minor Components

Duric Vitraquands

Composition: 10 percent

Landform: Outwash plains

Slope range and aspect: 1 to 15 percent, south to east aspects

Hydric soil: Yes

141—Humic Haploxerands-Typic Haploxerands-Bearrubble-Rubble land complex, 5 to 40 percent slopes

General location: Table Mountain

Landscape: Mountains

Elevation: 5,460 to 6,890 feet (1,663 to 2,101 meters)

Mean annual precipitation: 37 to 57 inches (940 to 1,448 millimeters)

Mean annual air temperature: 43 to 44 degrees F (6 to 7 degrees C)

Frost-free period: 70 to 90 days

Map Unit Composition

Humic Haploxerands component: 40 percent

Typic Haploxerands component: 35 percent

Bearrubble component: 15 percent

Rubble land: 10 percent

Minor components: 0 percent

Characteristics of Humic Haploxerands

Setting

Landform: Unglaciaded shield volcanoes

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Mountainflank

Slope range and aspect: 5 to 40 percent, north to southwest aspects

Parent material: Ash over colluvium derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 0 to 20 percent subangular gravel, 0 to 1 percent subangular cobbles

Depth to a restrictive feature: None within 60 inches
Drainage class: Well drained
Capacity to transmit water (K_{sat}): Moderately high or high (See table on physical properties)
Annual flooding frequency: None
Annual ponding frequency: None
Minimum depth of seasonal high water table: More than 72 inches
Salinity maximum: Not saline
Sodicity maximum: Not sodic
Available water capacity (entire profile): Low (about 3.9 inches)
Land capability class and subclass (nonirrigated): 4e
Hydric soil: No
Hydrologic soil group: A

Vegetation

Ecological site: *Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens* (F022BI103CA)
Typical vegetation: Greenleaf manzanita, snowbrush ceanothus, white fir, bush chinquapin

Typical Profile

Oi—0 to 2 inches; slightly decomposed plant material
Oa—2 to 3 inches; highly decomposed plant material
A1—3 to 4 inches; medial fine sandy loam
A2—4 to 6 inches; medial sandy loam
2Ab—6 to 15 inches; extremely stony medial sandy loam
2Bwb1—15 to 24 inches; very stony medial sandy loam
2Bwb2—24 to 29 inches; cobbly medial sandy loam
2Bwb3—29 to 42 inches; cobbly sandy loam
2Bwb4—42 to 60 inches; very stony medial loam

Characteristics of Typic Haploxerands

Setting

Landform: Unglaciaded shield volcanoes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Slope range and aspect: 5 to 40 percent, north to southwest aspects
Parent material: Colluvium over residuum weathered from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 5 to 10 percent subangular gravel, 10 to 30 percent subangular cobbles, 2 to 20 percent subangular stones, 2 to 20 percent subangular boulders
Depth to a restrictive feature: None within 60 inches
Drainage class: Well drained
Capacity to transmit water (K_{sat}): Moderately high or high (See table on physical properties)
Annual flooding frequency: None
Annual ponding frequency: None
Minimum depth of seasonal high water table: More than 72 inches
Salinity maximum: Not saline
Sodicity maximum: Not sodic
Available water capacity (entire profile): Low (about 4.0 inches)
Land capability class and subclass (nonirrigated): 4e
Hydric soil: No
Hydrologic soil group: A

Vegetation

Ecological site: Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens (F022BI103CA)

Typical vegetation: Jeffrey pine, incense cedar, white fir, Douglas-fir

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

A—1 to 2 inches; gravelly medial sandy loam

AB—2 to 5 inches; gravelly medial sandy loam

Bw1—5 to 12 inches; very gravelly medial sandy loam

Bw2—12 to 20 inches; very cobbly medial sandy loam

Bw3—20 to 30 inches; very gravelly medial sandy loam

Bw4—30 to 37 inches; extremely gravelly medial sandy loam

2Bw5—37 to 44 inches; extremely stony medial sandy loam

2Bw6—44 to 50 inches; stony medial sandy loam

2BC—50 to 61 inches; extremely paragravelly medial sandy loam

Characteristics of Bearrubble

Setting

Landform: Unglaciaded shield volcanoes

Landform position (two-dimensional): Summit

Landform position (three-dimensional): Mountainflank

Slope range and aspect: 5 to 40 percent, north to southwest aspects

Parent material: Tephra over residuum weathered from basalt and/or basaltic andesite

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 0 to 5 percent subangular gravel, 0 to 10 percent subangular cobbles, 15 to 25 percent subangular stones, 10 to 30 percent subangular boulders

Depth to a restrictive feature: None within 60 inches

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Moderately high to very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Low (about 3.4 inches)

Land capability class and subclass (nonirrigated): 4e

Hydric soil: No

Hydrologic soil group: A

Vegetation

Ecological site: Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens (F022BI103CA)

Typical vegetation: Greenleaf manzanita, Jeffrey pine, bush chinquapin, white fir

Typical Profile

Oi—0 to 3 inches; slightly decomposed plant material

A—3 to 6 inches; ashy fine sand

C—6 to 13 inches; extremely cobbly loamy coarse sand

2Bwb1—13 to 19 inches; extremely cobbly ashy sandy loam

2Bwb2—19 to 35 inches; extremely stony medial sandy loam

2Bwb3—35 to 49 inches; very stony medial fine sandy loam

2Bwb4—49 to 60 inches; very stony medial fine sandy loam



Figure 16.—Map unit 142 on the flat ground in the foreground and on the right. Map unit 145 is on the slope in the left portion of the photo. This photo shows the boundary between a moraine and an outwash plain southeast of Craggs Campground.

Characteristics of Rubble Land

Setting

Landform: Unglaciaded shield volcanoes

Slope range and aspect: 5 to 40 percent, north to southwest aspects

Definition: Rubble land consists of areas of cobbles, stones, and boulders and has little or no soil

Component Properties and Qualities

Land capability class (nonirrigated): 8

Hydric soil: No

142—Cragwash ashy loamy coarse sand, 1 to 30 percent slopes

General location: Outwash plains in the northwest area of the park

Landscape: Mountains (fig. 16)

Elevation: 5,500 to 7,260 feet (1,676 to 2,212 meters)

Mean annual precipitation: 39 to 93 inches (991 to 2,362 millimeters)

Mean annual air temperature: 40 to 44 degrees F (4 to 7 degrees C)

Frost-free period: 60 to 85 days

Map Unit Composition

Cragwash component: 85 percent

Minor components: 15 percent

Characteristics of Cragwash

Setting

Landform: Outwash plains

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Mountainbase

Slope range and aspect: 1 to 30 percent, west to east aspects

Parent material: Alluvium redeposited from tephra over outwash derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 5 to 20 percent subangular gravel, 0 to 10 percent subangular cobbles, 0 to 1 percent subangular stones, 0 to 1 percent subangular boulders

Depth to a restrictive feature: 40 to 60 inches to strongly cemented duripan

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Moderately low to very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 2.1 inches)

Land capability class and subclass (nonirrigated): 6e

Hydric soil: No

Hydrologic soil group: A

Vegetation

Ecological site: *Abies concolor*-*Pinus jeffreyi*/*Arctostaphylos patula*-*Chrysolepis sempervirens* (F022B1103CA)

Typical vegetation: White fir, Jeffrey pine, Idaho fescue, rubber rabbitbrush

Typical Profile

Oi—0 to 2 inches; slightly decomposed plant material

A1—2 to 3 inches; ashy loamy coarse sand

A2—3 to 5 inches; gravelly ashy coarse sand

C—5 to 11 inches; very gravelly ashy coarse sandy loam

2Ab—11 to 17 inches; very gravelly ashy loamy coarse sand

2Bwb1—17 to 27 inches; very gravelly ashy loamy coarse sand

2Bwb2—27 to 38 inches; extremely gravelly ashy loamy coarse sand

2Bqb—38 to 57 inches; extremely cobbly ashy coarse sand

2Bqmb—57 to 82 inches; cemented extremely gravelly ashy loamy coarse sand

Minor Components

Sueredo

Composition: 7 percent

Landform: Ground moraines

Slope range and aspect: 1 to 30 percent, west to east aspects

Hydric soil: No

Rubble land

Composition: 3 percent

Landform: Lava flows

Slope range and aspect: 1 to 35 percent, west to east aspects

Hydric soil: No

Aquepts

Composition: 3 percent

Landform: Kettles

Slope range and aspect: 1 to 4 percent, west to east aspects

Hydric soil: Yes

Rock outcrop

Composition: 2 percent

Landform: Lava flows

Slope range and aspect: 1 to 35 percent, west to east aspects

Hydric soil: No

**143—Andic Durixerepts gravelly ashy loamy coarse sand,
3 to 20 percent slopes**

General location: Outwash terrace west of Summit Lake

Landscape: Mountains

Elevation: 6,630 to 7,130 feet (2,020 to 2,174 meters)

Mean annual precipitation: 61 to 89 inches (1,549 to 2,261 millimeters)

Mean annual air temperature: 41 degrees F (5 degrees C)

Frost-free period: 60 to 85 days

Map Unit Composition

Andic Durixerepts component: 95 percent

Minor components: 5 percent

Characteristics of Andic Durixerepts

Setting

Landform: Outwash terraces

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Tread

Slope range and aspect: 3 to 20 percent, northwest to east aspects

Parent material: Ash over outwash derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 5 to 50 percent subangular gravel, 1 to 5 percent subangular cobbles, 0 to 3 percent subangular stones, 0 to 3 percent subangular boulders

Depth to a restrictive feature: 20 to 40 inches to strongly cemented duripan

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Moderately low to very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 0.8 inch)

Land capability class and subclass (nonirrigated): 6e

Hydric soil: No

Hydrologic soil group: B

Vegetation

Ecological site: *Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale* (F022B1115CA)

Typical vegetation: Pinemat manzanita, western white pine, California red fir, western needlegrass

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 3 inches; gravelly ashy loamy coarse sand
2Bw1—3 to 12 inches; extremely cobbly ashy coarse sandy loam
2Bw2—12 to 19 inches; extremely gravelly ashy coarse sandy loam
2Bq—19 to 24 inches; extremely gravelly loamy coarse sand
2Bqm—24 to 31 inches; cemented extremely gravelly ashy coarse sandy loam

Minor Components

Cascadesprings

Composition: 3 percent
Landform: Ground moraines
Slope range and aspect: 3 to 20 percent, northwest to east aspects
Hydric soil: No

Aquepts

Composition: 2 percent
Landform: Drainageways
Slope range and aspect: 2 to 20 percent, northwest to east aspects
Hydric soil: Yes

144—Xeric Vitricryands, cirque floor-Humic Xeric Vitricryands complex, 1 to 35 percent slopes

General location: The base of Lassen Peak and glacial-valley floors around Upper Kings Creek Meadows (fig. 17)
Landscape: Mountains
Elevation: 7,220 to 9,160 feet (2,201 to 2,792 meters)
Mean annual precipitation: 103 to 125 inches (2,616 to 3,175 millimeters)
Mean annual air temperature: 38 to 41 degrees F (4 to 5 degrees C)
Frost-free period: 50 to 85 days

Map Unit Composition

Xeric Vitricryands, cirque floor component: 55 percent
Humic Xeric Vitricryands component: 30 percent
Minor components: 15 percent

Characteristics of Xeric Vitricryands, Cirque Floor

Setting

Landform: Ground moraines on cirque floors
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Mountainbase
Slope range and aspect: 1 to 35 percent, north to southwest aspects
Parent material: Subglacial till derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 20 to 80 percent subangular gravel, 5 to 15 percent subangular cobbles, 3 to 10 percent subangular stones, 3 to 10 percent subangular boulders
Depth to a restrictive feature: 20 to 40 inches to dense material



Figure 17.—Map unit 144 around Lake Helen. Map unit 114 is on the cirque wall in the background.

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Moderately low to high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Low (about 3.5 inches)

Land capability class and subclass (nonirrigated): 6e

Hydric soil: No

Hydrologic soil group: B

Vegetation

Ecological site: Cirque floor (R022BI205CA)

Typical vegetation: Bluntlobe lupine, Shasta buckwheat, mountain hemlock, Mt. Hood pussypaws

Typical Profile

A—0 to 2 inches; gravelly ashy sandy loam

Bw1—2 to 5 inches; very gravelly ashy sandy loam

Bw2—5 to 13 inches; gravelly ashy sandy loam

C1—13 to 26 inches; gravelly ashy sandy loam

C2—26 to 36 inches; gravelly ashy sandy loam

Cd—36 to 46 inches; gravelly sandy loam

Characteristics of Humic Xeric Vitricryands

Setting

Landform: Moraines

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Mountainbase

Slope range and aspect: 1 to 35 percent, north to southwest aspects

Parent material: Tephra over till derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 20 to 50 percent subangular gravel, 15 to 20 percent subangular cobbles, 5 to 25 percent subangular stones, 5 to 10 percent subangular boulders

Depth to a restrictive feature: 20 to 40 inches to dense material

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Moderately low to high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 2.1 inches)

Land capability class and subclass (nonirrigated): 6e

Hydric soil: No

Hydrologic soil group: B

Vegetation

Ecological site: *Tsuga mertensiana/Lupinus obtusilobus-Cistanthe umbellata* var. *umbellata* (F022BI104CA)

Typical vegetation: Mountain hemlock, bluntlobe lupine, Rocky Mountain pussytoes, spike trisetum

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

A—1 to 4 inches; gravelly medial sandy loam

2Ab—4 to 6 inches; gravelly ashy sandy loam

2Bwb1—6 to 12 inches; very gravelly ashy sandy loam

2Bwb2—12 to 18 inches; very gravelly ashy sandy loam

2Bwb3—18 to 24 inches; gravelly ashy sandy loam

2Cdq—24 to 30 inches; very gravelly coarse sandy loam

Minor Components

Rock outcrop

Composition: 5 percent

Landform: Glacial-valley floors

Slope range and aspect: 1 to 35 percent, north to southwest aspects

Hydric soil: No

Terracelake

Composition: 5 percent

Landform: Moraines

Slope range and aspect: 1 to 35 percent, north to southwest aspects

Hydric soil: No

Aquepts

Composition: 3 percent

Landform: Drainageways

Slope range and aspect: 1 to 35 percent, north to southwest aspects

Hydric soil: Yes

Shadowlake

Composition: 2 percent

Landform: Ground moraines

Slope range and aspect: 1 to 35 percent, north to southwest aspects

Hydric soil: No

145—Sueredo bouldery ashy loamy coarse sand, 2 to 30 percent slopes

General location: Glacial valleys in Manzanita Creek, Lost Creek, and Hat Creek drainages

Landscape: Mountains

Elevation: 5,640 to 7,490 feet (1,720 to 2,284 meters)

Mean annual precipitation: 41 to 89 inches (1,041 to 2,261 millimeters)

Mean annual air temperature: 40 to 44 degrees F (4 to 7 degrees C)

Frost-free period: 60 to 85 days

Map Unit Composition

Sueredo component: 85 percent

Minor components: 15 percent

Characteristics of Sueredo

Setting

Landform: Ground moraines

Landform position (two-dimensional): Footslope

Landform position (three-dimensional): Mountainbase

Slope range and aspect: 2 to 30 percent, southwest to east aspects

Parent material: Tephra over till derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 0 to 25 percent subangular gravel, 0 to 15 percent subangular cobbles, 0 to 5 percent subangular stones, 0 to 10 percent subangular boulders

Depth to a restrictive feature: 55 to 80 inches to dense material

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Moderately low to very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 2.0 inches)

Land capability class and subclass (nonirrigated): 7e

Hydric soil: No

Hydrologic soil group: A

Vegetation

Ecological site: *Abies concolor*-*Pinus jeffreyi*/*Arctostaphylos patula*-*Chrysolepis sempervirens* (F022BI103CA)

Typical vegetation: White fir, Jeffrey pine, greenleaf manzanita, western needlegrass

Typical Profile

Oi—0 to 2 inches; slightly decomposed plant material
Oe—2 to 5 inches; moderately decomposed plant material
A1—5 to 9 inches; bouldery ashy loamy coarse sand
A2—9 to 13 inches; bouldery ashy loamy coarse sand
C1—13 to 16 inches; bouldery ashy loamy coarse sand
C2—16 to 18 inches; very bouldery ashy coarse sand
2Ab—18 to 26 inches; very bouldery ashy loamy coarse sand
2Bwb—26 to 50 inches; extremely cobbly ashy coarse sand
2C—50 to 76 inches; ashy stones
2Cdq—76 to 83 inches; extremely bouldery ashy loamy coarse sand

Minor Components

Vitrandic Cryorthents

Composition: 5 percent
Landform: Moraines
Slope range and aspect: 2 to 30 percent, southwest to east aspects
Hydric soil: No

Cragwash

Composition: 3 percent
Landform: Outwash plains
Slope range and aspect: 2 to 30 percent, southwest to east aspects
Hydric soil: No

Rock outcrop

Composition: 3 percent
Landform: Lava flows
Slope range and aspect: 2 to 30 percent, southwest to east aspects
Hydric soil: No

Aquepts

Composition: 2 percent
Landform: Kettles
Slope range and aspect: 2 to 4 percent, southwest to east aspects
Hydric soil: Yes

Badgerflat

Composition: 2 percent
Landform: Ground moraines
Slope range and aspect: 2 to 30 percent, southwest to east aspects
Hydric soil: No

146—Sueredo bouldery ashy loamy coarse sand, 20 to 60 percent slopes

General location: Glacial-valley walls in Manzanita Creek, Lost Creek, and Hat Creek drainages
Landscape: Mountains
Elevation: 5,910 to 7,470 feet (1,801 to 2,277 meters)
Mean annual precipitation: 43 to 95 inches (1,092 to 2,413 millimeters)
Mean annual air temperature: 40 to 44 degrees F (4 to 6 degrees C)
Frost-free period: 60 to 85 days

Map Unit Composition

Sueredo component: 90 percent

Minor components: 10 percent

Characteristics of Sueredo

Setting

Landform: Ground moraines on glacial-valley walls

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Mountainbase

Slope range and aspect: 20 to 60 percent, south to east aspects

Parent material: Tephra over till derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 0 to 25 percent subangular gravel, 0 to 15 percent subangular cobbles, 0 to 5 percent subangular stones, 0 to 10 percent subangular boulders

Depth to a restrictive feature: 55 to 80 inches to dense material

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Moderately low to very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 2.0 inches)

Land capability class and subclass (nonirrigated): 7e

Hydric soil: No

Hydrologic soil group: A

Vegetation

Ecological site: *Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens* (F022BI103CA)

Typical vegetation: White fir, Jeffrey pine, greenleaf manzanita, whiteveined wintergreen

Typical Profile

Oi—0 to 2 inches; slightly decomposed plant material

Oe—2 to 5 inches; moderately decomposed plant material

A1—5 to 9 inches; bouldery ashy loamy coarse sand

A2—9 to 13 inches; bouldery ashy loamy coarse sand

C1—13 to 16 inches; bouldery ashy loamy coarse sand

C2—16 to 18 inches; very bouldery ashy coarse sand

2Ab—18 to 26 inches; very bouldery ashy loamy coarse sand

2Bwb—26 to 50 inches; extremely cobbly ashy coarse sand

2C—50 to 76 inches; ashy stones

2Cdq—76 to 83 inches; extremely bouldery ashy loamy coarse sand

Minor Components

Scoured

Composition: 3 percent

Landform: Scoured glacial-valley walls

Slope range and aspect: 20 to 60 percent, south to east aspects

Hydric soil: No

Rock outcrop

Composition: 3 percent

Landform: Scoured glacial-valley walls

Slope range and aspect: 20 to 60 percent, south to east aspects

Hydric soil: No

Vitrandic Cryorthents

Composition: 3 percent

Landform: Moraines

Slope range and aspect: 20 to 60 percent, south to east aspects

Hydric soil: No

Vitrandic Xerorthents, debris fan

Composition: 1 percent

Landform: Debris flows

Slope range and aspect: 20 to 60 percent, south to east aspects

Hydric soil: No

147—Summertown gravelly ashy loamy coarse sand, 5 to 35 percent slopes

General location: Glacial valley in the Manzanita Creek drainage

Landscape: Mountains

Elevation: 5,710 to 6,800 feet (1,739 to 2,074 meters)

Mean annual precipitation: 39 to 65 inches (991 to 1,651 millimeters)

Mean annual air temperature: 40 to 45 degrees F (4 to 7 degrees C)

Frost-free period: 70 to 90 days

Map Unit Composition

Summertown component: 85 percent

Minor components: 15 percent

Characteristics of Summertown

Setting

Landform: Moraines

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Mountainbase

Slope range and aspect: 5 to 35 percent, south to north aspects

Parent material: Volcanic ash mixed with till derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 2 to 20 percent subangular gravel, 1 to 5 percent subangular cobbles, 1 to 3 percent subangular stones, 1 to 3 percent subangular boulders

Depth to a restrictive feature: 20 to 40 inches to dense material

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Moderately low to very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 1.4 inches)

Land capability class and subclass (nonirrigated): 7e

Hydric soil: No

Hydrologic soil group: B

Vegetation

Ecological site: *Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens* (F022B1103CA)

Typical vegetation: White fir, bush chinquapin, Jeffrey pine, greenleaf manzanita

Typical Profile

O_i—0 to 2 inches; slightly decomposed plant material

O_a—2 to 4 inches; highly decomposed plant material

A—4 to 6 inches; gravelly ashy loamy coarse sand

AB—6 to 15 inches; cobbly ashy loamy coarse sand

2Bw₁—15 to 22 inches; very cobbly ashy loamy coarse sand

2Bw₂—22 to 31 inches; extremely cobbly ashy loamy sand

2Cdq—31 to 43 inches; extremely stony ashy loamy coarse sand

Minor Components

Sueredo

Composition: 7 percent

Landform: Ground moraines

Slope range and aspect: 5 to 35 percent, south to north aspects

Hydric soil: No

Humic Haploxerands, outwash

Composition: 4 percent

Landform: Outwash plains

Slope range and aspect: 5 to 35 percent, south to north aspects

Hydric soil: No

Vitrandic Xerorthents, debris fan

Composition: 2 percent

Landform: Debris flows

Slope range and aspect: 5 to 35 percent, south to north aspects

Hydric soil: No

Rock outcrop

Composition: 2 percent

Landform: Lava flows

Slope range and aspect: 5 to 35 percent, south to north aspects

Hydric soil: No

148—Humic Haploxerands, lake terrace-Typic Endoaquands complex, 1 to 30 percent slopes

General location: Lake terraces around Juniper Lake and Snag Lake

Landscape: Mountains

Elevation: 6,080 to 6,900 feet (1,853 to 2,102 meters)

Mean annual precipitation: 35 to 51 inches (889 to 1,295 millimeters)

Mean annual air temperature: 41 to 42 degrees F (5 to 6 degrees C)

Frost-free period: 60 to 85 days

Map Unit Composition

Humic Haploxerands, lake terrace component: 70 percent

Typic Endoaquands component: 15 percent

Minor components: 15 percent

Characteristics of Humic Haploxerands, Lake Terrace

Setting

Landform: Lake terraces

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Tread

Slope range and aspect: 1 to 30 percent, north aspects

Parent material: Lacustrine deposits derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 15 to 70 percent subangular gravel, 0 to 2 percent subangular cobbles, 0 to 10 percent subangular stones, 0 to 5 percent subangular boulders

Depth to a restrictive feature: 20 to 80 inches to moderately cemented duripan

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Moderately low to high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 1.4 inches)

Land capability class and subclass (nonirrigated): 7e

Hydric soil: No

Hydrologic soil group: B

Vegetation

Ecological site: *Abies magnifica*/*Penstemon gracilentus*-*Lupinus arbustus*
(F022BI112CA)

Typical vegetation: Sierra lodgepole pine, longspur lupine, California red fir, mountain monardella

Typical Profile

Oi—0 to 0.4 inch; slightly decomposed plant material

A1—0.4 inch to 3 inches; medial sandy loam

A2—3 to 11 inches; very bouldery medial fine sandy loam

A3—11 to 18 inches; extremely bouldery medial fine sandy loam

Bw—18 to 26 inches; very cobbly medial fine sandy loam

Bqm—26 to 35 inches; cemented very gravelly medial sandy loam

Characteristics of Typic Endoaquands

Setting

Landform: Lake terraces

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Tread

Slope range and aspect: 1 to 30 percent, north aspects

Parent material: Alluvium derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 0 to 5 percent subrounded gravel

Depth to a restrictive feature: 40 to 80 inches to weakly cemented duripan

Drainage class: Poorly drained

Capacity to transmit water (K_{sat}): Moderately high to very high (See table on physical properties)

Annual flooding frequency: Frequent (See table on water features)

Annual ponding frequency: None

Minimum depth of seasonal high water table: About 0 to 60 inches (See table on water features)

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Low (about 3.5 inches)

Land capability class and subclass (nonirrigated): 5w

Hydric soil: Yes

Hydrologic soil group: C

Vegetation

Ecological site: *Pinus contorta* var. *murrayana*/*Veratrum californicum* var. *californicum*-*Elymus glaucus* (F022B1108CA)

Typical vegetation: Sierra lodgepole pine, arrowleaf ragwort, California false hellebore, bigleaf lupine

Typical Profile

Oi—0 to 2 inches; slightly decomposed plant material

Oa—2 to 3 inches; mucky highly decomposed plant material

A1—3 to 11 inches; gravelly medial sandy loam

A2—11 to 17 inches; gravelly medial sandy loam

Bw—17 to 29 inches; gravelly medial sandy loam

C1—29 to 52 inches; extremely gravelly medial coarse sandy loam

C2—52 to 57 inches; extremely gravelly medial loamy coarse sand

Minor Components

Juniperlake

Composition: 5 percent

Landform: Ground moraines

Slope range and aspect: 1 to 30 percent, north aspects

Hydric soil: No

Beaches

Composition: 4 percent

Landform: Beaches

Slope range and aspect: 1 to 8 percent, north aspects

Hydric soil: No

Rubble land

Composition: 3 percent

Landform: Wave-worked moraines

Slope range and aspect: 1 to 30 percent, north aspects

Hydric soil: No

Histic Humaquepts, lake sediments

Composition: 2 percent

Landform: Meadows in glacial lakes (relict)

Slope range and aspect: 1 to 4 percent, north aspects

Hydric soil: Yes

Histic Humaquepts, frequently flooded

Composition: 1 percent

Landform: Areas along channels in glacial lakes (relict)

Slope range and aspect: 1 to 4 percent, north aspects

Hydric soil: Yes



Figure 18.—Map unit 149 is on the sparsely vegetated cliffs and talus in the middle ground. Map unit 114 is in the foreground. This view is from Mount Conard looking east across the glacial valley in the Rice Creek drainage.

149—Rubble land-Rock outcrop, cliffs-Emeraldlake association, 35 to 150 percent slopes

General location: Glacially carved cliffs in the southwest and west-central areas of the park (fig. 18)

Landscape: Mountains

Elevation: 6,470 to 8,840 feet (1,973 to 2,693 meters)

Mean annual precipitation: 81 to 125 inches (2,057 to 3,175 millimeters)

Mean annual air temperature: 38 to 41 degrees F (4 to 5 degrees C)

Frost-free period: 50 to 85 days

Map Unit Composition

Rubble land: 45 percent

Rock outcrop: 30 percent

Emeraldlake component: 15 percent

Minor components: 10 percent

Characteristics of Rubble Land

Setting

Landform: Colluvial aprons

Slope range and aspect: 35 to 60 percent, northwest to southwest aspects

Definition: Rubble land consists of areas of cobbles, stones, and boulders and has little or no soil

Component Properties and Qualities

Land capability class (nonirrigated): 8

Hydric soil: No

Characteristics of Rock Outcrop

Setting

Landform: Cliffs

Slope range and aspect: 100 to 150 percent, northwest to southwest aspects

Definition: Rock outcrop consists of exposures of bare bedrock that have no soil

Component Properties and Qualities

Land capability class (nonirrigated): 8

Hydric soil: No

Characteristics of Emeraldlake

Setting

Landform: Colluvial aprons

Landform position (two-dimensional): Footslope

Landform position (three-dimensional): Mountainbase

Slope range and aspect: 35 to 60 percent, northwest to southwest aspects

Parent material: Tephra mixed with colluvium derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 10 to 45 percent subangular gravel, 5 to 45 percent subangular cobbles, 5 to 20 percent subangular stones, 3 to 15 percent subangular boulders

Depth to a restrictive feature: None within 60 inches

Drainage class: Somewhat excessively drained

Capacity to transmit water (K_{sat}): High or very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 1.6 inches)

Land capability class and subclass (nonirrigated): 7e

Hydric soil: No

Hydrologic soil group: A

Vegetation

Ecological site: Alpine slopes (R022BI207CA)

Typical vegetation: Bluntlobe lupine, mountain hemlock, Parry's rush, sedge

Typical Profile

A1—0 to 1 inch; extremely gravelly ashy fine sandy loam

A2—1 to 5 inches; extremely gravelly ashy loamy sand

A3—5 to 14 inches; extremely gravelly ashy loamy sand

Bw1—14 to 25 inches; extremely gravelly ashy loamy coarse sand

Bw2—25 to 35 inches; extremely gravelly ashy loamy coarse sand

Bw3—35 to 51 inches; ashy boulders

Bw4—51 to 60 inches; ashy boulders

Minor Components

Acroph

Composition: 4 percent

Landform: Glaciated lava plateaus



Figure 19.—Map unit 150 on the north side of Blue Lake Canyon.

Slope range and aspect: 35 to 90 percent, northwest to southwest aspects
Hydric soil: No

Terracelake

Composition: 3 percent
Landform: Glaciated lava plateaus
Slope range and aspect: 35 to 90 percent, northwest to southwest aspects
Hydric soil: No

Readingpeak

Composition: 3 percent
Landform: Glaciated lava plateaus
Slope range and aspect: 35 to 90 percent, northwest to southwest aspects
Hydric soil: No

150—Shadowlake-Terracelake-Acroph-Rock outcrop complex, 15 to 80 percent slopes

General location: Glacial-valley walls in the upper drainages of Hat Creek, Lost Creek, Manzanita Creek, North Fork Bailey Creek, and South Fork Bailey Creek (fig. 19)
Landscape: Mountains
Elevation: 6,360 to 8,510 feet (1,938 to 2,595 meters)
Mean annual precipitation: 61 to 107 inches (1,549 to 2,718 millimeters)
Mean annual air temperature: 39 to 43 degrees F (4 to 6 degrees C)
Frost-free period: 50 to 85 days

Map Unit Composition

Shadowlake component: 40 percent
Terracelake component: 30 percent
Acroph component: 15 percent
Rock outcrop: 10 percent
Minor components: 5 percent

Characteristics of Shadowlake

Setting

Landform: Ground moraines on glacial-valley walls
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Slope range and aspect: 15 to 80 percent, southeast to northeast aspects
Parent material: Tephra over or mixed with till derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 7 to 40 percent subangular gravel, 3 to 5 percent subangular cobbles, 1 to 10 percent subangular stones, 0 to 10 percent subangular boulders
Depth to a restrictive feature: 35 to 60 inches to dense material
Drainage class: Well drained
Capacity to transmit water (K_{sat}): Moderately low to very high (See table on physical properties)
Annual flooding frequency: None
Annual ponding frequency: None
Minimum depth of seasonal high water table: More than 72 inches
Salinity maximum: Not saline
Sodicity maximum: Not sodic
Available water capacity (entire profile): Low (about 4.1 inches)
Land capability class and subclass (nonirrigated): 4e
Hydric soil: No
Hydrologic soil group: A

Vegetation

Ecological site: *Abies magnifica*-*Pinus monticola*/*Arctostaphylos nevadensis*/*Achnatherum occidentale* (F022B115CA)
Typical vegetation: California red fir, western white pine, pinemat manzanita, greenleaf manzanita

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 2 inches; gravelly ashy sandy loam
Bw1—2 to 6 inches; gravelly ashy sandy loam
Bw2—6 to 13 inches; gravelly ashy sandy loam
Bw3—13 to 23 inches; very gravelly ashy sandy loam
Bq—23 to 41 inches; extremely gravelly ashy coarse sandy loam
Cdq—41 to 51 inches; loam

Characteristics of Terracelake

Setting

Landform: Scoured glacial-valley walls
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Slope range and aspect: 15 to 80 percent, southeast to northeast aspects
Parent material: Tephra over colluvium and residuum weathered from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 0 to 75 percent subangular gravel, 3 to 30 percent subangular cobbles, 0 to 25 percent subangular stones, 0 to 20 percent subangular boulders

Depth to a restrictive feature: 20 to 40 inches to lithic bedrock

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Very low to very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 2.6 inches)

Land capability class and subclass (nonirrigated): 6e

Hydric soil: No

Hydrologic soil group: B

Vegetation

Ecological site: *Abies magnifica*-*Pinus monticola*/*Arctostaphylos nevadensis*/*Achnatherum occidentale* (F022B115CA)

Typical vegetation: Pinemat manzanita, California red fir, western white pine, Sierra lodgepole pine

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

A—1 to 3 inches; gravelly ashy sandy loam

2Ab—3 to 7 inches; gravelly ashy sandy loam

2Bwb1—7 to 19 inches; very gravelly ashy fine sandy loam

2Bwb2—19 to 24 inches; extremely gravelly ashy fine sandy loam

2Bqb—24 to 37 inches; extremely stony ashy sandy loam

2R—37 inches; bedrock

Characteristics of Acroph

Setting

Landform: Scoured glacial-valley walls

Landform position (two-dimensional): Shoulder

Landform position (three-dimensional): Mountainflank

Slope range and aspect: 15 to 80 percent, southeast to northeast aspects

Parent material: Tephra over residuum

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 5 to 66 percent subangular gravel, 3 to 15 percent subangular cobbles, 2 to 6 percent subangular stones, 2 to 5 percent subangular boulders

Depth to a restrictive feature: 10 to 20 inches to lithic bedrock

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Very low to very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 0.9 inch)

Land capability class (nonirrigated): 8

Hydric soil: No

Hydrologic soil group: D

Vegetation

Ecological site: Glaciated mountain slopes (R022BI204CA)

Typical vegetation: Pinemat manzanita, California red fir, oceanspray, western white pine

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

A1—1 to 2 inches; ashy highly organic sand

A2—2 to 5 inches; ashy highly organic loamy sand

2Bw1—5 to 11 inches; very cobbly ashy loamy sand

2Bw2—11 to 15 inches; extremely cobbly ashy loamy sand

2R—15 inches; bedrock

Characteristics of Rock Outcrop

Setting

Landform: Scoured glacial-valley walls

Slope range and aspect: 15 to 80 percent, southeast to northeast aspects

Definition: Rock outcrop consists of exposures of bare bedrock that have no soil

Component Properties and Qualities

Land capability class (nonirrigated): 8

Hydric soil: No

Minor Components

Sueredo

Composition: 2 percent

Landform: Ground moraines

Slope range and aspect: 15 to 80 percent, southeast to northeast aspects

Hydric soil: No

Aquepts

Composition: 2 percent

Landform: Seeps on glacial-valley walls

Slope range and aspect: 15 to 80 percent, southeast to northeast aspects

Hydric soil: Yes

Rubble land

Composition: 1 percent

Landform: Scoured glacial-valley walls

Slope range and aspect: 15 to 80 percent, southeast to northeast aspects

Hydric soil: No

151—Terracelake-Acroph-Rock outcrop-Shadowlake complex, 15 to 80 percent slopes

General location: Glacial-valley walls in the upper drainages of Hat Creek, Lost Creek, Manzanita Creek, North Fork Bailey Creek, South Fork Bailey Creek, Kings Creek, Rice Creek, and Hot Springs Creek

Landscape: Mountains

Elevation: 5,720 to 8,450 feet (1,744 to 2,577 meters)

Mean annual precipitation: 55 to 117 inches (1,397 to 2,972 millimeters)

Mean annual air temperature: 38 to 43 degrees F (4 to 6 degrees C)

Frost-free period: 50 to 85 days

Map Unit Composition

Terracelake component: 40 percent

Acroph component: 20 percent

Rock outcrop: 15 percent

Shadowlake component: 15 percent

Minor components: 10 percent

Characteristics of Terracelake

Setting

Landform: Scoured glacial-valley walls

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Mountainflank

Slope range and aspect: 15 to 80 percent, north to west aspects

Parent material: Tephra over colluvium and residuum weathered from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 0 to 75 percent subangular gravel, 3 to 30 percent subangular cobbles, 0 to 25 percent subangular stones, 0 to 20 percent subangular boulders

Depth to a restrictive feature: 20 to 40 inches to lithic bedrock

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Very low to very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 2.6 inches)

Land capability class and subclass (nonirrigated): 6e

Hydric soil: No

Hydrologic soil group: B

Vegetation

Ecological site: *Abies magnifica*-*Pinus monticola*/*Arctostaphylos nevadensis*/*Achnatherum occidentale* (F022B115CA)

Typical vegetation: Pinemat manzanita, California red fir, western white pine, Sierra lodgepole pine

Typical Profile

O_i—0 to 1 inch; slightly decomposed plant material

A—1 to 3 inches; gravelly ashy sandy loam

2Ab—3 to 7 inches; gravelly ashy sandy loam

2Bwb1—7 to 19 inches; very gravelly ashy fine sandy loam

2Bwb2—19 to 24 inches; extremely gravelly ashy fine sandy loam

2Bqb—24 to 37 inches; extremely stony ashy sandy loam

2R—37 inches; bedrock

Characteristics of Acroph

Setting

Landform: Scoured glacial-valley walls

Landform position (two-dimensional): Shoulder

Soil Survey of Lassen Volcanic National Park, California

Landform position (three-dimensional): Mountainflank
Slope range and aspect: 15 to 80 percent, north to west aspects
Parent material: Tephra over residuum

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 5 to 66 percent subangular gravel, 3 to 15 percent subangular cobbles, 2 to 6 percent subangular stones, 2 to 5 percent subangular boulders
Depth to a restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Well drained
Capacity to transmit water (K_{sat}): Very low to very high (See table on physical properties)
Annual flooding frequency: None
Annual ponding frequency: None
Minimum depth of seasonal high water table: More than 72 inches
Salinity maximum: Not saline
Sodicity maximum: Not sodic
Available water capacity (entire profile): Very low (about 0.9 inch)
Land capability class (nonirrigated): 8
Hydric soil: No
Hydrologic soil group: D

Vegetation

Ecological site: Glaciated mountain slopes (R022BI204CA)
Typical vegetation: Pinemat manzanita, California red fir, oceanspray, western white pine

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
A1—1 to 2 inches; ashy highly organic sand
A2—2 to 5 inches; ashy highly organic loamy sand
2Bw1—5 to 11 inches; very cobbly ashy loamy sand
2Bw2—11 to 15 inches; extremely cobbly ashy loamy sand
2R—15 inches; bedrock

Characteristics of Rock Outcrop

Setting

Landform: Scoured glacial-valley walls
Slope range and aspect: 15 to 80 percent, north to west aspects
Definition: Rock outcrop consists of exposures of bare bedrock that have no soil

Component Properties and Qualities

Land capability class (nonirrigated): 8
Hydric soil: No

Characteristics of Shadowlake

Setting

Landform: Ground moraines on glacial-valley walls
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Slope range and aspect: 15 to 80 percent, north to west aspects
Parent material: Tephra over or mixed with till derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 7 to 40 percent subangular

Soil Survey of Lassen Volcanic National Park, California

gravel, 3 to 5 percent subangular cobbles, 1 to 10 percent subangular stones, 0 to 10 percent subangular boulders
Depth to a restrictive feature: 35 to 60 inches to dense material
Drainage class: Well drained
Capacity to transmit water (K_{sat}): Moderately low to very high (See table on physical properties)
Annual flooding frequency: None
Annual ponding frequency: None
Minimum depth of seasonal high water table: More than 72 inches
Salinity maximum: Not saline
Sodicity maximum: Not sodic
Available water capacity (entire profile): Low (about 4.1 inches)
Land capability class and subclass (nonirrigated): 4e
Hydric soil: No
Hydrologic soil group: A

Vegetation

Ecological site: *Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale* (F022B115CA)
Typical vegetation: California red fir, western white pine, pinemat manzanita, greenleaf manzanita

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 2 inches; gravelly ashy sandy loam
Bw1—2 to 6 inches; gravelly ashy sandy loam
Bw2—6 to 13 inches; gravelly ashy sandy loam
Bw3—13 to 23 inches; very gravelly ashy sandy loam
Bq—23 to 41 inches; extremely gravelly ashy coarse sandy loam
Cdq—41 to 51 inches; loam

Minor Components

Sueredo

Composition: 5 percent
Landform: Ground moraines
Slope range and aspect: 15 to 80 percent, north to west aspects
Hydric soil: No

Rubble land

Composition: 2 percent
Landform: Glacial-valley walls
Slope range and aspect: 15 to 80 percent, north to west aspects
Hydric soil: No

Aquepts

Composition: 2 percent
Landform: Seeps on glacial-valley walls
Slope range and aspect: 15 to 80 percent, north to west aspects
Hydric soil: Yes

Vitrandic Cryorthents

Composition: 1 percent
Landform: Glacial-valley walls
Slope range and aspect: 15 to 80 percent, north to west aspects
Hydric soil: No

152—Terracelake-Shadowlake-Acroph-Rock outcrop complex, 5 to 35 percent slopes

General location: Glacial-valley floors in the upper drainages of Hat Creek, Lost Creek, Manzanita Creek, North Fork Bailey Creek, South Fork Bailey Creek, Kings Creek, Rice Creek, and Hot Springs Creek

Landscape: Mountains

Elevation: 5,780 to 8,200 feet (1,763 to 2,500 meters)

Mean annual precipitation: 55 to 109 inches (1,397 to 2,769 millimeters)

Mean annual air temperature: 38 to 43 degrees F (4 to 6 degrees C)

Frost-free period: 50 to 85 days

Map Unit Composition

Terracelake component: 35 percent

Shadowlake component: 30 percent

Acroph component: 15 percent

Rock outcrop: 10 percent

Minor components: 10 percent

Characteristics of Terracelake

Setting

Landform: Scoured glacial-valley floors

Landform position (two-dimensional): Footslope

Landform position (three-dimensional): Mountainbase

Slope range and aspect: 5 to 35 percent, west to south aspects

Parent material: Tephra over colluvium and residuum weathered from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 0 to 75 percent subangular gravel, 3 to 30 percent subangular cobbles, 0 to 25 percent subangular stones, 0 to 20 percent subangular boulders

Depth to a restrictive feature: 20 to 40 inches to lithic bedrock

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Very low to very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 2.6 inches)

Land capability class and subclass (nonirrigated): 4e

Hydric soil: No

Hydrologic soil group: B

Vegetation

Ecological site: *Abies magnifica*-*Pinus monticola*/*Arctostaphylos nevadensis*/*Achnatherum occidentale* (F022B115CA)

Typical vegetation: Pinemat manzanita, California red fir, western white pine, Sierra lodgepole pine

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

A—1 to 3 inches; gravelly ashy sandy loam

2Ab—3 to 7 inches; gravelly ashy sandy loam

2Bwb1—7 to 19 inches; very gravelly ashy fine sandy loam
2Bwb2—19 to 24 inches; extremely gravelly ashy fine sandy loam
2Bqb—24 to 37 inches; extremely stony ashy sandy loam
2R—37 inches; bedrock

Characteristics of Shadowlake

Setting

Landform: Ground moraines on glacial-valley floors
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Mountainbase
Slope range and aspect: 5 to 35 percent, west to south aspects
Parent material: Tephra over or mixed with till derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 7 to 40 percent subangular gravel, 3 to 5 percent subangular cobbles, 1 to 10 percent subangular stones, 0 to 10 percent subangular boulders
Depth to a restrictive feature: 35 to 60 inches to dense material
Drainage class: Well drained
Capacity to transmit water (K_{sat}): Moderately low to very high (See table on physical properties)
Annual flooding frequency: None
Annual ponding frequency: None
Minimum depth of seasonal high water table: More than 72 inches
Salinity maximum: Not saline
Sodicity maximum: Not sodic
Available water capacity (entire profile): Low (about 4.1 inches)
Land capability class and subclass (nonirrigated): 4e
Hydric soil: No
Hydrologic soil group: A

Vegetation

Ecological site: *Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale* (F022B115CA)
Typical vegetation: California red fir, western white pine, pinemat manzanita, greenleaf manzanita

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 2 inches; gravelly ashy sandy loam
Bw1—2 to 6 inches; gravelly ashy sandy loam
Bw2—6 to 13 inches; gravelly ashy sandy loam
Bw3—13 to 23 inches; very gravelly ashy sandy loam
Bq—23 to 41 inches; extremely gravelly ashy coarse sandy loam
Cdq—41 to 51 inches; loam

Characteristics of Acroph

Setting

Landform: Scoured glacial-valley floors
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Mountainflank
Slope range and aspect: 5 to 35 percent, west to south aspects
Parent material: Tephra over residuum

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 5 to 66 percent subangular

Soil Survey of Lassen Volcanic National Park, California

gravel, 3 to 15 percent subangular cobbles, 2 to 6 percent subangular stones, 2 to 5 percent subangular boulders

Depth to a restrictive feature: 10 to 20 inches to lithic bedrock

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Very low to very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 0.9 inch)

Land capability class (nonirrigated): 8

Hydric soil: No

Hydrologic soil group: D

Vegetation

Ecological site: Glaciated mountain slopes (R022BI204CA)

Typical vegetation: Pinemat manzanita, California red fir, oceanspray, western white pine

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

A1—1 to 2 inches; ashy highly organic sand

A2—2 to 5 inches; ashy highly organic loamy sand

2Bw1—5 to 11 inches; very cobbly ashy loamy sand

2Bw2—11 to 15 inches; extremely cobbly ashy loamy sand

2R—15 inches; bedrock

Characteristics of Rock Outcrop

Setting

Landform: Scoured glacial-valley floors

Slope range and aspect: 5 to 35 percent, west to south aspects

Definition: Rock outcrop consists of bare bedrock with no soil

Component Properties and Qualities

Land capability class (nonirrigated): 8

Hydric soil: No

Minor Components

Sueredo

Composition: 4 percent

Landform: Ground moraines

Slope range and aspect: 5 to 35 percent, west to south aspects

Hydric soil: No

Vitrandic Cryorthents

Composition: 4 percent

Landform: Glacial-valley floors

Slope range and aspect: 5 to 35 percent, west to south aspects

Hydric soil: No

Aquepts

Composition: 2 percent

Landform: Seeps on glacial-valley floors

Slope range and aspect: 1 to 35 percent, west to south aspects

Hydric soil: Yes

153—Typic Vitrixerands-Vitrandid Xerorthents, moraine, complex, 3 to 30 percent slopes

General location: Glacial valleys in Lost Creek and Hat Creek drainages

Landscape: Mountains

Elevation: 6,280 to 7,330 feet (1,915 to 2,235 meters)

Mean annual precipitation: 59 to 95 inches (1,499 to 2,413 millimeters)

Mean annual air temperature: 40 to 41 degrees F (4 to 5 degrees C)

Frost-free period: 60 to 85 days

Map Unit Composition

Typic Vitrixerands component: 50 percent

Vitrandid Xerorthents, moraine component: 45 percent

Minor components: 5 percent

Characteristics of Typic Vitrixerands

Setting

Landform: Moraines

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Mountainbase

Slope range and aspect: 3 to 30 percent, southwest to east aspects

Parent material: Debris flow deposits and/or pyroclastic flow and/or rockfall avalanche deposits over till derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 50 to 80 percent subangular gravel, 0 to 20 percent subangular cobbles, 0 to 10 percent subangular stones, 0 to 5 percent subangular boulders

Depth to a restrictive feature: 20 to 60 inches to dense material

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Moderately low to very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Low (about 3.1 inches)

Land capability class and subclass (nonirrigated): 6e

Hydric soil: No

Hydrologic soil group: B

Vegetation

Ecological site: *Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens* (F022B1103CA)

Typical vegetation: Jeffrey pine, California red fir, goldenbush, Sierra lodgepole pine

Typical Profile

A1—0 to 2 inches; very gravelly ashy loamy sand

A2—2 to 4 inches; gravelly ashy loamy fine sand

2Bwb1—4 to 8 inches; gravelly ashy loamy fine sand

2Bwb2—8 to 18 inches; gravelly ashy loamy sand

2Bwb3—18 to 31 inches; very gravelly ashy loamy sand

2Cdq—31 to 52 inches; very gravelly ashy loamy sand

Characteristics of Vitrandic Xerorthents, Moraine

Setting

Landform: Moraines

Landform position (two-dimensional): Footslope

Landform position (three-dimensional): Mountainbase

Slope range and aspect: 3 to 30 percent, southwest to east aspects

Parent material: Debris flow deposits and/or pyroclastic flow and/or rockfall avalanche deposits over till derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 50 to 80 percent subangular gravel, 0 to 20 percent subangular cobbles, 0 to 10 percent subangular stones, 0 to 5 percent subangular boulders

Depth to a restrictive feature: 20 to 60 inches to dense material

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Moderately low to high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 2.7 inches)

Land capability class and subclass (nonirrigated): 6e

Hydric soil: No

Hydrologic soil group: B

Vegetation

Ecological site: *Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens* (F022BI103CA)

Typical vegetation: White fir, bush chinquapin, mountain monardella, Jeffrey pine

Typical Profile

A1—0 to 3 inches; gravelly ashy sandy loam

A2—3 to 9 inches; gravelly ashy sandy loam

C—9 to 16 inches; gravelly ashy coarse sandy loam

2Bwb—16 to 23 inches; very gravelly ashy sandy loam

2Cdq—23 to 37 inches; extremely gravelly ashy loamy sand

Minor Components

Vitrandic Cryorthents, debris flows

Composition: 2 percent

Landform: Moraines

Slope range and aspect: 3 to 30 percent, southwest to east aspects

Hydric soil: No

Sueredo

Composition: 2 percent

Landform: Ground moraines

Slope range and aspect: 3 to 30 percent, southwest to east aspects

Hydric soil: No

Vitrandic Xerorthents, debris fan

Composition: 1 percent

Landform: Debris flows

Slope range and aspect: 3 to 30 percent, southwest to east aspects
Hydric soil: No

154—Typic Vitrixerands-Vitrandid Xerorthents, moraine, complex, 15 to 60 percent slopes

General location: Glacial valleys in Lost Creek and Hat Creek drainages
Landscape: Mountains
Elevation: 6,270 to 7,230 feet (1,910 to 2,205 meters)
Mean annual precipitation: 59 to 89 inches (1,499 to 2,261 millimeters)
Mean annual air temperature: 40 to 41 degrees F (4 to 5 degrees C)
Frost-free period: 60 to 85 days

Map Unit Composition

Typic Vitrixerands component: 45 percent
Vitrandid Xerorthents, moraine component: 35 percent
Minor components: 20 percent

Characteristics of Typic Vitrixerands

Setting

Landform: Moraines
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Mountainbase
Slope range and aspect: 15 to 60 percent, northwest to southeast aspects
Parent material: Debris flow deposits and/or pyroclastic flow and/or rockfall avalanche deposits over till derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 50 to 80 percent subangular gravel, 0 to 20 percent subangular cobbles, 0 to 10 percent subangular stones, 0 to 5 percent subangular boulders
Depth to a restrictive feature: 20 to 60 inches to dense material
Drainage class: Well drained
Capacity to transmit water (K_{sat}): Moderately low to very high (See table on physical properties)
Annual flooding frequency: None
Annual ponding frequency: None
Minimum depth of seasonal high water table: More than 72 inches
Salinity maximum: Not saline
Sodicity maximum: Not sodic
Available water capacity (entire profile): Low (about 3.1 inches)
Land capability class and subclass (nonirrigated): 6e
Hydric soil: No
Hydrologic soil group: B

Vegetation

Ecological site: *Abies concolor*-*Pinus jeffreyi*/*Arctostaphylos patula*-*Chrysolepis sempervirens* (F022BI103CA)
Typical vegetation: Jeffrey pine, California red fir, goldenbush, Sierra lodgepole pine

Typical Profile

A1—0 to 2 inches; very gravelly ashy loamy sand
A2—2 to 4 inches; gravelly ashy loamy fine sand
2Bwb1—4 to 8 inches; gravelly ashy loamy fine sand
2Bwb2—8 to 18 inches; gravelly ashy loamy sand

2Bwb3—18 to 31 inches; very gravelly ashy loamy sand
2Cdq—31 to 52 inches; very gravelly ashy loamy sand

Characteristics of Vitrandic Xerorthents, Moraine

Setting

Landform: Moraines

Landform position (two-dimensional): Foothlope

Landform position (three-dimensional): Mountainbase

Slope range and aspect: 15 to 60 percent, northwest to southeast aspects

Parent material: Debris flow deposits and/or pyroclastic flow and/or rockfall avalanche deposits over till derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 50 to 80 percent subangular gravel, 0 to 20 percent subangular cobbles, 0 to 10 percent subangular stones, 0 to 5 percent subangular boulders

Depth to a restrictive feature: 20 to 60 inches to dense material

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Moderately low to high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 2.7 inches)

Land capability class and subclass (nonirrigated): 6e

Hydric soil: No

Hydrologic soil group: B

Vegetation

Ecological site: *Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens* (F022BI103CA)

Typical vegetation: White fir, bush chinquapin, mountain monardella, Jeffrey pine

Typical Profile

A1—0 to 3 inches; gravelly ashy sandy loam

A2—3 to 9 inches; gravelly ashy sandy loam

C—9 to 16 inches; gravelly ashy coarse sandy loam

2Bwb—16 to 23 inches; very gravelly ashy sandy loam

2Cdq—23 to 37 inches; extremely gravelly ashy loamy sand

Minor Components

Rock outcrop

Composition: 10 percent

Landform: Lava flows

Slope range and aspect: 15 to 60 percent, northwest to southeast aspects

Hydric soil: No

Aquepts

Composition: 3 percent

Landform: Seeps on moraines

Slope range and aspect: 15 to 60 percent, northwest to southeast aspects

Hydric soil: Yes

Sueredo

Composition: 3 percent

Landform: Ground moraines

Slope range and aspect: 15 to 60 percent, northwest to southeast aspects

Hydric soil: No

Vitrandic Cryorthents, debris flows

Composition: 2 percent

Landform: Moraines

Slope range and aspect: 15 to 60 percent, northwest to southeast aspects

Hydric soil: No

Typic Endoaquents

Composition: 2 percent

Landform: Flood plains

Slope range and aspect: 1 to 5 percent, northwest to southeast aspects

Hydric soil: Yes

155—Xeric Vitricryands, pyroclastic surge, 8 to 35 percent slopes

General location: Medial moraine between upper Lost Creek and upper West Fork Hat Creek drainages

Landscape: Mountains

Elevation: 6,810 to 7,600 feet (2,075 to 2,316 meters)

Mean annual precipitation: 83 to 101 inches (2,108 to 2,565 millimeters)

Mean annual air temperature: 40 degrees F (4 degrees C)

Frost-free period: 50 to 85 days

Map Unit Composition

Xeric Vitricryands, pyroclastic surge component: 90 percent

Minor components: 10 percent

Characteristics of Xeric Vitricryands, Pyroclastic Surge

Setting

Landform: Medial moraines

Landform position (two-dimensional): Footslope, summit

Landform position (three-dimensional): Mountainbase

Slope range and aspect: 8 to 35 percent, west to east aspects

Parent material: Pyroclastic surge over till derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 15 to 25 percent subangular gravel, 0 to 5 percent subangular cobbles, 0 to 5 percent subangular stones, 0 to 5 percent subangular boulders

Depth to a restrictive feature: 40 to 80 inches to dense material

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Moderately low to very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 2.8 inches)

Land capability class and subclass (nonirrigated): 6e

Hydric soil: No

Hydrologic soil group: A

Vegetation

Ecological site: *Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale* (F022B115CA)

Typical vegetation: California red fir, lupine, mountain monardella, western needlegrass

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

Oe—1 to 3 inches; moderately decomposed plant material

A—3 to 6 inches; very gravelly ashy loamy coarse sand

2Ab—6 to 10 inches; very gravelly medial loamy coarse sand

2Bwb1—10 to 15 inches; very gravelly medial sandy loam

2Bwb2—15 to 27 inches; very cobbly medial sandy loam

2Bwb3—27 to 39 inches; extremely gravelly medial sandy loam

2Bwb4—39 to 48 inches; extremely gravelly medial sandy loam

2Cdq—48 to 60 inches; very gravelly loamy coarse sand

Minor Components

Vitrantic Cryorthents, debris flows

Composition: 5 percent

Landform: Moraines

Slope range and aspect: 8 to 35 percent, west to east aspects

Hydric soil: No

Shadowlake

Composition: 3 percent

Landform: Moraines

Slope range and aspect: 8 to 35 percent, west to east aspects

Hydric soil: No

Aquepts

Composition: 2 percent

Landform: Seeps on moraines

Slope range and aspect: 8 to 35 percent, west to east aspects

Hydric soil: Yes

156—Xeric Vitricryands, pyroclastic surge, 20 to 50 percent slopes

General location: Medial moraine between upper Lost Creek and upper West Fork Hat Creek drainages

Landscape: Mountains

Elevation: 6,560 to 7,330 feet (1,998 to 2,233 meters)

Mean annual precipitation: 79 to 93 inches (2,007 to 2,362 millimeters)

Mean annual air temperature: 40 degrees F (4 degrees C)

Frost-free period: 50 to 85 days

Map Unit Composition

Xeric Vitricryands, pyroclastic surge component: 90 percent

Minor components: 10 percent

Characteristics of Xeric Vitricryands, Pyroclastic Surge

Setting

Landform: Medial moraines

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Mountainbase

Slope range and aspect: 20 to 50 percent, northeast to east aspects

Parent material: Pyroclastic surge over till derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 15 to 25 percent subangular gravel, 0 to 5 percent subangular cobbles, 0 to 5 percent subangular stones, 0 to 5 percent subangular boulders

Depth to a restrictive feature: 40 to 80 inches to dense material

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Moderately low to very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 2.8 inches)

Land capability class and subclass (nonirrigated): 7e

Hydric soil: No

Hydrologic soil group: A

Vegetation

Ecological site: *Abies magnifica*-*Pinus monticola*/*Arctostaphylos nevadensis*/*Achnatherum occidentale* (F022B1115CA)

Typical vegetation: Pinemat manzanita, California red fir, bush chinquapin, greenleaf manzanita

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

Oe—1 to 3 inches; moderately decomposed plant material

A—3 to 6 inches; very gravelly ashy loamy coarse sand

2Ab—6 to 10 inches; very gravelly medial loamy coarse sand

2Bwb1—10 to 15 inches; very gravelly medial sandy loam

2Bwb2—15 to 27 inches; very cobbly medial sandy loam

2Bwb3—27 to 39 inches; extremely gravelly medial sandy loam

2Bwb4—39 to 48 inches; extremely gravelly medial sandy loam

2Cdq—48 to 60 inches; very gravelly loamy coarse sand

Minor Components

Aquepts

Composition: 5 percent

Landform: Seeps on moraines

Slope range and aspect: 20 to 50 percent, northeast to east aspects

Hydric soil: Yes

Shadowlake

Composition: 5 percent

Landform: Moraines

Slope range and aspect: 20 to 50 percent, northeast to east aspects

Hydric soil: No

157—Typic Vitrixerands, very deep, 5 to 50 percent slopes

General location: Uplands south of Manzanita Lake

Landscape: Mountains

Elevation: 5,720 to 6,520 feet (1,745 to 1,987 meters)

Mean annual precipitation: 45 to 57 inches (1,143 to 1,448 millimeters)

Mean annual air temperature: 40 to 43 degrees F (4 to 6 degrees C)

Frost-free period: 70 to 90 days

Map Unit Composition

Typic Vitrixerands, very deep component: 90 percent

Minor components: 10 percent

Characteristics of Typic Vitrixerands, Very Deep

Setting

Landform: Glaciated rhyodacite lava flows

Landform position (two-dimensional): Footslope

Landform position (three-dimensional): Lower third of mountainflank

Slope range and aspect: 5 to 50 percent, northwest to east aspects

Parent material: Volcanic ash mixed with colluvium and residuum weathered from rhyodacite

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 2 to 10 percent subangular gravel, 0 to 5 percent subangular cobbles, 0 to 5 percent subangular stones, 0 to 5 percent subangular boulders

Depth to a restrictive feature: None within 60 inches

Drainage class: Well drained

Capacity to transmit water (K_{sat}): High or very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 2.6 inches)

Land capability class and subclass (nonirrigated): 4e

Hydric soil: No

Hydrologic soil group: A

Vegetation

Ecological site: *Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens* (F022B1103CA)

Typical vegetation: Greenleaf manzanita, snowbrush ceanothus, white fir, Jeffrey pine

Typical Profile

Oi—0 to 2 inches; slightly decomposed plant material

Oe—2 to 4 inches; moderately decomposed plant material

A1—4 to 6 inches; gravelly ashy sandy loam

A2—6 to 10 inches; gravelly ashy sandy loam

Bw1—10 to 22 inches; stony ashy sandy loam

Bw2—22 to 31 inches; very stony ashy loamy sand

Bw3—31 to 39 inches; extremely gravelly ashy loamy sand

Bw4—39 to 60 inches; extremely stony ashy loamy sand



Figure 20.—Map unit 158 west of the glacial valley in the Manzanita Creek drainage. The presence of unique rock outcrop provides evidence that this area was not glaciated.

Minor Components

Rock outcrop

Composition: 7 percent

Landform: Rhyodacite lava flows

Slope range and aspect: 5 to 50 percent, northwest to east aspects

Hydric soil: No

Typic Vitrixerands, unglaciated

Composition: 3 percent

Landform: Unglaciated rhyodacite lava flows

Slope range and aspect: 5 to 50 percent, northwest to east aspects

Hydric soil: No

158—Typic Vitrixerands, unglaciated-Rock outcrop complex, 5 to 20 percent slopes

General location: West of the western edge of the glacial valley in the Manzanita Creek drainage (fig. 20)

Landscape: Mountains

Elevation: 6,300 to 6,690 feet (1,921 to 2,038 meters)

Mean annual precipitation: 49 to 59 inches (1,235 to 1,499 millimeters)

Mean annual air temperature: 43 degrees F (6 degrees C)

Frost-free period: 70 to 90 days

Map Unit Composition

Typic Vitrixerands, unglaciated component: 75 percent

Rock outcrop: 20 percent

Minor components: 5 percent

Characteristics of Typic Vitrixerands, Unglaciaded

Setting

Landform: Unglaciaded rhyodacite lava flows

Landform position (two-dimensional): Footslope

Landform position (three-dimensional): Lower third of mountainflank

Slope range and aspect: 5 to 20 percent, west to northeast aspects

Parent material: Volcanic ash over colluvium over residuum weathered from rhyodacite

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 0 to 20 percent subangular gravel, 0 to 5 percent subangular cobbles, 0 to 5 percent subangular stones, 0 to 5 percent subangular boulders

Depth to a restrictive feature: 20 to 60 inches to paralithic bedrock

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Moderately low to very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 2.7 inches)

Land capability class and subclass (nonirrigated): 7e

Hydric soil: No

Hydrologic soil group: B

Vegetation

Ecological site: *Pinus jeffreyi/Arctostaphylos patula* (F022B1121CA)

Typical vegetation: Pinemat manzanita, bush chinquapin, Jeffrey pine, California red fir

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

A—1 to 3 inches; ashy fine sandy loam

2Bw1—3 to 8 inches; ashy sandy loam

2Bw2—8 to 15 inches; gravelly ashy sandy loam

3Bw3—15 to 25 inches; very gravelly ashy loamy coarse sand

3C—25 to 39 inches; very gravelly ashy loamy coarse sand

3Cr—39 inches; weathered bedrock

Characteristics of Rock Outcrop

Setting

Landform: Rhyodacite lava flows

Slope range and aspect: 5 to 20 percent, west to northeast aspects

Definition: Rock outcrop consists of exposures of bare bedrock that have no soil

Component Properties and Qualities

Land capability class (nonirrigated): 8

Hydric soil: No

Minor Components

Typic Vitrixerands, very deep

Composition: 5 percent

Landform: Glaciaded rhyodacite lava flows

Slope range and aspect: 5 to 20 percent, west to northeast aspects

Hydric soil: No

159—Typic Vitrixerands, bouldery-Typic Vitrixerands, tephra over colluvium-Rubble land complex, 15 to 60 percent slopes

General location: Volcanic domes just north of Chaos Crags

Landscape: Mountains

Elevation: 5,680 to 7,330 feet (1,730 to 2,235 meters)

Mean annual precipitation: 39 to 61 inches (991 to 1,549 millimeters)

Mean annual air temperature: 43 to 44 degrees F (6 to 7 degrees C)

Frost-free period: 60 to 85 days

Map Unit Composition

Typic Vitrixerands, bouldery component: 40 percent

Typic Vitrixerands, tephra over colluvium component: 35 percent

Rubble land: 15 percent

Minor components: 10 percent

Characteristics of Typic Vitrixerands, Bouldery

Setting

Landform: Unglaciaded volcanic domes

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Mountainflank

Slope range and aspect: 15 to 60 percent, northwest to northeast aspects

Parent material: Tephra mixed with colluvium derived from rhyodacite

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 10 to 25 percent subangular gravel, 2 to 15 percent subangular cobbles, 10 to 35 percent subangular stones, 10 to 50 percent subangular boulders

Depth to a restrictive feature: None within 60 inches

Drainage class: Somewhat excessively drained

Capacity to transmit water (K_{sat}): High or very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 1.2 inches)

Land capability class and subclass (nonirrigated): 7e

Hydric soil: No

Hydrologic soil group: A

Vegetation

Ecological site: *Pinus jeffreyi/Arctostaphylos patula* (F022B1121CA)

Typical vegetation: Sugar pine, California red fir, bush chinquapin, Jeffrey pine

Typical Profile

Oi—0 to 2 inches; slightly decomposed plant material

A—2 to 5 inches; very stony ashy sand

AC—5 to 11 inches; very stony ashy loamy coarse sand

C1—11 to 34 inches; ashy boulders

C2—34 to 56 inches; ashy boulders

2Bwb—56 to 60 inches; ashy boulders

Characteristics of Typic Vitrixerands, Tephra Over Colluvium

Setting

Landform: Unglaciated volcanic domes

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Mountainflank

Slope range and aspect: 15 to 60 percent, northwest to northeast aspects

Parent material: Tephra over colluvium derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 0 to 10 percent subangular gravel, 0 to 5 percent subangular cobbles, 0 to 5 percent subangular stones, 0 to 5 percent subangular boulders

Depth to a restrictive feature: None within 60 inches

Drainage class: Well drained

Capacity to transmit water (K_{sat}): High or very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Low (about 3.1 inches)

Land capability class and subclass (nonirrigated): 7e

Hydric soil: No

Hydrologic soil group: A

Vegetation

Ecological site: *Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens* (F022BI103CA)

Typical vegetation: White fir, California red fir, Jeffrey pine

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

A1—1 to 2 inches; ashy sandy loam

A2—2 to 4 inches; ashy sandy loam

C1—4 to 7 inches; ashy fine sandy loam

C2—7 to 14 inches; extremely gravelly ashy coarse sand

2Ab—14 to 20 inches; very gravelly ashy sandy loam

2Bwb1—20 to 28 inches; very gravelly ashy sandy loam

2Bwb2—28 to 41 inches; very gravelly ashy sandy loam

2C1—41 to 51 inches; extremely cobbly ashy sandy loam

2C2—51 to 61 inches; extremely stony ashy loamy coarse sand

Characteristics of Rubble Land

Setting

Landform: Volcanic domes

Slope range and aspect: 15 to 60 percent, northwest to northeast aspects

Definition: Rubble land consists of areas of cobbles, stones, and boulders and has little or no soil

Component Properties and Qualities

Land capability class (nonirrigated): 8

Hydric soil: No

Minor Components

Rock outcrop

Composition: 7 percent

Landform: Volcanic domes

Slope range and aspect: 15 to 60 percent, northwest to northeast aspects

Hydric soil: No

Vitrandic Cryorthents

Composition: 3 percent

Landform: Unglaciaded volcanic domes

Slope range and aspect: 15 to 60 percent, northwest to northeast aspects

Hydric soil: No

160—Aeric Endoaquents-Humic Haploxerands, stream terraces-Riverwash complex, 2 to 30 percent slopes

General location: Alluvial bottom along lower Kings Creek

Landscape: Mountains (fig. 21)

Elevation: 5,280 to 5,520 feet (1,609 to 1,684 meters)

Mean annual precipitation: 49 to 53 inches (1,245 to 1,346 millimeters)

Mean annual air temperature: 42 degrees F (6 degrees C)

Frost-free period: 70 to 90 days

Map Unit Composition

Aeric Endoaquents component: 45 percent

Humic Haploxerands, stream terraces component: 35 percent

Riverwash: 15 percent

Minor components: 5 percent

Characteristics of Aeric Endoaquents

Setting

Landform: Flood plains

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Tread

Slope range and aspect: 2 to 6 percent, north to southwest aspects

Parent material: Recent alluvium derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 0 to 80 percent subrounded gravel, 0 to 20 percent subrounded cobbles, 0 to 10 percent subrounded stones, 0 to 2 percent subrounded boulders

Depth to a restrictive feature: None within 60 inches

Drainage class: Somewhat poorly drained

Capacity to transmit water (K_{sat}): High or very high (See table on physical properties)

Annual flooding frequency: Occasional (See table on water features)

Annual ponding frequency: None

Minimum depth of seasonal high water table: About 13 to 80 inches (See table on water features)

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 1.2 inches)

Land capability class and subclass (nonirrigated): 6s

Hydric soil: No

Hydrologic soil group: C

Vegetation

Ecological site: Gravelly flood plains (R022B1215CA)

Typical vegetation: White fir, thinleaf alder, bluejoint, black cottonwood



Figure 21.—Map unit 160 along Kings Creek.

Typical Profile

O_i—0 to 2 inches; slightly decomposed plant material

O_e—2 to 3 inches; moderately decomposed plant material

C₁—3 to 5 inches; loamy very fine sand

C₂—5 to 7 inches; sand

C₃—7 to 13 inches; very gravelly coarse sand

C₄—13 to 24 inches; extremely gravelly sand

- C5—24 to 30 inches; stony fine sand
- C6—30 to 33 inches; very gravelly fine sand
- C7—33 to 38 inches; extremely gravelly coarse sand
- C8—38 to 63 inches; extremely cobbly coarse sand

Characteristics of Humic Haploxerands, Stream Terraces

Setting

Landform: Stream terraces

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Tread

Slope range and aspect: 2 to 30 percent, north to southwest aspects

Parent material: Ash-influenced alluvium derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 3 to 35 percent subrounded gravel, 0 to 1 percent subrounded cobbles, 0 to 1 percent subrounded stones, 0 to 1 percent subrounded boulders

Depth to a restrictive feature: None within 60 inches

Drainage class: Well drained

Capacity to transmit water (K_{sat}): High or very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: About 40 to 80 inches (See table on water features)

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 1.7 inches)

Land capability class and subclass (nonirrigated): 7e

Hydric soil: No

Hydrologic soil group: B

Vegetation

Ecological site: *Abies concolor-Calocedrus decurrens/Ceanothus cordulatus/Achnatherum* (F022BI110CA)

Typical vegetation: White fir, western needlegrass, mountain monardella

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

A1—1 to 4 inches; gravelly medial sandy loam

A2—4 to 7 inches; gravelly medial sandy loam

Bw1—7 to 17 inches; gravelly medial coarse sandy loam

Bw2—17 to 28 inches; extremely stony medial coarse sandy loam

Bw3—28 to 48 inches; extremely stony medial loamy coarse sand

Bw4—48 to 68 inches; ashy stones

Bw5—68 to 84 inches; ashy stones

Characteristics of Riverwash

Setting

Landform: Flood plains

Slope range and aspect: 2 to 10 percent, north to southwest aspects

Definition: Riverwash is unstabilized sandy, gravelly, cobbly, stony, or bouldery sediment that is flooded and reworked frequently by streams

Component Properties and Qualities

Land capability class (nonirrigated): 8

Hydric soil: Yes

Minor Components

Aquandic Humaquepts, flood plains

Composition: 5 percent

Landform: Flood plains

Slope range and aspect: 2 to 5 percent, north to southwest aspects

Hydric soil: Yes

161—Typic Psammaquents ashy fine sand, 0 to 3 percent slopes

General location: Alluvial bottom along Manzanita Creek, just above Manzanita Lake

Landscape: Mountains

Elevation: 5,860 to 5,930 feet (1,787 to 1,806 meters)

Mean annual precipitation: 45 to 47 inches (1,143 to 1,194 millimeters)

Mean annual air temperature: 44 degrees F (6 degrees C)

Frost-free period: 70 to 90 days

Map Unit Composition

Typic Psammaquents component: 95 percent

Minor components: 5 percent

Characteristics of Typic Psammaquents

Setting

Landform: Flood plains

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Tread

Slope range and aspect: 0 to 3 percent, south to northwest aspects

Parent material: Alluvium redeposited from debris flows derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 0 to 10 percent subrounded gravel, 0 to 2 percent subrounded cobbles

Depth to a restrictive feature: None within 60 inches

Drainage class: Poorly drained

Capacity to transmit water (K_{sat}): High or very high (See table on physical properties)

Annual flooding frequency: Occasional (See table on water features)

Annual ponding frequency: None

Minimum depth of seasonal high water table: About 0 to 60 inches (See table on water features)

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Low (about 3.2 inches)

Land capability class and subclass (nonirrigated): 6w

Hydric soil: Yes

Hydrologic soil group: C

Vegetation

Ecological site: Sandy flood plains (R022BI213CA)

Typical vegetation: Shining willow, squirreltail, western needlegrass, sedge

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

C—1 to 4 inches; ashy fine sand

Ab—4 to 5 inches; gravelly ashy loamy coarse sand

- C1—5 to 9 inches; gravelly ashy coarse sand
- C2—9 to 17 inches; ashy sand
- C3—17 to 26 inches; gravelly ashy coarse sand
- C4—26 to 33 inches; gravelly ashy coarse sand
- C5—33 to 39 inches; ashy sand
- C6—39 to 48 inches; ashy fine sand
- C7—48 to 55 inches; ashy very fine sand
- C8—55 to 63 inches; ashy sand

Minor Components

Riverwash

Composition: 5 percent

Landform: Flood plains

Slope range and aspect: 0 to 5 percent, south to northwest aspects

Hydric soil: Yes

162—Humic Haploxerands, outwash, 1 to 8 percent slopes

General location: Outwash plain adjacent to Manzanita Lake

Landscape: Mountains

Elevation: 5,710 to 5,970 feet (1,739 to 1,821 meters)

Mean annual precipitation: 45 to 53 inches (1,143 to 1,346 millimeters)

Mean annual air temperature: 40 to 43 degrees F (4 to 6 degrees C)

Frost-free period: 70 to 90 days

Map Unit Composition

Humic Haploxerands, outwash component: 95 percent

Minor components: 5 percent

Characteristics of Humic Haploxerands, Outwash

Setting

Landform: Outwash plains

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Mountainbase

Slope range and aspect: 1 to 8 percent, southwest to northwest aspects

Parent material: Outwash derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 0 to 5 percent subrounded gravel, 0 to 5 percent subrounded cobbles, 0 to 5 percent subrounded stones, 0 to 3 percent subrounded boulders

Depth to a restrictive feature: None within 60 inches

Drainage class: Well drained

Capacity to transmit water (K_{sat}): High or very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 1.9 inches)

Land capability class and subclass (nonirrigated): 7e

Hydric soil: No

Hydrologic soil group: A

Vegetation

Ecological site: Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens (F022BI103CA)

Typical vegetation: White fir, sedge, Jeffrey pine, western needlegrass

Typical Profile

Oi—0 to 2 inches; slightly decomposed plant material

A1—2 to 8 inches; medial sandy loam

A2—8 to 15 inches; very stony medial sandy loam

Bw1—15 to 28 inches; extremely cobbly medial loamy sand

Bw2—28 to 41 inches; extremely stony ashy sand

Bw3—41 to 59 inches; extremely stony ashy sand

Minor Components

Vitrantic Xerorthents, debris fan

Composition: 3 percent

Landform: Debris flows

Slope range and aspect: 1 to 8 percent, southwest to northwest aspects

Hydric soil: No

Summertown

Composition: 2 percent

Landform: Moraines

Slope range and aspect: 1 to 8 percent, southwest to northwest aspects

Hydric soil: No

163—Vitrantic Cryofluvents-Aquandic Cryaquents complex, 0 to 8 percent slopes

General location: Meadows in East Fork Hat Creek, West Fork Hat Creek, Kings Creek, Rice Creek, and Bumpass Creek drainages

Landscape: Mountains

Elevation: 6,420 to 7,510 feet (1,956 to 2,290 meters)

Mean annual precipitation: 59 to 111 inches (1,499 to 2,819 millimeters)

Mean annual air temperature: 38 to 41 degrees F (4 to 5 degrees C)

Frost-free period: 50 to 85 days

Map Unit Composition

Vitrantic Cryofluvents component: 65 percent

Aquandic Cryaquents component: 30 percent

Minor components: 5 percent

Characteristics of Vitrantic Cryofluvents

Setting

Landform: Meadows in glacial lakes (relict)

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Tread

Slope range and aspect: 0 to 8 percent, west to southwest aspects

Parent material: Glaciolacustrine deposits derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: None noted

Depth to a restrictive feature: None within 60 inches

Drainage class: Poorly drained

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Capacity to transmit water (K_{sat}): Moderately low to very high (See table on physical properties)
Annual flooding frequency: None
Annual ponding frequency: Frequent (See table on water features)
Minimum depth of seasonal high water table: About 0 to 60 inches (See table on water features)
Salinity maximum: Not saline
Sodicity maximum: Not sodic
Available water capacity (entire profile): Moderate (about 8.4 inches)
Land capability class and subclass (nonirrigated): 5w
Hydric soil: Yes
Hydrologic soil group: C

Vegetation

Ecological site: Cryic lacustrine flat (R022BI206CA)
Typical vegetation: Nebraska sedge, Northwest Territory sedge, mountain rush, water sedge

Typical Profile

Oi—0 to 3 inches; slightly decomposed plant material
A—3 to 8 inches; gravelly ashy sandy loam
C—8 to 11 inches; very gravelly ashy coarse sand
Oa—11 to 13 inches; mucky clay loam
Ab—13 to 16 inches; silty clay
Cg1—16 to 23 inches; silty clay loam
Cg2—23 to 28 inches; gravelly ashy coarse sandy loam
Cg3—28 to 36 inches; ashy silt loam
A b—36 to 55 inches; ashy silt loam
Cg4—55 to 61 inches; extremely gravelly ashy coarse sand

Characteristics of Aquandic Cryaquents

Setting

Landform: Areas along channels in meadows in glacial lakes (relict)
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Slope range and aspect: 0 to 8 percent, west to southwest aspects
Parent material: Glaciolacustrine deposits derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: None noted
Depth to a restrictive feature: None within 60 inches
Drainage class: Very poorly drained
Capacity to transmit water (K_{sat}): Moderately high to very high (See table on physical properties)
Annual flooding frequency: Frequent (See table on water features)
Annual ponding frequency: None
Minimum depth of seasonal high water table: About 0 to 40 inches (See table on water features)
Salinity maximum: Not saline
Sodicity maximum: Not sodic
Available water capacity (entire profile): Low (about 5.4 inches)
Land capability class and subclass (nonirrigated): 5w
Hydric soil: Yes
Hydrologic soil group: C

Vegetation

Ecological site: Cryic lacustrine flat (R022BI206CA)

Typical vegetation: Nebraska sedge, tundra aster, Northwest Territory sedge, water sedge

Typical Profile

Ag1—0 to 7 inches; silty clay loam

Ag2—7 to 12 inches; silty clay loam

Cg1—12 to 14 inches; ashy silt loam

Cg2—14 to 20 inches; very gravelly ashy coarse sand

Agb—20 to 28 inches; mucky silty clay loam

Cg3—28 to 34 inches; very gravelly ashy coarse sandy loam

Cg4—34 to 47 inches; very gravelly ashy coarse sand

Minor Components

Typic Endoaquands

Composition: 2 percent

Landform: Lake terraces

Slope range and aspect: 0 to 8 percent, west to southwest aspects

Hydric soil: Yes

Aquepts

Composition: 1 percent

Landform: Lake terraces

Slope range and aspect: 0 to 15 percent, west to southwest aspects

Hydric soil: Yes

Duric Vitraquands

Composition: 1 percent

Landform: Outwash plains

Slope range and aspect: 0 to 8 percent, west to southwest aspects

Hydric soil: Yes

Typic Endoaquents

Composition: 1 percent

Landform: Flood plains

Slope range and aspect: 0 to 8 percent, west to southwest aspects

Hydric soil: Yes

164—Aquepts-Typic Petraquepts, bedrock-Aquic Haploxerands-Typic Petraquepts complex, 4 to 30 percent slopes

General location: Hydrothermal areas along Hot Springs Creek

Landscape: Mountains

Elevation: 5,660 to 6,760 feet (1,725 to 2,059 meters)

Mean annual precipitation: 63 to 91 inches (1,600 to 2,311 millimeters)

Mean annual air temperature: 41 to 42 degrees F (5 degrees C)

Frost-free period: 70 to 90 days

Map Unit Composition

Aquepts component: 35 percent

Typic Petraquepts, bedrock component: 25 percent

Aquic Haploxerands component: 20 percent

Typic Petraquepts component: 10 percent
Minor components: 10 percent

Characteristics of Aquepts

Setting

Landform: Seeps on glacial-valley floors
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Mountainbase
Slope range and aspect: 4 to 30 percent, northwest to southeast aspects
Parent material: Slope alluvium derived from volcanic rock over colluvium derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 5 to 25 percent subrounded stones, 0 to 15 percent subrounded boulders
Depth to a restrictive feature: 40 to 80 inches to lithic bedrock
Drainage class: Poorly drained
Capacity to transmit water (K_{sat}): High (See table on physical properties)
Annual flooding frequency: None
Annual ponding frequency: None
Minimum depth of seasonal high water table: About 0 to 11 inches (See table on water features)
Salinity maximum: Not saline
Sodicity maximum: Not sodic
Available water capacity (entire profile): Very low (about 1.0 inch)
Land capability class and subclass (nonirrigated): 6w
Hydric soil: Yes
Hydrologic soil group: C

Vegetation

Ecological site: Spring complex (R022BI211CA)
Typical vegetation: Thinleaf alder, blue wildrye, common cowparsnip, bugle hedgenettle

Typical Profile

Oi—0 to 2 inches; slightly decomposed plant material
Ag—2 to 6 inches; very bouldery mucky ashy sandy loam
2Agb—6 to 11 inches; extremely bouldery ashy sandy loam
2Cg—11 to 16 inches; extremely bouldery ashy sandy loam
2A'gb—16 to 26 inches; extremely cobbly ashy sandy loam
2C'g—26 to 45 inches; extremely stony ashy sandy loam

Characteristics of Typic Petraquepts, Bedrock

Setting

Landform: Seeps on glacial-valley floors
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Mountainbase
Slope range and aspect: 4 to 30 percent, northwest to southeast aspects
Parent material: Colluvium derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 1 to 3 percent angular stones, 1 to 3 percent angular boulders
Depth to a restrictive feature: 10 to 40 inches to lithic bedrock
Drainage class: Poorly drained

Capacity to transmit water (K_{sat}): Very low to very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: About 0 to 7 inches (See table on water features)

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Low (about 3.2 inches)

Land capability class and subclass (nonirrigated): 7w

Hydric soil: Yes

Hydrologic soil group: D

Vegetation

Ecological site: Spring complex (R022BI211CA)

Typical vegetation: Thinleaf alder, woollyhead parsnip, streambank bird's-foot trefoil, Parish's yampah, seep monkeyflower

Typical Profile

Oi1—0 to 2 inches; slightly decomposed plant material

Oi2—2 to 7 inches; slightly decomposed plant material

Ag1—7 to 13 inches; very bouldery ashy loamy sand

Ag2—13 to 28 inches; extremely bouldery ashy coarse sandy loam

Cg—28 to 35 inches; extremely bouldery ashy loamy coarse sand

R—35 inches; bedrock

Characteristics of Aquic Haploxerands

Setting

Landform: Outwash terraces

Landform position (two-dimensional): Footslope

Landform position (three-dimensional): Tread

Slope range and aspect: 4 to 30 percent, northwest to southeast aspects

Parent material: Outwash derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 0 to 5 percent subangular gravel, 0 to 5 percent subangular cobbles

Depth to a restrictive feature: 20 to 40 inches to indurated duripan

Drainage class: Somewhat poorly drained

Capacity to transmit water (K_{sat}): Moderately low to high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: About 16 to 60 inches (See table on water features)

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Low (about 3.4 inches)

Land capability class and subclass (nonirrigated): 6e

Hydric soil: No

Hydrologic soil group: C

Vegetation

Ecological site: *Abies concolor*-*Pinus contorta* var. *murrayana*/*Elymus glaucus* (F022BI120CA)

Typical vegetation: Sierra lodgepole pine, white fir, white hawkweed, sedge

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
A1—1 to 2 inches; gravelly medial sandy loam
A2—2 to 4 inches; gravelly medial sandy loam
A3—4 to 9 inches; gravelly medial fine sandy loam
Bw1—9 to 16 inches; gravelly medial fine sandy loam
Bw2—16 to 24 inches; gravelly medial fine sandy loam
Bq—24 to 39 inches; very gravelly medial coarse sandy loam
Bqm—39 to 60 inches; cemented very gravelly sandy loam

Characteristics of Typic Petraquepts

Setting

Landform: Seeps on strath terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Slope range and aspect: 4 to 30 percent, northwest to southeast aspects
Parent material: Geothermal spring alluvium derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: None noted
Depth to a restrictive feature: 10 to 40 inches to moderately cemented duripan
Drainage class: Poorly drained
Capacity to transmit water (K_{sat}): Moderately low to high (See table on physical properties)
Annual flooding frequency: None
Annual ponding frequency: None
Minimum depth of seasonal high water table: About 0 to 7 inches (See table on water features)
Salinity maximum: Not saline
Sodicity maximum: Not sodic
Available water capacity (entire profile): Low (about 4.5 inches)
Land capability class and subclass (nonirrigated): 6w
Hydric soil: Yes
Hydrologic soil group: D

Vegetation

Ecological site: Thermal seeps (R022BI218CA)
Typical vegetation: Whitetip clover, brown sedge, Douglas' thistle, lakeshore sedge

Typical Profile

A1—0 to 2 inches; peaty silt loam
A2—2 to 7 inches; mucky silt loam
Cg1—7 to 12 inches; gravelly ashy loam
Cg2—12 to 19 inches; ashy loam
Cg3—19 to 25 inches; gravelly ashy loam
Bqgm—25 to 33 inches; cemented duripan

Minor Components

Typic Dystroxerepts

Composition: 4 percent
Landform: Actively eroding mountain slopes
Slope range and aspect: 4 to 50 percent, northwest to southeast aspects
Hydric soil: No

Aquic Dystroxerepts, debris flows

Composition: 3 percent

Landform: Debris flows

Slope range and aspect: 4 to 30 percent, northwest to southeast aspects

Hydric soil: Yes

Aquandic Humaquepts, flood plains

Composition: 1 percent

Landform: Flood plains

Slope range and aspect: 4 to 8 percent, northwest to southeast aspects

Hydric soil: Yes

Humic Haploxerands, strath terrace

Composition: 1 percent

Landform: Strath terraces

Slope range and aspect: 4 to 30 percent, northwest to southeast aspects

Hydric soil: No

Badland

Composition: 1 percent

Landform: Free faces

Slope range and aspect: 20 to 50 percent, northwest to southeast aspects

Hydric soil: No

**165—Aquandic Humaquepts-Histic Humaquepts-
Aquandic Endoaquepts-Terric Haplohemists complex,
1 to 5 percent slopes**

General location: Meadows adjacent to Hot Springs Creek and Willow Creek

Landscape: Mountains

Elevation: 5,440 to 5,790 feet (1,658 to 1,764 meters)

Mean annual precipitation: 51 to 69 inches (1,295 to 1,753 millimeters)

Mean annual air temperature: 42 to 43 degrees F (5 to 6 degrees C)

Frost-free period: 70 to 90 days

Map Unit Composition

Aquandic Humaquepts component: 35 percent

Histic Humaquepts component: 25 percent

Aquandic Endoaquepts component: 20 percent

Terric Haplohemists component: 15 percent

Minor components: 5 percent

Characteristics of Aquandic Humaquepts

Setting

Landform: Meadows on stream terraces

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Tread

Slope range and aspect: 1 to 5 percent, northeast to southwest aspects

Parent material: Alluvium derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: None noted

Depth to a restrictive feature: None within 60 inches

Drainage class: Poorly drained

Capacity to transmit water (K_{sat}): Moderately high to very high (See table on physical properties)

Annual flooding frequency: None

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Annual ponding frequency: Frequent (See table on water features)

Minimum depth of seasonal high water table: About 0 to 60 inches (See table on water features)

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Low (about 3.8 inches)

Land capability class and subclass (nonirrigated): 6w

Hydric soil: Yes

Hydrologic soil group: C

Vegetation

Ecological site: Frigid alluvial flat (R022BI202CA)

Typical vegetation: Tufted hairgrass, Kentucky bluegrass, widefruit sedge, mountain rush

Typical Profile

Oe—0 to 4 inches; peaty moderately decomposed plant material

A1—4 to 11 inches; ashy very fine sandy loam

A2—11 to 22 inches; very gravelly ashy very fine sandy loam

Bw1—22 to 28 inches; extremely gravelly ashy sandy loam

Bw2—28 to 38 inches; extremely gravelly ashy sandy loam

Cg—38 to 52 inches; gravelly ashy sandy loam

Characteristics of Histic Humaquepts

Setting

Landform: Meadows on stream terraces

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Tread

Slope range and aspect: 1 to 5 percent, northeast to southwest aspects

Parent material: Alluvium derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: None noted

Depth to a restrictive feature: None within 60 inches

Drainage class: Very poorly drained

Capacity to transmit water (K_{sat}): Moderately high to very high (See table on physical properties)

Annual flooding frequency: Rare (See table on water features)

Annual ponding frequency: None

Minimum depth of seasonal high water table: About 0 to 60 inches (See table on water features)

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): High (about 9.5 inches)

Land capability class and subclass (nonirrigated): 6w

Hydric soil: Yes

Hydrologic soil group: C

Vegetation

Ecological site: Frigid alluvial flat (R022BI202CA)

Typical vegetation: Nebraska sedge, mountain rush, Rydberg's penstemon, knotweed

Typical Profile

Oi—0 to 2 inches; herbaceous peat

Oe—2 to 6 inches; ashy herbaceous mucky peat

Oa—6 to 9 inches; ashy muck

Ab—9 to 12 inches; ashy loam

Agb—12 to 21 inches; ashy loam
Bgb—21 to 30 inches; ashy loam
Cg1—30 to 51 inches; extremely cobbly ashy sandy clay loam
Cg2—51 to 62 inches; very cobbly ashy coarse sandy loam

Characteristics of Aquandic Endoaquepts

Setting

Landform: Meadows on bars on stream terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Slope range and aspect: 1 to 5 percent, northeast to southwest aspects
Parent material: Alluvium derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 0 to 10 percent subangular gravel
Depth to a restrictive feature: None within 60 inches
Drainage class: Somewhat poorly drained
Capacity to transmit water (K_{sat}): Moderately high to very high (See table on physical properties)
Annual flooding frequency: None
Annual ponding frequency: None
Minimum depth of seasonal high water table: About 12 to 35 inches (See table on water features)
Salinity maximum: Not saline
Sodicity maximum: Not sodic
Available water capacity (entire profile): Moderate (about 7.0 inches)
Land capability class and subclass (nonirrigated): 6w
Hydric soil: Yes
Hydrologic soil group: C

Vegetation

Ecological site: Frigid alluvial flat (R022BI202CA)
Typical vegetation: Mountain rush, sedge, annual bluegrass, Columbia needlegrass

Typical Profile

A1—0 to 4 inches; ashy very fine sandy loam
A2—4 to 12 inches; ashy very fine sandy loam
Bw1—12 to 22 inches; gravelly ashy very fine sandy loam
Bw2—22 to 35 inches; gravelly ashy very fine sandy loam
Cg1—35 to 41 inches; gravelly ashy very fine sandy loam
Cg2—41 to 49 inches; ashy loamy fine sand
Cg3—49 to 59 inches; extremely gravelly ashy loamy coarse sand

Characteristics of Terric Haplohemists

Setting

Landform: Fens on stream terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Slope range and aspect: 1 to 5 percent, northeast to southwest aspects
Parent material: Herbaceous organic material over alluvium derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: None noted
Depth to a restrictive feature: None within 60 inches
Drainage class: Very poorly drained

Capacity to transmit water (K_{sat}): Moderately high to very high (See table on physical properties)
Annual flooding frequency: None
Annual ponding frequency: Frequent (See table on water features)
Minimum depth of seasonal high water table: About 0 to 24 inches (See table on water features)
Salinity maximum: Not saline
Sodicity maximum: Not sodic
Available water capacity (entire profile): Low (about 4.6 inches)
Land capability class and subclass (nonirrigated): 5w
Hydric soil: Yes
Hydrologic soil group: D

Vegetation

Ecological site: Frigid alluvial flat (R022BI202CA)
Typical vegetation: Rush, Nebraska sedge, Northwest Territory sedge, bulrush

Typical Profile

Oe1—0 to 5 inches; muck
Oe2—5 to 20 inches; herbaceous muck
A1—20 to 30 inches; ashy silty clay loam
A2—30 to 35 inches; ashy silt loam
C—35 to 43 inches; ashy silt loam

Minor Components

Humic Haploxerands, stream terrace

Composition: 5 percent
Landform: Stream terraces
Slope range and aspect: 1 to 5 percent, northeast to southwest aspects
Hydric soil: No

166—Aquic Haploxerands-Humic Haploxerands, outwash terrace, complex, 2 to 30 percent slopes

General location: Outwash terrace in Hot Springs Creek drainage
Landscape: Mountains
Elevation: 5,740 to 6,010 feet (1,750 to 1,831 meters)
Mean annual precipitation: 63 to 77 inches (1,600 to 1,956 millimeters)
Mean annual air temperature: 41 to 42 degrees F (5 degrees C)
Frost-free period: 70 to 90 days

Map Unit Composition

Aquic Haploxerands component: 50 percent
Humic Haploxerands, outwash terrace component: 40 percent
Minor components: 10 percent

Characteristics of Aquic Haploxerands

Setting

Landform: Outwash terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Slope range and aspect: 2 to 30 percent, west to southeast aspects
Parent material: Outwash derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 0 to 5 percent subangular gravel, 0 to 5 percent subangular cobbles

Depth to a restrictive feature: 20 to 40 inches to indurated duripan

Drainage class: Somewhat poorly drained

Capacity to transmit water (K_{sat}): Moderately low to high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: About 16 to 60 inches (See table on water features)

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Low (about 3.4 inches)

Land capability class and subclass (nonirrigated): 6e

Hydric soil: No

Hydrologic soil group: C

Vegetation

Ecological site: *Abies concolor*-*Pinus contorta* var. *murrayana*/*Elymus glaucus* (F022BI120CA)

Typical vegetation: Sierra lodgepole pine, white fir, sugar pine, white hawkweed

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

A1—1 to 2 inches; gravelly medial sandy loam

A2—2 to 4 inches; gravelly medial sandy loam

A3—4 to 9 inches; gravelly medial fine sandy loam

Bw1—9 to 16 inches; gravelly medial fine sandy loam

Bw2—16 to 24 inches; gravelly medial fine sandy loam

Bq—24 to 39 inches; very gravelly medial coarse sandy loam

Bqm—39 to 47 inches; cemented very gravelly sandy loam

Characteristics of Humic Haploxerands, Outwash Terrace

Setting

Landform: Outwash terraces

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Tread

Slope range and aspect: 2 to 30 percent, west to southeast aspects

Parent material: Ash mixed with outwash derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 15 to 25 percent subangular gravel, 2 to 5 percent subangular cobbles, 2 to 5 percent subangular stones, 0 to 3 percent subangular boulders

Depth to a restrictive feature: 20 to 40 inches to moderately cemented duripan

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Very low to very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 1.8 inches)

Land capability class and subclass (nonirrigated): 4e

Hydric soil: No

Hydrologic soil group: B

Vegetation

Ecological site: *Abies concolor-Calocedrus decurrens/Ceanothus cordulatus/Achnatherum* (F022BI110CA)

Typical vegetation: White fir, California brome, Jeffrey pine, incense cedar

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

Oe—1 to 2 inches; moderately decomposed plant material

A1—2 to 5 inches; medial gravelly sandy loam

A2—5 to 8 inches; medial fine sandy loam

A3—8 to 15 inches; medial gravelly sandy loam

AB—15 to 24 inches; gravelly medial fine sandy loam

Bw—24 to 31 inches; very gravelly medial fine sandy loam

Bqm—31 to 39 inches; cemented very gravelly ashy sandy loam

Minor Components

Juniperlake, bouldery

Composition: 4 percent

Landform: Ground moraines

Slope range and aspect: 2 to 30 percent, west to southeast aspects

Hydric soil: No

Humic Haploxerands, strath terrace

Composition: 3 percent

Landform: Strath terraces

Slope range and aspect: 2 to 30 percent, west to southeast aspects

Hydric soil: No

Aquepts

Composition: 2 percent

Landform: Seeps on glacial-valley floors

Slope range and aspect: 2 to 30 percent, west to southeast aspects

Hydric soil: Yes

Aquandic Humaquepts, flood plains

Composition: 1 percent

Landform: Flood plains

Slope range and aspect: 2 to 8 percent, west to southeast aspects

Hydric soil: Yes

167—Emeraldlake-Readingpeak-Terracelake-Rock outcrop complex, 30 to 95 percent slopes

General location: Lassen Peak

Landscape: Mountains

Elevation: 7,600 to 10,450 feet (2,315 to 3,186 meters)

Mean annual precipitation: 101 to 125 inches (2,565 to 3,175 millimeters)

Mean annual air temperature: 38 to 40 degrees F (3 to 4 degrees C)

Frost-free period: 50 to 85 days

Map Unit Composition

Emeraldlake component: 35 percent

Readingpeak component: 20 percent

Terracelake component: 15 percent
Rock outcrop: 15 percent
Minor components: 15 percent

Characteristics of Emeraldlake

Setting

Landform: Glaciated volcanic domes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Slope range and aspect: 30 to 95 percent, north aspects
Parent material: Tephra mixed with colluvium derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 10 to 45 percent subangular gravel, 5 to 45 percent subangular cobbles, 5 to 20 percent subangular stones, 3 to 15 percent subangular boulders
Depth to a restrictive feature: None within 60 inches
Drainage class: Somewhat excessively drained
Capacity to transmit water (K_{sat}): High or very high (See table on physical properties)
Annual flooding frequency: None
Annual ponding frequency: None
Minimum depth of seasonal high water table: More than 72 inches
Salinity maximum: Not saline
Sodicity maximum: Not sodic
Available water capacity (entire profile): Very low (about 1.6 inches)
Land capability class and subclass (nonirrigated): 7e
Hydric soil: No
Hydrologic soil group: A

Vegetation

Ecological site: Alpine slopes (R022BI207CA)
Typical vegetation: Bluntlobe lupine, mountain hemlock, whitebark pine, marumleaf buckwheat

Typical Profile

A1—0 to 1 inch; extremely gravelly ashy fine sandy loam
A2—1 to 5 inches; extremely gravelly ashy loamy sand
A3—5 to 14 inches; extremely gravelly ashy loamy sand
Bw1—14 to 25 inches; extremely gravelly ashy loamy coarse sand
Bw2—25 to 35 inches; extremely gravelly ashy loamy coarse sand
Bw3—35 to 51 inches; ashy boulders
Bw4—51 to 60 inches; ashy boulders

Characteristics of Readingpeak

Setting

Landform: Glaciated volcanic domes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Slope range and aspect: 30 to 95 percent, north aspects
Parent material: Tephra over colluvium and residuum weathered from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 20 to 30 percent angular gravel, 25 to 35 percent angular cobbles, 15 to 30 percent angular stones, 0 to 15 percent angular boulders

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Depth to a restrictive feature: 40 to 60 inches to lithic bedrock
Drainage class: Well drained
Capacity to transmit water (K_{sat}): Very low to very high (See table on physical properties)
Annual flooding frequency: None
Annual ponding frequency: None
Minimum depth of seasonal high water table: More than 72 inches
Salinity maximum: Not saline
Sodicity maximum: Not sodic
Available water capacity (entire profile): Very low (about 0.9 inch)
Land capability class and subclass (nonirrigated): 7s
Hydric soil: No
Hydrologic soil group: A

Vegetation

Ecological site: *Tsuga mertensiana*-*Pinus albicaulis*/*Holodiscus discolor*/*Lupinus obtusilobus*-*Polygonum davisiae* (F022B1124CA)
Typical vegetation: Mountain hemlock, bluntlobe lupine, Davis' knotweed, whitebark pine

Typical Profile

A1—0 to 2 inches; very gravelly ashy sandy loam
A2—2 to 7 inches; very gravelly ashy sandy loam
2Bq1—7 to 14 inches; extremely gravelly ashy loamy sand
2Bq2—14 to 26 inches; extremely cobbly ashy loamy coarse sand
2Bq3—26 to 35 inches; extremely cobbly ashy loamy sand
2Bq4—35 to 50 inches; extremely stony ashy loamy sand
2R—50 inches; bedrock

Characteristics of Terracelake

Setting

Landform: Glaciated volcanic domes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Slope range and aspect: 30 to 95 percent, north aspects
Parent material: Tephra over colluvium and residuum weathered from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 0 to 75 percent subangular gravel, 3 to 30 percent subangular cobbles, 0 to 25 percent subangular stones, 0 to 20 percent subangular boulders
Depth to a restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity to transmit water (K_{sat}): Very low to very high (See table on physical properties)
Annual flooding frequency: None
Annual ponding frequency: None
Minimum depth of seasonal high water table: More than 72 inches
Salinity maximum: Not saline
Sodicity maximum: Not sodic
Available water capacity (entire profile): Very low (about 2.6 inches)
Land capability class and subclass (nonirrigated): 7e
Hydric soil: No
Hydrologic soil group: B

Vegetation

Ecological site: Alpine slopes (R022BI207CA)

Typical vegetation: Mountain hemlock, mountain pride, spike trisetum, pioneer rockcress

Typical Profile

O_i—0 to 1 inch; slightly decomposed plant material

A—1 to 3 inches; gravelly ashy sandy loam

2Ab—3 to 7 inches; gravelly ashy sandy loam

2Bwb₁—7 to 19 inches; very gravelly ashy fine sandy loam

2Bwb₂—19 to 24 inches; extremely gravelly ashy fine sandy loam

2Bqb—24 to 37 inches; extremely stony ashy sandy loam

2R—37 inches; bedrock

Characteristics of Rock Outcrop

Setting

Landform: Volcanic domes

Slope range and aspect: 30 to 95 percent, north aspects

Definition: Rock outcrop consists of exposures of bare bedrock that have no soil

Component Properties and Qualities

Land capability class (nonirrigated): 8

Hydric soil: No

Minor Components

Rubble land

Composition: 10 percent

Landform: Volcanic domes

Slope range and aspect: 30 to 95 percent, north aspects

Hydric soil: No

Lava flows

Composition: 5 percent

Landform: Lava flows on volcanic domes

Slope range and aspect: 30 to 95 percent, north aspects

Hydric soil: No

168—Vitrixerands, low elevation, 1 to 15 percent slopes

General location: Outwash terrace in Hat Creek drainage

Landscape: Mountains

Elevation: 6,100 to 6,300 feet (1,858 to 1,919 meters)

Mean annual precipitation: 43 to 59 inches (1,092 to 1,499 millimeters)

Mean annual air temperature: 41 to 44 degrees F (5 to 6 degrees C)

Frost-free period: 60 to 85 days

Map Unit Composition

Vitrixerands, low elevation component: 90 percent

Minor components: 10 percent

Characteristics of Vitrixerands, Low Elevation

Setting

Landform: Outwash terraces

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Tread

Slope range and aspect: 1 to 15 percent, southwest to southeast aspects

Parent material: Tephra over outwash derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 10 to 50 percent subangular gravel, 0 to 2 percent subangular cobbles, 0 to 2 percent subangular stones, 0 to 1 percent subangular boulders

Depth to a restrictive feature: 20 to 60 inches to strongly cemented duripan

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Moderately low to very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 2.2 inches)

Land capability class and subclass (nonirrigated): 6e

Hydric soil: No

Hydrologic soil group: B

Vegetation

Ecological site: *Abies concolor-Pinus contorta* var. *murrayana/Achnatherum occidentale* (F022BI123CA)

Typical vegetation: Sierra lodgepole pine, western needlegrass, white fir, squirreltail

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

A1—1 to 4 inches; gravelly ashy loamy coarse sand

A2—4 to 8 inches; gravelly ashy loamy coarse sand

A3—8 to 12 inches; gravelly ashy loamy coarse sand

2Ab—12 to 21 inches; gravelly ashy loamy sand

2Bwb—21 to 37 inches; very stony medial loamy sand

2Bqmb—37 to 46 inches; cemented duripan

Minor Components

Vitrandic Xerofluvents, debris flows

Composition: 5 percent

Landform: Low stream terraces

Slope range and aspect: 1 to 15 percent, southwest to southeast aspects

Hydric soil: No

Sueredo

Composition: 4 percent

Landform: Ground moraines

Slope range and aspect: 1 to 15 percent, southwest to southeast aspects

Hydric soil: No

Rock outcrop

Composition: 1 percent

Landform: Lava flows

Slope range and aspect: 1 to 15 percent, southwest to southeast aspects

Hydric soil: No

169—Sueredo-Rock outcrop, cliffs-Scoured complex, 15 to 150 percent slopes

General location: Raker Peak

Landscape: Mountains

Elevation: 6,230 to 7,490 feet (1,899 to 2,282 meters)

Mean annual precipitation: 57 to 69 inches (1,448 to 1,753 millimeters)

Mean annual air temperature: 40 to 44 degrees F (4 to 6 degrees C)

Frost-free period: 60 to 85 days

Map Unit Composition

Sueredo component: 55 percent

Rock outcrop: 20 percent

Scoured component: 15 percent

Minor components: 10 percent

Characteristics of Sueredo

Setting

Landform: Ground moraines on volcanic domes

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Mountainflank

Slope range and aspect: 15 to 80 percent, north to west aspects

Parent material: Tephra over till derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 0 to 25 percent subangular gravel, 0 to 15 percent subangular cobbles, 0 to 5 percent subangular stones, 0 to 10 percent subangular boulders

Depth to a restrictive feature: 55 to 80 inches to dense material

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Moderately low to very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 2.0 inches)

Land capability class and subclass (nonirrigated): 7e

Hydric soil: No

Hydrologic soil group: A

Vegetation

Ecological site: *Abies concolor*-*Pinus jeffreyi*/*Arctostaphylos patula*-*Chrysolepis sempervirens* (F022BI103CA)

Typical vegetation: White fir, greenleaf manzanita, prostrate ceanothus, Jeffrey pine

Typical Profile

Oi—0 to 2 inches; slightly decomposed plant material

Oe—2 to 5 inches; moderately decomposed plant material

A1—5 to 9 inches; bouldery ashy loamy coarse sand

A2—9 to 13 inches; bouldery ashy loamy coarse sand

C1—13 to 16 inches; bouldery ashy loamy coarse sand

C2—16 to 18 inches; very bouldery ashy coarse sand
2Ab—18 to 26 inches; very bouldery ashy loamy coarse sand
2Bwb—26 to 50 inches; extremely cobbly ashy coarse sand
2C—50 to 76 inches; ashy stones
2Cdq—76 to 83 inches; extremely bouldery ashy loamy coarse sand

Characteristics of Rock Outcrop

Setting

Landform: Glacially scoured volcanic domes
Slope range and aspect: 15 to 150 percent, north to west aspects
Definition: Rock outcrop consists of exposures of bare bedrock that have no soil

Component Properties and Qualities

Land capability class (nonirrigated): 8
Hydric soil: No

Characteristics of Scoured

Setting

Landform: Glacially scoured volcanic domes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Slope range and aspect: 15 to 90 percent, north to west aspects
Parent material: Tephra over colluvium and/or residuum weathered from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 3 to 40 percent subangular gravel, 3 to 10 percent subangular cobbles, 3 to 10 percent subangular stones, 0 to 10 percent subrounded boulders
Depth to a restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity to transmit water (K_{sat}): Very low to very high (See table on physical properties)
Annual flooding frequency: None
Annual ponding frequency: None
Minimum depth of seasonal high water table: More than 72 inches
Salinity maximum: Not saline
Sodicity maximum: Not sodic
Available water capacity (entire profile): Very low (about 0.6 inch)
Land capability class (nonirrigated): 8
Hydric soil: No
Hydrologic soil group: B

Vegetation

Ecological site: *Pinus jeffreyi/Arctostaphylos patula* (F022B1121CA)
Typical vegetation: Greenleaf manzanita, Jeffrey pine, snowbrush ceanothus, huckleberry oak

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
A—1 to 4 inches; very bouldery medial loamy sand
AB—4 to 10 inches; very bouldery medial sandy loam
2Bw—10 to 17 inches; very bouldery medial fine sandy loam
2C—17 to 30 inches; boulders
2R—30 to 39 inches; bedrock

Minor Components

Rubble land

Composition: 10 percent

Landform: Glacially scoured volcanic domes

Slope range and aspect: 15 to 60 percent, north to west aspects

Hydric soil: No

170—Rock outcrop-Emeraldlake-Rubble land- Readingpeak complex, 20 to 150 percent slopes

General location: Chaos Crags

Landscape: Mountains

Elevation: 6,680 to 8,530 feet (2,035 to 2,600 meters)

Mean annual precipitation: 53 to 91 inches (1,346 to 2,311 millimeters)

Mean annual air temperature: 40 degrees F (4 degrees C)

Frost-free period: 50 to 85 days

Map Unit Composition

Rock outcrop: 35 percent

Emeraldlake component: 20 percent

Rubble land: 18 percent

Readingpeak component: 15 percent

Minor components: 12 percent

Characteristics of Rock Outcrop

Setting

Landform: Volcanic domes

Slope range and aspect: 20 to 150 percent, south to east aspects

Definition: Rock outcrop consists of exposures of bare bedrock that have no soil

Component Properties and Qualities

Land capability class (nonirrigated): 8

Hydric soil: No

Characteristics of Emeraldlake

Setting

Landform: Colluvial aprons on volcanic domes

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Mountainflank

Slope range and aspect: 20 to 95 percent, south to east aspects

Parent material: Tephra mixed with colluvium derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 10 to 45 percent subangular gravel, 5 to 45 percent subangular cobbles, 5 to 20 percent subangular stones, 3 to 15 percent subangular boulders

Depth to a restrictive feature: None within 60 inches

Drainage class: Somewhat excessively drained

Capacity to transmit water (K_{sat}): High or very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 1.6 inches)

Land capability class and subclass (nonirrigated): 7e

Hydric soil: No

Hydrologic soil group: A

Vegetation

Ecological site: Alpine slopes (R022BI207CA)

Typical vegetation: Bluntlobe lupine, mountain hemlock, whitebark pine, marumleaf buckwheat

Typical Profile

A1—0 to 1 inch; extremely gravelly ashy fine sandy loam

A2—1 to 5 inches; extremely gravelly ashy loamy sand

A3—5 to 14 inches; extremely gravelly ashy loamy sand

Bw1—14 to 25 inches; extremely gravelly ashy loamy coarse sand

Bw2—25 to 35 inches; extremely gravelly ashy loamy coarse sand

Bw3—35 to 51 inches; ashy boulders

Bw4—51 to 60 inches; ashy boulders

Characteristics of Rubble Land

Setting

Landform: Volcanic domes

Slope range and aspect: 20 to 95 percent, south to east aspects

Definition: Rubble land consists of areas of cobbles, stones, and boulders and has little soil

Component Properties and Qualities

Land capability class (nonirrigated): 8

Hydric soil: No

Characteristics of Readingpeak

Setting

Landform: Convex backslopes on volcanic domes

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Mountainflank

Slope range and aspect: 20 to 95 percent, south to east aspects

Parent material: Tephra over colluvium and residuum weathered from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 20 to 30 percent angular gravel, 25 to 35 percent angular cobbles, 15 to 30 percent angular stones, 0 to 15 percent angular boulders

Depth to a restrictive feature: 40 to 60 inches to lithic bedrock

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Very low to very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 0.9 inch)

Land capability class and subclass (nonirrigated): 7s

Hydric soil: No

Hydrologic soil group: A

Vegetation

Ecological site: Alpine slopes (R022BI207CA)

Typical vegetation: Mountain hemlock, bluntlobe lupine, Davis' knotweed, whitebark pine

Typical Profile

A1—0 to 2 inches; very gravelly ashy sandy loam

A2—2 to 7 inches; very gravelly ashy sandy loam

2Bq1—7 to 14 inches; extremely gravelly ashy loamy sand

2Bq2—14 to 26 inches; extremely cobbly ashy loamy coarse sand

2Bq3—26 to 35 inches; extremely cobbly ashy loamy sand

2Bq4—35 to 50 inches; extremely stony ashy loamy sand

2R—50 inches; bedrock

Minor Components

Terracelake

Composition: 12 percent

Landform: Volcanic domes

Slope range and aspect: 20 to 95 percent, south to east aspects

Hydric soil: No

171—Aquepts-Typic Petraquepts, bedrock complex, 2 to 45 percent slopes

General location: Springs in the southwest quarter of the park

Landscape: Mountains

Elevation: 5,400 to 8,210 feet (1,645 to 2,502 meters)

Mean annual precipitation: 55 to 113 inches (1,397 to 2,870 millimeters)

Mean annual air temperature: 38 to 43 degrees F (4 to 6 degrees C)

Frost-free period: 50 to 85 days

Map Unit Composition

Aquepts component: 50 percent

Typic Petraquepts, bedrock component: 35 percent

Minor components: 15 percent

Characteristics of Aquepts

Setting

Landform: Seeps on glacial-valley walls

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Mountainbase

Slope range and aspect: 2 to 45 percent, west to southeast aspects

Parent material: Slope alluvium derived from volcanic rock over colluvium derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 5 to 25 percent subrounded stones, 0 to 15 percent subrounded boulders

Depth to a restrictive feature: 40 to 80 inches to lithic bedrock

Drainage class: Poorly drained

Capacity to transmit water (K_{sat}): High (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

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Minimum depth of seasonal high water table: About 0 to 11 inches (See table on water features)

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 1.0 inch)

Land capability class and subclass (nonirrigated): 6e

Hydric soil: Yes

Hydrologic soil group: C

Vegetation

Ecological site: Spring complex (R022BI211CA)

Typical vegetation: Thinleaf alder, blue wildrye, bugle hedgenettle, common cowparsnip

Typical Profile

Oi—0 to 2 inches; slightly decomposed plant material

Ag—2 to 6 inches; very bouldery mucky ashy sandy loam

2Agb—6 to 11 inches; extremely bouldery ashy sandy loam

2Cg—11 to 16 inches; extremely bouldery ashy sandy loam

2A'gb—16 to 26 inches; extremely cobbly ashy sandy loam

2C'g—26 to 45 inches; extremely stony ashy sandy loam

Characteristics of Typic Petraquepts, Bedrock

Setting

Landform: Seeps on glacial-valley walls

Landform position (two-dimensional): Footslope

Landform position (three-dimensional): Mountainbase

Slope range and aspect: 2 to 45 percent, west to southeast aspects

Parent material: Colluvium derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 1 to 3 percent angular stones, 1 to 3 percent angular boulders

Depth to a restrictive feature: 10 to 40 inches to lithic bedrock

Drainage class: Poorly drained

Capacity to transmit water (K_{sat}): Very low to very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: About 0 to 7 inches (See table on water features)

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Low (about 3.2 inches)

Land capability class and subclass (nonirrigated): 7w

Hydric soil: Yes

Hydrologic soil group: D

Vegetation

Ecological site: Spring complex (R022BI211CA)

Typical vegetation: Thinleaf alder, woollyhead parsnip, streambank bird's-foot trefoil, Parish's yampah, seep monkeyflower

Typical Profile

Oi1—0 to 2 inches; slightly decomposed plant material

Oi2—2 to 7 inches; slightly decomposed plant material

Ag1—7 to 13 inches; very bouldery ashy loamy sand

Ag2—13 to 28 inches; extremely bouldery ashy coarse sandy loam
Cg—28 to 35 inches; extremely bouldery ashy loamy coarse sand
R—35 inches; bedrock

Minor Components

Shadowlake

Composition: 5 percent

Landform: Moraines

Slope range and aspect: 2 to 45 percent, west to southeast aspects

Hydric soil: No

Endoaquepts

Composition: 5 percent

Landform: Seeps on mountain slopes

Slope range and aspect: 2 to 45 percent, west to southeast aspects

Hydric soil: Yes

Typic Endoaquands

Composition: 5 percent

Landform: Stream terraces

Slope range and aspect: 2 to 15 percent, west to southeast aspects

Hydric soil: Yes

172—Badgerflat very gravelly ashy sandy loam, 1 to 30 percent slopes

General location: Glacial valley north of the Central Plateau

Landscape: Mountains

Elevation: 6,110 to 6,880 feet (1,863 to 2,098 meters)

Mean annual precipitation: 39 to 57 inches (991 to 1,448 millimeters)

Mean annual air temperature: 41 to 44 degrees F (5 to 7 degrees C)

Frost-free period: 60 to 85 days

Map Unit Composition

Badgerflat component: 90 percent

Minor components: 10 percent

Characteristics of Badgerflat

Setting

Landform: Ground moraines

Landform position (two-dimensional): Summit

Landform position (three-dimensional): Mountainbase

Slope range and aspect: 1 to 30 percent, southeast to east aspects

Parent material: Tephra over till derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 15 to 65 percent subangular gravel, 2 to 10 percent subangular cobbles, 3 to 10 percent subangular stones, 0 to 10 percent subangular boulders

Depth to a restrictive feature: 20 to 40 inches to dense material

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Moderately low to very high (See table on physical properties)

Annual flooding frequency: None
Annual ponding frequency: None
Minimum depth of seasonal high water table: More than 72 inches
Salinity maximum: Not saline
Sodicity maximum: Not sodic
Available water capacity (entire profile): Very low (about 1.3 inches)
Land capability class and subclass (nonirrigated): 7e
Hydric soil: No
Hydrologic soil group: B

Vegetation

Ecological site: *Pinus jeffreyi*-*Pinus contorta* var. *murrayana*/*Monardella odoratissima*
(F022BI126CA)
Typical vegetation: Jeffrey pine, Sierra lodgepole pine, woolly mule-ears, narrowleaf lupine

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material
A1—1 to 4 inches; very gravelly ashy sandy loam
A2—4 to 7 inches; gravelly ashy sandy loam
2Bwb1—7 to 11 inches; extremely stony ashy loamy sand
2Bwb2—11 to 23 inches; extremely stony ashy loamy sand
2BCb—23 to 33 inches; extremely stony ashy loamy sand
2Cd—33 to 43 inches; extremely gravelly ashy loamy coarse sand

Minor Components

Badgerwash

Composition: 5 percent
Landform: Outwash plains
Slope range and aspect: 1 to 10 percent, southeast to east aspects
Hydric soil: No

Cenplat

Composition: 4 percent
Landform: Glaciated lava plateaus
Slope range and aspect: 1 to 30 percent, southeast to east aspects
Hydric soil: No

Typic Endoaquands

Composition: 1 percent
Landform: Lake terraces
Slope range and aspect: 1 to 15 percent, southeast to east aspects
Hydric soil: Yes

173—Badgerwash very bouldery medial loamy coarse sand, 1 to 10 percent slopes

General location: Glacial-valley bottom north of the Central Plateau
Landscape: Mountains
Elevation: 6,210 to 6,610 feet (1,894 to 2,016 meters)
Mean annual precipitation: 39 to 49 inches (991 to 1,245 millimeters)
Mean annual air temperature: 42 to 44 degrees F (6 to 7 degrees C)
Frost-free period: 60 to 85 days

Map Unit Composition

Badgerwash component: 90 percent

Minor components: 10 percent

Characteristics of Badgerwash

Setting

Landform: Outwash plains

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Mountainbase

Slope range and aspect: 1 to 10 percent, south to east aspects

Parent material: Mixed tephra and outwash over outwash derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 25 to 70 percent subangular gravel, 0 to 5 percent subangular cobbles, 2 to 10 percent subangular stones, 0 to 5 percent subangular boulders

Depth to a restrictive feature: 20 to 40 inches to strongly cemented duripan

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Moderately low to very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 1.0 inch)

Land capability class and subclass (nonirrigated): 7e

Hydric soil: No

Hydrologic soil group: B

Vegetation

Ecological site: *Pinus contorta* var. *murrayana*/*Elymus elymoides* (F022B1125CA)

Typical vegetation: Sierra lodgepole pine, narrowleaf lupine, squirreltail, western needlegrass

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

A1—1 to 4 inches; very bouldery ashy loamy coarse sand

A2—4 to 9 inches; very bouldery ashy loamy coarse sand

AC—9 to 13 inches; very bouldery ashy coarse sand

2Ab—13 to 20 inches; extremely stony ashy sandy loam

2Bwb—20 to 35 inches; extremely stony ashy sandy loam

2Bqmb—35 to 45 inches; cemented extremely bouldery ashy loamy coarse sand

Minor Components

Typic Endoaquands

Composition: 8 percent

Landform: Lake terraces

Slope range and aspect: 1 to 10 percent, south to east aspects

Hydric soil: Yes

Badgerflat

Composition: 2 percent

Landform: Ground moraines

Slope range and aspect: 1 to 10 percent, south to east aspects

Hydric soil: No



Figure 22.—Map unit 174 north of Lassen Peak. Map unit 167 is in the background on Lassen Peak.

174—Vitrandic Cryorthents-Readingpeak-Rock outcrop complex, 5 to 150 percent slopes

General location: Hanging valley between Chaos Crags and Crescent Crater (fig. 22)

Landscape: Mountains

Elevation: 6,710 to 8,630 feet (2,046 to 2,629 meters)

Mean annual precipitation: 71 to 119 inches (1,803 to 3,023 millimeters)

Mean annual air temperature: 40 degrees F (4 degrees C)

Frost-free period: 50 to 85 days

Map Unit Composition

Vitrandic Cryorthents component: 60 percent

Readingpeak component: 20 percent

Rock outcrop: 10 percent

Minor components: 10 percent

Characteristics of Vitrandic Cryorthents

Setting

Landform: Pyroclastic flow in hanging valleys

Slope range and aspect: 5 to 60 percent, west to east aspects

Parent material: Pumiceous pyroclastic flow derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 70 to 80 percent subangular gravel, 10 to 20 percent subangular cobbles, 0 to 10 percent subangular stones, 0 to 5 percent subangular boulders

Depth to a restrictive feature: None within 60 inches

Drainage class: Excessively drained

Capacity to transmit water (K_{sat}): High or very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 1.2 inches)

Land capability class and subclass (nonirrigated): 7e

Hydric soil: No

Hydrologic soil group: A

Vegetation

Ecological site: Pyroclastic flow (R022BI214CA)

Typical vegetation: Marumleaf buckwheat, dwarf alpinegold, cobwebby Indian paintbrush, western white pine

Typical Profile

A—0 to 4 inches; very gravelly ashy loamy coarse sand

AC—4 to 9 inches; very gravelly ashy loamy coarse sand

C1—9 to 17 inches; extremely gravelly ashy coarse sand

C2—17 to 19 inches; very gravelly ashy loamy coarse sand

C3—19 to 27 inches; extremely gravelly ashy coarse sand

C4—27 to 30 inches; extremely gravelly ashy coarse sand

C5—30 to 35 inches; very gravelly ashy coarse sand

C6—35 to 38 inches; very gravelly ashy coarse sand

C7—38 to 60 inches; extremely gravelly ashy coarse sand

Characteristics of Readingpeak

Setting

Landform: Roche moutonnées on hanging valleys

Landform position (two-dimensional): Summit

Landform position (three-dimensional): Mountainbase

Slope range and aspect: 5 to 60 percent, west to east aspects

Parent material: Tephra over colluvium and residuum weathered from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 20 to 30 percent angular gravel, 25 to 35 percent angular cobbles, 15 to 30 percent angular stones, 0 to 15 percent angular boulders

Depth to a restrictive feature: 40 to 60 inches to lithic bedrock

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Very low to very high (See table on physical properties)

Annual flooding frequency: None
Annual ponding frequency: None
Minimum depth of seasonal high water table: More than 72 inches
Salinity maximum: Not saline
Sodicity maximum: Not sodic
Available water capacity (entire profile): Very low (about 0.9 inch)
Land capability class and subclass (nonirrigated): 7s
Hydric soil: No
Hydrologic soil group: A

Vegetation

Ecological site: *Tsuga mertensiana*-*Pinus albicaulis*/*Holodiscus discolor*/*Lupinus obtusilobus*-*Polygonum davisiae* (F022B1124CA)
Typical vegetation: Mountain hemlock, Davidson's penstemon, oceanspray, whitebark pine

Typical Profile

A1—0 to 2 inches; very gravelly ashy sandy loam
A2—2 to 7 inches; very gravelly ashy sandy loam
2Bq1—7 to 14 inches; extremely gravelly ashy loamy sand
2Bq2—14 to 26 inches; extremely cobbly ashy loamy coarse sand
2Bq3—26 to 35 inches; extremely cobbly ashy loamy sand
2Bq4—35 to 50 inches; extremely stony ashy loamy sand
2R—50 inches; bedrock

Characteristics of Rock Outcrop

Setting

Landform: Lava flows
Slope range and aspect: 5 to 150 percent, west to east aspects
Definition: Rock outcrop consists of exposures of bare bedrock that have no soil

Component Properties and Qualities

Land capability class (nonirrigated): 8
Hydric soil: No

Minor Components

Terracelake

Composition: 7 percent
Landform: Glaciated volcanic domes
Slope range and aspect: 5 to 60 percent, west to east aspects
Hydric soil: No

Rubble land

Composition: 3 percent
Landform: Hanging valleys
Slope range and aspect: 5 to 60 percent, west to east aspects
Hydric soil: No

175—Shadowlake-Vitrandid Cryofluents complex, 2 to 30 percent slopes

General location: Glacial-valley floors in Rice Creek, Bumpass Creek, and West Fork Hat Creek drainages
Landscape: Mountains

Soil Survey of Lassen Volcanic National Park, California

Elevation: 6,470 to 7,440 feet (1,972 to 2,268 meters)

Mean annual precipitation: 71 to 111 inches (1,803 to 2,819 millimeters)

Mean annual air temperature: 38 to 41 degrees F (4 to 5 degrees C)

Frost-free period: 50 to 85 days

Map Unit Composition

Shadowlake component: 75 percent

Vitrandid Cryofluvents component: 15 percent

Minor components: 10 percent

Characteristics of Shadowlake

Setting

Landform: Ground moraines

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Mountainbase

Slope range and aspect: 2 to 30 percent, west to southwest aspects

Parent material: Tephra over or mixed with till derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 7 to 40 percent subangular gravel, 3 to 5 percent subangular cobbles, 1 to 10 percent subangular stones, 0 to 10 percent subangular boulders

Depth to a restrictive feature: 35 to 60 inches to dense material

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Moderately low to very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Low (about 4.1 inches)

Land capability class and subclass (nonirrigated): 4e

Hydric soil: No

Hydrologic soil group: A

Vegetation

Ecological site: *Tsuga mertensiana-Abies magnifica/Lupinus obtusilobus-Eriogonum marifolium* (F022B111CA)

Typical vegetation: California red fir, Sierra lodgepole pine, mountain hemlock, sedge

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

A—1 to 2 inches; gravelly ashy sandy loam

Bw1—2 to 6 inches; gravelly ashy sandy loam

Bw2—6 to 13 inches; gravelly ashy sandy loam

Bw3—13 to 23 inches; very gravelly ashy sandy loam

Bq—23 to 41 inches; extremely gravelly ashy coarse sandy loam

Cdq—41 to 51 inches; loam

Characteristics of Vitrandid Cryofluvents

Setting

Landform: Meadows in glacial lakes (relict)

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Tread

Slope range and aspect: 2 to 8 percent, west to southwest aspects
Parent material: Glaciolacustrine deposits derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: None noted
Depth to a restrictive feature: None within 60 inches
Drainage class: Poorly drained
Capacity to transmit water (K_{sat}): Moderately low to very high (See table on physical properties)
Annual flooding frequency: None
Annual ponding frequency: Frequent (See table on water features)
Minimum depth of seasonal high water table: About 0 to 60 inches (See table on water features)
Salinity maximum: Not saline
Sodicity maximum: Not sodic
Available water capacity (entire profile): Moderate (about 8.4 inches)
Land capability class and subclass (nonirrigated): 5w
Hydric soil: Yes
Hydrologic soil group: C

Vegetation

Ecological site: Cryic lacustrine flat (R022BI206CA)
Typical vegetation: Nebraska sedge, Northwest Territory sedge, mountain rush, water sedge

Typical Profile

Oi—0 to 3 inches; slightly decomposed plant material
A—3 to 8 inches; gravelly ashy sandy loam
C—8 to 11 inches; very gravelly ashy coarse sand
Oa—11 to 13 inches; mucky clay loam
Ab—13 to 16 inches; silty clay
Cg1—16 to 23 inches; silty clay loam
Cg2—23 to 28 inches; gravelly ashy coarse sandy loam
Cg3—28 to 36 inches; ashy silt loam
A b—36 to 55 inches; ashy silt loam
Cg4—55 to 61 inches; extremely gravelly ashy coarse sand

Minor Components

Terracelake

Composition: 5 percent
Landform: Glacial-valley floors
Slope range and aspect: 2 to 30 percent, west to southwest aspects
Hydric soil: No

Aquandic Cryaquents

Composition: 3 percent
Landform: Along channels in meadows in glacial lakes (relict)
Slope range and aspect: 2 to 8 percent, west to southwest aspects
Hydric soil: Yes

Aquepts

Composition: 2 percent
Landform: Glacial-valley floors
Slope range and aspect: 2 to 30 percent, west to southwest aspects
Hydric soil: Yes

176—Juniperlake, bouldery, 10 to 35 percent slopes

General location: Glacial-valley walls in Hot Springs Creek and Willow Creek drainages

Landscape: Mountains

Elevation: 5,440 to 6,450 feet (1,659 to 1,966 meters)

Mean annual precipitation: 51 to 83 inches (1,295 to 2,108 millimeters)

Mean annual air temperature: 42 to 43 degrees F (5 to 6 degrees C)

Frost-free period: 70 to 90 days

Map Unit Composition

Juniperlake, bouldery component: 85 percent

Minor components: 15 percent

Characteristics of Juniperlake, Bouldery

Setting

Landform: Ground moraines on glacial-valley walls

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Mountainbase

Slope range and aspect: 10 to 35 percent, northwest to southwest aspects

Parent material: Tephra and till derived from volcanic rock

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 5 to 30 percent subangular gravel, 2 to 5 percent subangular cobbles, 2 to 10 percent subangular stones, 2 to 15 percent subangular boulders

Depth to a restrictive feature: 35 to 60 inches to dense material

Drainage class: Well drained

Capacity to transmit water (K_{sat}): Moderately low to very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Low (about 3.3 inches)

Land capability class and subclass (nonirrigated): 4e

Hydric soil: No

Hydrologic soil group: A

Vegetation

Ecological site: *Abies concolor-Calocedrus decurrens/Ceanothus cordulatus/Achnatherum* (F022B1110CA)

Typical vegetation: White fir, incense cedar, huckleberry oak, white hawkweed

Typical Profile

Oi—0 to 1 inch; slightly decomposed plant material

A1—1 to 4 inches; gravelly medial sandy loam

A2—4 to 10 inches; gravelly medial sandy loam

AB—10 to 21 inches; very cobbly medial coarse sandy loam

Bw1—21 to 30 inches; very cobbly medial sandy loam

Bw2—30 to 47 inches; very gravelly medial sandy loam

Cdq—47 to 56 inches; extremely gravelly coarse sandy loam

Minor Components

Scoured

Composition: 10 percent

Landform: Scoured glacial-valley walls

Slope range and aspect: 10 to 35 percent, northwest to southwest aspects

Hydric soil: No

Humic Haploxerands, outwash terrace

Composition: 3 percent

Landform: Outwash terraces

Slope range and aspect: 10 to 35 percent, northwest to southwest aspects

Hydric soil: No

Aquepts

Composition: 1 percent

Landform: Seeps on glacial-valley walls

Slope range and aspect: 10 to 35 percent, northwest to southwest aspects

Hydric soil: Yes

Endoaquepts

Composition: 1 percent

Landform: Seeps on glacial-valley walls

Slope range and aspect: 10 to 35 percent, northwest to southwest aspects

Hydric soil: Yes

177—Vitrandic Cryorthents, debris flows, high elevation, 15 to 95 percent slopes

General location: Lassen Peak (fig. 23)

Landscape: Mountains

Elevation: 7,470 to 10,340 feet (2,276 to 3,152 meters)

Mean annual precipitation: 103 to 125 inches (2,616 to 3,175 millimeters)

Mean annual air temperature: 38 to 40 degrees F (3 to 4 degrees C)

Frost-free period: 50 to 85 days

Map Unit Composition

Vitrandic Cryorthents, debris flows, high elevation component: 85 percent

Minor components: 15 percent

Characteristics of Vitrandic Cryorthents, Debris Flows, High Elevation

Setting

Landform: Debris flows

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Mountainflank

Slope range and aspect: 15 to 95 percent, west to east aspects

Parent material: Debris flow deposits and/or pyroclastic flow

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 70 to 90 percent subangular gravel, 5 to 15 percent subangular cobbles, 2 to 10 percent subangular stones, 0 to 10 percent subangular boulders

Depth to a restrictive feature: None within 60 inches

Drainage class: Well drained

Capacity to transmit water (K_{sat}): High or very high (See table on physical properties)

Annual flooding frequency: None



Figure 23.—The Devastated Area viewed from east of Crescent Crater. Map unit 177 is in the background, and map unit 132 is in the foreground.

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Available water capacity (entire profile): Very low (about 1.8 inches)

Land capability class and subclass (nonirrigated): 7e

Hydric soil: No

Hydrologic soil group: A

Vegetation

Ecological site: Alpine slopes (R022BI207CA)

Typical vegetation: Bluntlobe lupine, mountain hemlock, whitebark pine, marumleaf buckwheat

Typical Profile

A—0 to 4 inches; very gravelly ashy loamy coarse sand

C1—4 to 13 inches; very gravelly ashy loamy coarse sand

C2—13 to 60 inches; extremely gravelly ashy loamy coarse sand

Minor Components

Rubble land

Composition: 12 percent

Landform: Volcanic domes

Slope range and aspect: 15 to 95 percent, west to east aspects

Hydric soil: No

Rock outcrop

Composition: 3 percent

Landform: Volcanic domes

Slope range and aspect: 15 to 150 percent, west to east aspects

Hydric soil: No

200—Cinder land

General location: Cinder Cone

Landscape: Mountains

Elevation: 6,160 to 6,900 feet (1,879 to 2,102 meters)

Mean annual precipitation: 31 to 33 inches (787 to 838 millimeters)

Mean annual air temperature: 43 degrees F (6 degrees C)

Frost-free period: 60 to 85 days

Map Unit Composition

Cinder land: 100 percent

Minor components: 0 percent

Characteristics of Cinder Land

Setting

Landform: Cinder cones

Slope range and aspect: 15 to 70 percent, north aspects

Definition: Cinder land is composed of loose cinders and other scoriaceous magmatic ejecta

Component Properties and Qualities

Land capability class (nonirrigated): 8

Hydric soil: No

201—Lava flows

General location: Fantastic Lava Beds

Landscape: Mountains

Elevation: 6,050 to 6,180 feet (1,845 to 1,884 meters)

Mean annual precipitation: 25 to 35 inches (635 to 889 millimeters)

Mean annual air temperature: 42 to 44 degrees F (6 degrees C)

Frost-free period: 60 to 85 days

Map Unit Composition

Lava flows: 100 percent

Minor components: 0 percent

Characteristics of Lava Flows

Setting

Landform: Lava flows

Slope range and aspect: 0 to 150 percent, north aspects

Definition: Lava flows are areas covered with solidified lava

Component Properties and Qualities

Land capability class (nonirrigated): 8

Hydric soil: No



Figure 24.—Map unit 202, in the foreground, as viewed from the top of Cinder Cone. Map unit 201 is on the Fantastic Lava Beds in the middle ground.

202—Typic Xerorthents, tephra-Typic Xerorthents, welded, complex, 2 to 50 percent slopes

General location: Painted Dunes (fig. 24)

Landscape: Mountains

Elevation: 6,150 to 6,530 feet (1,876 to 1,991 meters)

Mean annual precipitation: 31 to 35 inches (787 to 889 millimeters)

Mean annual air temperature: 43 to 44 degrees F (6 degrees C)

Frost-free period: 70 to 90 days

Map Unit Composition

Typic Xerorthents, tephra component: 85 percent

Typic Xerorthents, welded component: 10 percent

Minor components: 5 percent

Characteristics of Typic Xerorthents, Tephra

Setting

Landform: Tephra-covered lava flows

Landform position (two-dimensional): Footslope

Landform position (three-dimensional): Mountainbase

Slope range and aspect: 2 to 50 percent, north aspects

Parent material: Tephra from Cinder Cone

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 65 to 99 percent subangular gravel, 0 to 5 percent subangular cobbles, 0 to 1 percent subangular stones, 0 to 1 percent subangular boulders

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Depth to a restrictive feature: None within 60 inches
Drainage class: Excessively drained
Capacity to transmit water (K_{sat}): High or very high (See table on physical properties)
Annual flooding frequency: None
Annual ponding frequency: None
Minimum depth of seasonal high water table: More than 72 inches
Salinity maximum: Not saline
Sodicity maximum: Not sodic
Available water capacity (entire profile): Very low (about 2.8 inches)
Land capability class and subclass (nonirrigated): 4e
Hydric soil: No
Hydrologic soil group: A

Vegetation

Ecological site: Bedded Tephra Deposits (R022BI201CA)
Typical vegetation: Jeffrey pine, marumleaf buckwheat, sulphur-flower buckwheat

Typical Profile

C1—0 to 5 inches; ashy loamy sand
C2—5 to 8 inches; ashy sand
C3—8 to 12 inches; gravelly ashy sand
C4—12 to 14 inches; ashy loamy sand
C5—14 to 25 inches; stratified gravelly coarse sand to gravelly sand
C6—25 to 35 inches; stratified very gravelly coarse sand to gravelly sand
C7—35 to 49 inches; extremely gravelly coarse sand
C8—49 to 60 inches; gravelly coarse sand

Characteristics of Typic Xerorthents, Welded

Setting

Landform: Tephra-covered knolls on lava flows
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Slope range and aspect: 2 to 30 percent, north aspects
Parent material: Tephra from Cinder Cone

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 80 to 90 percent angular gravel, 0 to 2 percent angular cobbles, 0 to 1 percent angular stones
Depth to a restrictive feature: 7 to 20 inches to cemented horizon
Drainage class: Excessively drained
Capacity to transmit water (K_{sat}): High or very high (See table on physical properties)
Annual flooding frequency: None
Annual ponding frequency: None
Minimum depth of seasonal high water table: More than 72 inches
Salinity maximum: Not saline
Sodicity maximum: Not sodic
Available water capacity (entire profile): Very low (about 0.1 inch)
Land capability class (nonirrigated): 8
Hydric soil: No
Hydrologic soil group: A

Vegetation

Ecological site: Bedded Tephra Deposits (R022BI201CA)
Typical vegetation: Barren

Typical Profile

C1—0 to 1 inch; gravelly ashy coarse sand
C2—1 to 3 inches; welded very gravelly ashy coarse sand
C3—3 to 7 inches; welded very gravelly coarse sand
Cqm1—7 to 9 inches; welded gravelly coarse sand
Cq1—9 to 12 inches; very gravelly coarse sand
Cqm2—12 to 15 inches; welded very gravelly coarse sand
C4—15 to 25 inches; gravelly coarse sand
Cq2—25 to 26 inches; gravelly coarse sand
C5—26 to 34 inches; gravelly coarse sand
C6—34 to 37 inches; very gravelly coarse sand
C7—37 to 39 inches; extremely gravelly coarse sand
C8—39 to 43 inches; extremely gravelly coarse sand
C9—43 to 59 inches; extremely gravelly coarse sand

Minor Components

Rock outcrop

Composition: 5 percent

Landform: Lava flows

Slope range and aspect: 2 to 50 percent, north aspects

Hydric soil: No

203—Typic Xerorthents, tephra, 2 to 20 percent slopes

General location: The base of Cinder Cone

Landscape: Mountains

Elevation: 6,110 to 6,530 feet (1,862 to 1,990 meters)

Mean annual precipitation: 31 to 35 inches (787 to 889 millimeters)

Mean annual air temperature: 42 to 44 degrees F (6 degrees C)

Frost-free period: 70 to 90 days

Map Unit Composition

Typic Xerorthents, tephra component: 90 percent

Minor components: 10 percent

Characteristics of Typic Xerorthents, Tephra

Setting

Landform: Tephra-covered lake terraces, tephra-covered lava flows, tephra-covered outwash plains, tephra-covered moraines

Landform position (two-dimensional): Toeslope, footslope

Landform position (three-dimensional): Mountainbase, tread

Slope range and aspect: 2 to 20 percent, northwest to south aspects

Parent material: Tephra from Cinder Cone

Component Properties and Qualities

Percentage of the surface covered by rock fragments: 65 to 99 percent subangular gravel, 0 to 5 percent subangular cobbles, 0 to 1 percent subangular stones, 0 to 1 percent subangular boulders

Depth to a restrictive feature: None within 60 inches

Drainage class: Excessively drained

Capacity to transmit water (K_{sat}): High or very high (See table on physical properties)

Annual flooding frequency: None

Annual ponding frequency: None

Minimum depth of seasonal high water table: More than 72 inches

Salinity maximum: Not saline
Sodicity maximum: Not sodic
Available water capacity (entire profile): Very low (about 2.8 inches)
Land capability class and subclass (nonirrigated): 4e
Hydric soil: No
Hydrologic soil group: A

Vegetation

Ecological site: *Pinus jeffreyi*-*Abies concolor*/*Achnatherum occidentale* ssp. *occidentale*-*Elymus elymoides* (F022BI100CA)
Typical vegetation: Jeffrey pine, Sierra lodgepole pine, marumleaf buckwheat, western needlegrass

Typical Profile

C1—0 to 5 inches; ashy loamy sand
C2—5 to 8 inches; ashy sand
C3—8 to 12 inches; gravelly ashy sand
C4—12 to 14 inches; ashy loamy sand
C5—14 to 25 inches; stratified gravelly coarse sand to gravelly sand
C6—25 to 35 inches; stratified very gravelly coarse sand to gravelly sand
C7—35 to 49 inches; extremely gravelly coarse sand
C8—49 to 60 inches; gravelly coarse sand

Minor Components

Typic Xerorthents

Composition: 10 percent
Landform: Tephra-covered lake terraces, tephra-covered moraines, tephra-covered outwash plains
Slope range and aspect: 2 to 20 percent, northwest to south aspects
Hydric soil: No

205—Beaches

General location: Around Snag Lake
Landscape: Mountains
Elevation: 6,080 to 6,110 feet (1,853 to 1,863 meters)
Mean annual precipitation: 35 to 41 inches (889 to 1,041 millimeters)
Mean annual air temperature: 42 degrees F (6 degrees C)
Frost-free period: 60 to 85 days

Map Unit Composition

Beaches: 100 percent
Minor components: 0 percent

Characteristics of Beaches

Setting

Landform: Beaches
Slope range and aspect: 0 to 8 percent, northeast to northwest aspects
Definition: Beaches consist of sandy, gravelly, or cobbly lakeshores that are washed and rewashed by waves

Component Properties and Qualities

Land capability class (nonirrigated): 8
Hydric soil: No

W—Water

Map Unit Composition

Water: 100 percent

Minor components: 0 percent

Characteristics of Water

Setting

Landform: Lakes

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 uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

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

Information in this section can be used to plan the use and management of soils as rangeland and forestland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and as wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

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

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

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

Interpretive Ratings

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

Rating Class Terms

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

Numerical Ratings

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

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

See table 26 (“Physical Properties of the Soils”) and table 28 (“Chemical Properties of the Soils”) for component horizon data.

For additional component horizon data, see the “Soil Properties” section of this publication.

A typical soil description with range in characteristics is included, in alphabetical order, in the “Classification of the Soils” section.

Major Land Resource Areas

Lassen Volcanic National Park is located in Major Land Resource Area 22B (Southern Cascade Mountains). This MLRA covers the southernmost area of the north-to-south-trending Cascade Mountains. The Southern Cascade Mountains are made up primarily of Tertiary and Quaternary volcanics (basalt, andesite, dacite, and rhyolite) exposed as prominent peaks and volcanic uplands that are surrounded by lower, moderately steep and steep shield and composite volcanoes and cinder cones. Well-known peaks and recently active volcanoes in this area include Medicine Lake Volcano, Mount Lassen, and Mount Shasta. Alluvial and lacustrine deposits have collected in the depressions on lava flows, between lava flows, and in stream valleys and basins. Glacial drift occurs at the higher elevations.

Elevation generally ranges from about 1,500 feet (455 meters), in the foothills, to 8,200 feet (2,500 meters). It is as high as 14,162 feet (4,318 meters) on Mount Shasta.

The average annual precipitation is 15 to 80 inches (380 to 2,030 millimeters). The annual precipitation can be as high as 125 inches (3,175 millimeters). The precipitation falls mainly from fall to spring, mostly as snow. Winter precipitation is from Pacific storms that are frontal in nature. The amount of precipitation decreases from west to east. Summers are typically warm and dry, but there are occasional thunderstorms. The average annual temperature is 33 to 62 degrees F (1 to 17 degrees C).

The rainfall and snowfields that are abundant on the higher mountain slopes supply the water needed to support forests and rangelands as well as help in meeting water needs of the lower areas by contributing to perennial streams.

This MLRA has three main vegetation types—low-elevation mixed conifer (ponderosa pine) forest, mixed conifer forest, and upper montane red fir forest. Meadows occur throughout the forested areas.

Federally owned land, mainly as national forests, makes up more than half of this MLRA. The remaining land is privately owned ranches, farms, and forestland. About 72 percent of the total MLRA consists of forests which are used for wildlife habitat, recreation, timber, and watershed, and about 17 percent is rangeland. Only about 2 percent of the MLRA is used as cropland.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation’s short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation’s prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed,

forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. Slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

There are no areas in Lassen Volcanic National Park that meet the soil requirements for prime farmland.

Land Capability Classification

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

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit.

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

Class 1 soils have slight limitations that restrict their use.

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

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

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

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

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

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

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

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

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

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

Capability units are soil groups within a subclass. The soils in a capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, 2e-4 and 3e-6. These units are not given in all soil surveys.

The capability classification of map units in this survey area is given in table 6.

Hydric Soils

Table 7 lists the map unit components that are rated as hydric soils in the survey area. This list can help in planning land uses; however, onsite investigation is recommended to determine the hydric soils on a specific site (National Research Council, 1995; Hurt and others, 1998).

The three essential characteristics of wetlands are hydrophytic vegetation, hydric soils, and wetland hydrology (Cowardin and others, 1979; U.S. Army Corps of Engineers, 1987; National Research Council, 1995; Tiner, 1985). Criteria for each of the characteristics must be met for areas to be identified as wetlands. Undrained hydric soils that have natural vegetation should support a dominant population of ecological wetland plant species. Hydric soils that have been converted to other uses should be capable of being restored to wetlands.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). These soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 1995). These criteria are used to identify a phase of a soil series that normally is associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2006) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils in this survey area are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and others, 1998).

Hydric soils are identified by examining and describing the soil to a depth of about 20 inches. This depth may be greater if determination of an appropriate indicator so requires. It is always recommended that soils be excavated and described to the depth necessary for an understanding of the redoximorphic processes. Then, using the completed soil descriptions, soil scientists can compare the soil features required

by each indicator and specify which indicators have been matched with the conditions observed in the soil. The soil can be identified as a hydric soil if at least one of the approved indicators is present.

Map units that are dominantly made up of hydric soils may have small areas, or inclusions, of nonhydric soils in the higher positions on the landform, and map units dominantly made up of nonhydric soils may have inclusions of hydric soils in the lower positions on the landform.

The criteria for hydric soils are represented by codes in the table (for example, 2B3). Definitions for the codes are as follows:

- I. All Histels, except for Folistels, and Histosols except for Folists.
- II. Soils in Aquic suborders, great groups, or subgroups, Albolls suborder, Historthels great group, Histoturbels great group, Pachic subgroups, or Cumulic subgroups that:
 - A. Are somewhat poorly drained and have a water table at the surface (0.0 feet) during the growing season, or
 - B. Are poorly drained or very poorly drained and have either:
 - 1) A water table at the surface (0.0 feet) during the growing season if textures are coarse sand, sand, or fine sand in all layers within a depth of 20 inches, or
 - 2) A water table at a depth of 0.5 foot or less during the growing season if permeability is equal to or greater than 6.0 in/hr in all layers within a depth of 20 inches, or
 - 3) A water table at a depth of 1.0 foot or less during the growing season if permeability is less than 6.0 in/hr in any layer within a depth of 20 inches.
 - III. Soils that are frequently ponded for long or very long duration during the growing season.
 - IV. Soils that are frequently flooded for long or very long duration during the growing season.

Ecological Sites in Lassen Volcanic National Park

This section was prepared by Marchel Munnecke.

This section discusses the characterization and management of forestland and rangeland in the survey area, describes the vegetation, explains the ecological site tables, and provides a brief description of each ecological site.

Characterization and Management of Forestlands and Rangelands

Forestlands and rangelands are currently subject to an abundance of uses. It is important to characterize and quantify these areas based upon their ability to produce various kinds, proportions, and amounts of plants. These abilities and their resultant plant communities are largely dependent on the soil, climate, topography, aspect, and slope of the landscape as well as on other abiotic features. To better understand these soil-plant interactions and the effects of selected management practices, the Natural Resources Conservation Service classifies forestlands and rangelands into ecological sites.

Landscapes of native vegetation are divided into ecological sites for the purposes of inventory, evaluation, and management. An ecological site, as defined for rangeland, is a distinctive kind of land with specific physical characteristics that differs from other kinds of land in its ability to produce a distinctive kind and amount of vegetation.

An ecological site is the product of all the environmental factors responsible for its development, including parent material, landscape, climate, soils, living organisms, hydrology, fire, and time in place. Ecological site descriptions contain information on

each of these environmental factors. Included are brief descriptions of: a) physiographic and climatic features; b) major identifiable plant community types that may occupy the site, including the reference plant community; c) total annual production; d) ecological dynamics of the plant communities; e) soils and their main properties; and f) site interpretations and general management considerations for wildlife, hydrology, recreation, fire, aesthetics, and restoration/revegetation.

The reference plant community for a site is the plant community that has evolved under natural ecological processes and disturbances and is considered to be at its highest natural site potential under the current climate. It is a plant community that has developed on the site as a result of all site-forming factors and is best adapted to the unique combination of environmental factors associated with the site. Natural disturbances, such as fire, drought, herbivory, and flooding, were inherent in the development and maintenance of these reference plant communities. Plant communities that are or have been subjected to anthropogenic disturbances or physical site deterioration or have been protected from their natural disturbance regimes do not typify the reference state and may exist in a stable or steady state that is different from the reference plant community.

The reference plant community of an ecological site is not a precise assemblage of species for which the proportions are the same from place to place or from year to year. In all plant communities, variability is apparent in productivity and occurrence of individual species. Special boundaries of the communities can be recognized by characteristic patterns of species composition, association, and community structure. Generally one species or group of species dominates the site, and their stability within the natural dynamics or disturbances to the site allow them to be used as the distinguishing factor to differentiate one site from another.

At times, less frequently occurring plants may increase on a site or plants not formerly occurring in the reference community may invade the site. The presence or abundance of these plants may fluctuate greatly due to the plant's ability to adapt to the differences in the microenvironment, weather conditions, soil alterations, or human actions. Using these species for site identification can be misleading; thus they should not be used to differentiate sites.

The following ecological site inventory methods are used in determining the characteristic plant communities of an ecological site:

1. Identification and evaluation of reference and/or relict sites with similar plant communities and associated soils.
2. Interpolation and extrapolation of plant, soil, and climatic data from existing historic reference areas along a continuum to other points on that continuum for which no suitable reference community is available.
3. Evaluation and comparison of the same ecological site in different areas that have experienced different levels of disturbance and management. Further comparison is made with areas that are not disturbed.
4. Evaluation and interpretation of research data dealing with the ecology, management, and soils of plant communities.
5. Review of historical accounts, survey and military records, and botanical literature of the area.

The initial description of the reference state should be considered as an approximation subject to modification as additional knowledge is gained or discovered.

Plant communities change along environmental gradients. When changes in soils, aspect, topography, or moisture conditions are abrupt, the plant community boundaries are reasonably distinct. Boundaries are less distinct or visible where the plant communities change gradually over wide environmental gradients of relatively uniform soils and topography. Thus, the need for site differentiation may not be readily apparent until the cumulative impact of soil, topography, hydrology, or climate is

examined over a broad area. Frequently, such differences are reflected first in production and second in the kinds and proportions of a plant species making up the core of the plant community. In some cases, the boundaries that are drawn between ecological sites along a continuum of closely related soils and a gradually changing climate are somewhat arbitrary.

The following criteria are used to differentiate one ecological site from another:

1. Significant differences in the species or species groups that are in the characteristic plant community.
2. Significant differences in the relative proportion of species or species groups in the characteristic plant community.
3. Significant differences in the total annual production/site index of the characteristic plant community.
4. Soil factors that determine the plant production and composition, the hydrology of the site, and the functioning of the ecological process of the water cycle, mineral cycles, and energy flow.

Differences in kind, proportion, and production of plants are the result of differences in soil, topography, climate, and other environmental factors. Slight variations in these factors are not criteria for site differentiation. Individual environmental factors are frequently associated with significant differences in reference plant communities. The differences in the environmental factors must be great enough to affect the kinds, amounts, and proportions of the plant community to be differentiated into a distinct site (See the "National Range and Pasture Handbook," available online at <http://www.glti.nrcs.usda.gov/technical/publications/nrph.html>.)

The following ecological site descriptions are drafts that are under review and awaiting approval. Approved site descriptions will be available online after the review process has been completed. These descriptions are dynamic documents that are constantly updated as new research and data is gained; thus, the online version, even after approval, will be the most recent version of the descriptions. They can be found at <http://esis.sc.egov.usda.gov/>.

Ecological sites are divided into forestland and rangeland, both of which carry specific descriptions.

Forestland is a spatially defined site where the reference community is dominantly a minimum 25 percent tree species that are overstory canopy cover, as determined by a crown perimeter-vertical projection. The reference community is the climax community that is present today that most resembles the forest conditions prior to European contact. It developed with natural disturbances, such as drought, fire, and insects. Several other plant communities may be present during the seral stages of development. Vegetation on forestland provides many habitat components, assists in controlling soil erosion, is suitable for grazing or browsing by wildlife, and offers scenic and recreational opportunities. Forestland is environmentally and economically important. For more information about national forestry policies of the Natural Resources Conservation Service, see the "National Forestry Manual," which is available online at <http://soils.usda.gov/technical/nfmanual/>.

The reference community for a rangeland ecological site does not have the potential to produce a minimum 25 percent tree species that are overstory canopy cover. Several other plant communities may be present during phases of development or altered conditions. Vegetation on rangeland provides many habitat components, assists in controlling soil erosion, is suitable for grazing or browsing by wildlife and domestic animals, and offers scenic and recreational opportunities. Rangeland is environmentally and economically important.

There are 44 ecological sites correlated to this survey: 25 are forestland ecological sites and 19 are rangeland ecological sites.

General Description of Vegetation

The vegetation in Lassen Volcanic National Park is dominated by coniferous forests. The park has lesser areas characterized by several types of rangelands.

Conifer tree species occur in bands determined by species' tolerance ranges for elevation, droughtiness, and annual precipitation. As elevation increases, precipitation and duration of snow pack tend to increase while soil temperature and length of growing season decrease. Park elevations vary from approximately 5,200 feet in Warner Valley to 10,457 feet on Lassen Peak. White fir mixed conifer forests and Jeffrey pine forests occupy the lower elevations. California red fir and white fir co-dominate in some forests; however, California red fir eventually replaces white fir as elevation increases. California red fir can develop into pure stands or co-mingle with western white pine. Sub-alpine mixed conifer forests exist above or in cooler pockets than the California red fir forests. The sub-alpine mixed conifer forest is dominated by California red fir in addition to mountain hemlock, western white pine, and Sierra lodgepole pine. Above the sub-alpine mixed conifer forest is a band of mountain hemlock forests. The mountain hemlock zone grades into the tree-line forest that is often composed of multi-stemmed, dwarfed, and twisted mountain hemlock and whitebark pine. Sierra lodgepole pine grows in cold air drainages and wet areas bordering meadows and streams. Sierra lodgepole pine is a pioneer species. It is dominant during primary succession on volcanic debris or during secondary succession after fire in red fir mixed conifer forests. The general forest types described above are subdivided into several ecological sites based on productivity and species composition.

The rangeland sites identified for Lassen Volcanic National Park can be divided easily into wet or dry sites. The wet rangeland sites include riparian corridors, springs, hydrothermal seeps, and small stream channels with their associated meadows. The wet rangeland sites are differentiated by temperature regimes, stream channel types, and hydrology. The Rosgen Stream Type Classification is used to identify and classify stream types (Rosgen, 1996). For example, Rosgen type E channels occur in Upper Kings Meadow and Dersch Meadow while Hot Springs Creek has sections with characteristics of types B and C channels. There is an ecological site for springs that emerge from various locations within the park. Flows often emerge at contacts with bedrock, and vegetation is generally dominated by thinleaf alder with a variety of forbs and mosses. Another ecological site encompasses hydrothermal seeps and springs; however, the order of this survey did not allow time to collect soil, vegetation, and water chemistry data to fully describe the complexity of the hydrothermal areas. The ecological sites mentioned above are all associated with a unique hydrology. The sites are designed as a complex and are linked to a unique hydrologic regime. Thus the entire meadow, seep area, or flood plain and its associated plant communities are described as a unit. This way the relationship between the hydrology of the site and the presence (or absence) of the dominant plant communities can be described as a whole. Kings Creek, for example, has several associated plant community types, including cottonwood forests, alder shrubs, and pioneer forbs. Should flood wash out the cottonwood forest, the pioneer forbs community would establish itself for a few years in its place. Because the stream is constantly shifting and moving, the plant community types may always be present but in different places and compositions due to the dynamics of the stream channel.

Several dry upland rangeland sites are identified. They include slopes of woolly mule-ears near Sulfur Works, sagebrush shrubland on Loomis Peak, distributions of pinemat manzanita shrubland on southern slopes, and sparse alpine vegetation on exposed ridges and mountain peaks. The upland rangeland sites commonly have a high content of rock fragments at all soil depths and either bedrock or dense till that creates a layer of root restriction. The shallow soils have a limited water-holding

capacity. Trees have a low survival rate due to the inability to tap into a deeper water source. Perennial forbs, annuals, or shrubs commonly occur because they are more adapted to a shorter growing season. Soils may be deep enough in other areas but exposure to sun and strong winds inhibit tree establishment and growth, leaving only the most compact, hardy perennials to endure the elements.

Mean annual precipitation reaches a maximum of 125 inches on Lassen Peak and diminishes quickly as elevation decreases. The Butte Lake area receives 23 to 27 inches of annual precipitation, which is the lowest precipitation within the park. Most precipitation is received as snow during the winter months. The combination of elevation, aspect, soil characteristics, and precipitation creates a complex pattern for the distribution of vegetation. The influence of aspect is more subtle in this survey area than in the foothills at the lower elevations, but some patterns can be seen. Due to heat intensities, high evapotranspiration rates, and resultant droughtiness, southern and western aspects commonly support pine forest communities or shrub-dominated rangeland sites. Northern and eastern aspects, which are exposed to less solar radiation, generally support fir or hemlock forests. The upper elevation range for tree species tends to be higher on southern aspects than on northern aspects. Alpine sites are affected by the duration of the snow pack and exposure to desiccating winds. Areas with snow pockets that remain throughout most of the summer experience a shortened growing season, which inhibits the establishment of conifer seedlings. In wind-exposed areas, such as ridges and peaks, snow is blown away and redeposited on the leeward slopes. The exposed areas are desiccated by wind, resulting in a low amount of available water. In addition to elevation, aspect, and precipitation, soil properties such as texture, depth, temperature, and parent material affect the water-holding capacity and available nutrients.

Temperature is critical in initiating conifer growth after snowmelt. Many of the conifer species occurring in this survey area generally start stem growth about 2 weeks after snowmelt, a delay that may be related to the warming of soils, roots, and microbial activity. If snowmelt is unusually early, the trees may not begin annual growth until specific air temperatures are reached. Heavy shrub cover may delay the start of annual growth because the shade keeps the soil from warming. The pines begin leader growth at cooler temperatures when compared to firs. Pines have heavily insulated terminal buds, whereas the terminal buds of fir trees are less insulated and more susceptible to frost damage. It appears that some conifers do not start leader growth until a specific photoperiod (a ratio of light hours to dark hours during one 24-hour period) is met, even if the snow has melted and the temperatures are warm enough. If drought conditions set in before the leader has reached its determinate length, growth is terminated prematurely. If precipitation comes after the snow has melted, it can prolong the growing season. Conifer growth ceases with the onset of drought conditions and the decline of water potentials (Royce and Barbour, 2001). All of these factors can have a significant influence on the productivity, composition, and distribution of forest and rangeland plant communities.

Ecological Site Tables

Tables 8 through 12 display the correlation between the map units and the soil component to the ecological sites. The data represented in these tables refers to site index, canopy cover, and annual production by dry weight that was collected at the same location as the representative soil pit. This data does not represent the climax community but rather the many community phases that may be present at any given point in time. Due to complex geomorphology, steep elevation gradients, and microclimates, there is not always a definitive line where one ecological site ends and another begins. This is particularly true with forestland ecological sites. There is a broad transition zone as one ecological site gradually converts to another. Due to this

gradient, sometimes soil characteristics take precedence over forest composition because the boundary is more definitive. For example, the soil component may occur on moraines that terminate at a given point yet the forest on the moraine may be dominantly a white fir mixed conifer forest that grades into a red fir forest at the upper elevations of the moraine.

The differences in soil properties, precipitation, and climate that affect plant community composition, production, and distribution are accounted for in the correlation of ecological sites to the individual soil map unit components.

Table 8 summarizes the climatic features by map unit symbol and soil name, percent of map unit, and the correlated ecological site name and number. Climatic features include, slope, elevation, mean annual precipitation (MAP), landscape, landform, and parent material.

Table 9 lists the map unit symbol, component percent, and soil name (component) alongside the ecological site name, ecological site type (forestland or rangeland), and ecological site ID (ecological site number).

Table 10 can help forest managers plan for soil use when managing forest ecosystems. It shows the potential output of soils for forest production. The *potential productivity* of merchantable or *characteristic trees* on a soil is expressed as a *site index* and as a *volume* number. Site index average is the average height, in feet, that dominant and co-dominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. *Site index base* is a number that refers to the site index curve used to determine the site index for a specific tree species. For example, a site index base number of 600 refers to a site index curve used for Jeffrey pine (Meyer, 1961); a site index base number of 605 refers to a site index curve used for sugar pine (Dunning, 1942); and a site index base number of 030 refers to a site index curve used for white fir (Schumacher, 1926). *Site index base age* indicates the age used for the site curves. For the site index base curve number 605, for example, the base age is 300 years; for the curve number 600, it is 100 years; and for the curve number 030, it is 50 years. More detailed information regarding site index is available in the "National Forestry Manual," which is available at local offices of the Natural Resources Conservation Service or on the Internet (<http://soils.usda.gov/technical/nfmanual>). The number representing *volume of wood fiber* is the likely production yielded by the most important tree species at the age of culmination of the mean annual increment (CMAI). It is the amount of fiber produced in a fully stocked, even-aged, unmanaged stand. CMAI age is the point at which the stand reaches its maximum annual rate of growth.

Table 11 lists the map unit symbol, soil name (component), and percentage of map unit; ecological site name and number; the total annual production of vegetation in favorable, normal, and unfavorable years; the characteristic vegetation using common names; and the average species composition by annual production (percent of total annual air-dry weight). Species composition for forestland ecological sites is listed under the forest column and pertains to annual production up to 13 feet in height. Species composition for rangeland ecological sites is listed under the range column.

Total production is the amount of vegetation that can be expected to grow annually on well managed rangeland or forest understory and support the potential natural plant community. It includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year's growth of leaves, twigs, and fruits of woody plants. It does not include the increase in stem diameter of trees and shrubs. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year, the amount and distribution of precipitation provide substantially better growing conditions than average. In a normal year, growing conditions are about average. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture.

Dry weight is the total annual yield per acre of air-dry vegetation. Yields are

adjusted to a common percentage of air-dry moisture content. The relationship of green weight to air-dry weight varies according to such factors as exposure, amount of shade, recent rains, and unseasonable dry periods. These production amounts can be used to calculate carrying capacities and stocking rates for the management of domestic or wild animals or to determine fuel-loading in preparation of prescribed burning plans or fire modeling.

Characteristic plants include the grasses, forbs, shrubs, and trees that are associated with the soil component. The associated plants are listed by common name in table 13.

Table 12 is sorted by map unit symbol and soil name (component). It displays the correlated ecological site name and number along with the percent canopy cover of the characteristic vegetation. Canopy cover, by definition, is the amount of cover determined by crown perimeter-vertical projection by species. As cover can overlap in layers by species, total cover can be more than 100 percent. If a tree species is listed twice, the smaller number represents understory canopy that is less than 13 feet in height. This table lists canopy cover for both forestland and rangeland ecological sites.

Table 13 alphabetically lists the species by local common name and shows the plant symbol and scientific name. The plant nomenclature is from the USDA Plants Database, which is available online at <http://plants.usda.gov/index.html>.

Table 14 alphabetically lists the species by plant symbol and shows the local common name and scientific name. The plant symbol is from the USDA Plants Database, which is available online at <http://plants.usda.gov/index.html>.

Brief Descriptions of Ecological Sites

This section provides a short description of each ecological site occurring in the survey area. The complete ecological site descriptions have much more detail about plant community dynamics, ecological characteristics, and soil information. These descriptions are available online at <http://esis.sc.egov.usda.gov/Welcome/pgReportLocation.aspx?type=ESD>. The following plant nomenclature is from the USDA Plants Database online at <http://plants.usda.gov/index.html>. Since the time of this writing, some of the species in the plants database have been renamed. For other plants, recent nomenclature may still be pending due to the new classification system that will be in the next edition of the “Jepson Manual” (Hickman, 1993).

Forestland Ecological Sites

F022B1100CA—*Pinus jeffreyi*-*Abies concolor*/*Achnatherum occidentale* ssp. *occidentale*-*Elymus elymoides*

This ecological site occurs in the vicinity of Butte Lake and is associated with Buttelake soils, Buttewash soils, Typic Xerorthents, and Typic Xerorthents, tephra. This site is located on moraines, glacial outwash plains, tephra-covered toeslopes, and tephra-covered lake terraces and on pyroclastic flows over moraines, outwash terraces, lake terraces, and lava flows. The soils are moderately deep to very deep and well drained to excessively drained. They formed in recently deposited tephra over glacial till or glacial outwash or in very deep tephra deposits. The tephra deposits are from the eruption of Cinder Cone, about 350 years ago. Buttelake and Buttewash soils have about 12 inches of tephra over the buried soils but Typic Xerorthents and Typic Xerorthents, tephra formed in thick tephra deposits. The surface layers are ashy sand, ashy coarse sand, and ashy loamy sand, and all the subsurface layers are coarse. Buttelake and Buttewash soils have a root-restrictive densic horizon or duripan at a depth of 40 to 60 inches (102 to 152 centimeters). This site is in the driest region of the park and has very droughty soils due to the coarse tephra deposits. The tephra may not have killed all the existing trees at the time of the eruption but it left a sterile,



Figure 25.—This photo represents ecological site F022BI100CA—*Pinus jeffreyi*-*Abies concolor*/*Achnatherum occidentale* ssp. *occidentale*-*Elymus elymoides*. This is a mature forest of Jeffrey pine (*Pinus jeffreyi*) near Butte Lake.

black, coarse textured layer of tephra on the surface. Possibly, the tephra killed the understory vegetation, making it difficult for seedlings to reestablish. Some areas are still mostly barren; there are a few small trees. Jeffrey pine (*Pinus jeffreyi*) is well suited to the lower amounts of precipitation associated with this site (fig. 25). However, white fir (*Abies concolor*) has come in as a secondary colonizer. In general, the understory is very sparse and includes western needlegrass (*Achnatherum*



Figure 26.—This photo represents ecological site F022B1102CA—*Abies magnifica*/*Arctostaphylos nevadensis*/*Carex rossii*-*Penstemon gracilentus*. Pinemat manzanita (*Arctostaphylos nevadensis*) is visible in the foreground, and an open forest of California red fir (*Abies magnifica*) is in the background.

occidentale ssp. *occidentale*), squirreltail (*Elymus elymoides*), whiteveined wintergreen (*Pyrola picta*), rockcress (*Arabis platysperma*), and silverleaf phacelia (*Phacelia hastata*). This site is at elevations between 5,600 and 7,000 feet (1,707 and 2,134 meters). This site occurs on 0 to 35 percent slopes. The mean annual precipitation ranges from 23 to 43 inches (584 to 1,092 millimeters), and the mean annual temperature ranges from 42 to 44 degrees F (6 to 7 degrees C).

F022B1102CA—*Abies magnifica*/*Arctostaphylos nevadensis*/*Carex rossii*-*Penstemon gracilentus*

This ecological site is dominated by an open forest of California red fir (*Abies magnifica*), Sierra lodgepole pine (*Pinus contorta* var. *murrayana*), and western white pine (*Pinus monticola*) (fig. 26). Generally, it is at elevations between 6,000 and 8,000 feet (1,829 and 2,438 meters) and on glacially scoured ridges and glacial headlands. Scoured soils are associated with this site. They consist of moderately deep and well drained soils that formed in tephra over colluvium and/or residuum from volcanic rocks. The surface layer is very bouldery medial loamy sand. The combined A, AB, and C horizons have 2 percent clay, 17 to 24 percent gravel, 10 percent cobbles, 10 percent stones, and 10 to 15 percent boulders. The C horizon begins at a depth of 17 inches and has a bouldery texture with 20 percent gravel and 75 percent cobbles, stones, and boulders. These moderately deep soils that have a high content of rock fragments have a very low available water capacity. Indurated bedrock is encountered at a depth of 20 to 40 inches (51 to 102 centimeters). The tree canopy cover ranges



Figure 27.—This photo represents ecological site F022B1103CA—*Abies concolor*-*Pinus jeffreyi*/*Arctostaphylos patula*-*Chrysolepis sempervirens*. This photo shows the dense forest community of white fir.

from 15 to 40 percent. Exposed bedrock outcrops cover 10 to 20 percent of the surface. The understory is heavily dominated by pinemat manzanita (*Arctostaphylos nevadensis*). There is a diversity of forbs and grasses including Columbia needlegrass (*Achnatherum nelsonii*), western needlegrass (*Achnatherum occidentale*), pioneer rockcress (*Arabis platysperma*), Ross' sedge (*Carex rossii*), Whitney's sedge (*Carex whitneyi*), bush chinquapin (*Chrysolepis sempervirens*), squirreltail (*Elymus elymoides*), oceanspray (*Holodiscus discolor*), mountain monardella (*Monardella odoratissima*), slender penstemon (*Penstemon gracilentus*), mountain pride (*Penstemon newberryi*), and pinewoods lousewort (*Pedicularis semibarbata*). Slopes range from 2 to 40 percent. The mean annual precipitation ranges from 33 to 109 inches (838 to 2,768 millimeters), but the majority of this site has a mean annual precipitation between 33 and 53 inches (838 and 1,346 millimeters). The mean annual temperature ranges from 38 to 43 degrees F (3.3 to 6.1 degrees C).

F022B1103CA—*Abies concolor*-*Pinus jeffreyi*/*Arctostaphylos patula*-*Chrysolepis sempervirens*

This ecological site is presently dominated by dense forests of white fir (*Abies concolor*) (fig. 27). In the absence of fire, the density and canopy cover of the less fire-tolerant white fir have increased, reducing the ability of the shade-intolerant pines to regenerate. Jeffrey pine (*Pinus jeffreyi*) and Ponderosa pine (*Pinus ponderosa*) would benefit from certain types of fires. In some areas fire-dependent shrubs, such as greenleaf manzanita (*Arctostaphylos patula*), bush chinquapin (*Chrysolepis sempervirens*), and snowbrush ceanothus (*Ceanothus velutinus*), may flourish after a fire, slowing the reestablishment of conifers. This ecological site occurs on several



Figure 28.—This photo represents ecological site F022B1104CA—*Tsuga mertensiana*/*Lupinus obtusilobus*-*Cistanthe umbellata* var. *umbellata*. This is a mature forest of mountain hemlock (*Tsuga mertensiana*).

geomorphic features and in several positions, including unglaciated volcanic mountain slopes, moraines, and outwash plains. There are ten soil components associated with this site that can be grouped into the following five soil subgroups: Typic Haploxerands, Humic Haploxerands, Typic Vitrixerands, Humic Vitrixerands, and Vitrandic Xerorthents. These soils range from moderately deep to very deep and are well drained. The surface layers include loamy coarse sand, ashy loamy coarse sand, ashy sandy loam, ashy sand, sandy loam, and fine sandy loam, and the subsurface layers are coarse or loamy. The available water capacity is very low or low. This ecological site is at elevations between 5,450 and 7,500 feet (1,661 and 2,286 meters) on all aspects. Slopes range from 1 to 30 percent. The mean annual precipitation ranges from 37 to 93 inches (939 to 2,362 millimeters), and the mean annual temperature is between 40 and 44 degrees F (4.4 and 6.6 degrees C).

F022B1104CA—*Tsuga mertensiana*/*Lupinus obtusilobus*-*Cistanthe umbellata* var. *umbellata*

This ecological site is on glacial headlands, lava flows, moraines, and cinder cones at elevations between 7,000 and 9,100 feet (2,134 and 2,774 meters). This site is dominated by mountain hemlock (*Tsuga mertensiana*) and has a sparse understory (fig. 28). Mountain hemlock is more tolerant than many conifers of the low amount of soil nutrients and the frost conditions that are common at the higher elevations. The well developed forests of mountain hemlock occur in sheltered positions and/or on north-facing slopes. There are several nice stands of large mature mountain hemlock trees with an average of 45 percent canopy cover. Understory species include western needlegrass (*Achnatherum occidentale*), Holboell's rockcress (*Arabis holboellii*),



Figure 29.—This photo represents ecological site F022BI105CA—*Pinus contorta* var. *murrayana*-*Populus tremuloides*/*Elymus glaucus*. Sierra lodgepole pine (*Pinus contorta* var. *murrayana*) is competing with Quaking aspen (*Populus tremuloides*) for sunlight and nutrients.

pioneer rockcress (*Arabis platysperma*), carex (*Carex* sp.), Mt. Hood pussypaws (*Cistanthe umbellata* var. *umbellata*), bluntlobe lupine (*Lupinus obtusilobus*), and spike trisetum (*Trisetum spicatum*). Terracelake soils; Humic Xeric Vitricryands; Xeric Vitricryands, tephra over till; and Xeric Vitricryands, colluvium are associated with this site. These soils are moderately deep to very deep, are well drained, and have a very low or low available water capacity. The surface layers are loamy sand, ashy sandy loam, gravelly fine sandy loam, or gravelly sandy loam, and the subsurface layers are sandy. These soils formed in tephra over till, tephra over colluvium, or colluvium, all derived from volcanic rock. Slopes range from 1 to 80 percent but are generally between 1 and 35 percent. The mean annual precipitation ranges from 37 to 125 inches (940 to 3,175 millimeters), and the mean annual temperature ranges from 38 to 43 degrees F (3.3 to 6.1 degrees C).

F022BI105CA—*Pinus contorta* var. *murrayana*-*Populus tremuloides*/*Elymus glaucus*

This ecological site is along Hat Creek on low stream terraces at elevations between 6,120 and 6,360 feet (1,865 and 1,939 meters). A forest of Sierra lodgepole pine (*Pinus contorta* var. *murrayana*) occurs and is associated with Vitrandic Xerofluvents, debris flows (fig. 29). These soils are very deep, are somewhat poorly drained, and have a low available water capacity in the upper 60 inches. They have 10 to 50 inches of debris deposits over the preexisting alluvial soil from the 1915 eruption of Lassen Peak. There are a few inches of fresh organic material over several C horizons and a buried A horizon. The upper C horizons have textures of ashy very fine sandy loam. This material is from reworked debris material that overlays the coarser textured initial debris material. The initial debris material in the lower C horizons is

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ashy loamy coarse sand, and the content of gravel increases as depth increases, from 6 to 60 percent. The buried A horizon is very gravelly ashy fine sandy loam. A seasonal water table fluctuates between depths of 9 and 20 inches during April and May and continues to lower through the year, to a depth of more than 60 inches. Quaking aspen (*Populus tremuloides*) is an important feature on this site but is gradually being replaced by Sierra lodgepole pine. To stimulate regeneration, aspens need fire or other natural disturbances to remove the lodgepole pine and create canopy openings. White fir (*Abies concolor*) and Jeffrey pine (*Pinus jeffreyi*) occur in some areas. The understory is dominated by blue wildrye (*Elymus glaucus*). Also occurring are common yarrow (*Achillea millefolium*), western needlegrass (*Achnatherum occidentale*), carex (*Carex* spp.), squirreltail (*Elymus elymoides*), blue wildrye (*Elymus glaucus*), spreading groundsmoke (*Gayophytum diffusum*), Gray's licorice-root (*Ligusticum grayi*), and whitestem gooseberry (*Ribes inerme*). Slopes range from 0 to 8 percent. The mean annual precipitation ranges from 45 to 61 inches (1,143 to 1,549 millimeters), and the mean annual temperature is between 41 and 44 degrees F (5 and 6.6 degrees C).

F022BI106CA—*Pinus jeffreyi*-*Abies*/*Achnatherum* sp.-*Lupinus* spp.

This ecological site encompasses the areas affected by debris deposits, primarily from the 1914-1917 eruptions of Lassen Peak. Vitrandic Xerorthents, debris fan and Vitrandic Xerofluvents are associated with this site. These soils formed in debris flows from volcanic rocks. They are moderately deep to very deep and well drained. Vitrandic Xerofluvents are on debris flows and have about 50 inches of debris over the buried tephra from Chaos Crags. Vitrandic Xerorthents, debris fan have more than 6 feet of debris material. The buried soil was not encountered. Vitrandic Xerorthents, debris fan have a layer of densic material that may be encountered at a depth of 20 to more than 80 inches (51 to more than 203 centimeters). The surface layers are very gravelly ashy loamy coarse sand and gravelly ashy loamy sand, and the subsurface layers are coarse. These soils have a very low or low available water capacity in the upper 60 inches. In those areas with shallower debris deposits, the trees are able to reach the buried soil and utilize the stored nutrients, enabling them to reestablish more quickly than those trees in the deeper debris deposits. The trees in the deeper deposits have to go through a slow progression of primary succession since the soils in those areas have not had time to develop. Other factors, such as proximity to a seed or water source, influence species composition and recovery time. (Please refer to the complete ecological site description for a full summary of this unique and complex process.) Sierra lodgepole pine (*Pinus contorta* var. *murrayana*) is the early successional species, followed by California red fir (*Abies magnifica*) and western white pine (*Pinus monticola*) (fig. 30). Jeffrey pine (*Pinus jeffreyi*) and white fir (*Abies concolor*) occur at the lower portion of the devastated area. Cover is sparse in open areas and under the developing tree canopy, but western needlegrass (*Achnatherum occidentale*), pinemat manzanita (*Arctostaphylos nevadensis*), goldenbush (*Ericameria* sp.), buckwheats (*Eriogonum* spp.), oceanspray (*Holodiscus discolor*), bluntlobe lupine (*Lupinus obtusilobus*), longspur lupine (*Lupinus arbustus*), and Lemmon's willow (*Salix lemmonii*) occur in some areas. This site is at elevations between 5,880 and 7,210 feet (1,792 and 2,198 meters). Slopes range from 0 to 30 percent. The mean annual precipitation is between 45 and 95 inches (1,143 and 2,413 millimeters), and the mean annual temperature is between 40 and 42 degrees F (4.4 and 5.5 degrees C).

F022BI107CA—*Abies magnifica*-*Abies concolor*/*Chrysolepis sempervirens*

This ecological site is associated with a forest of California red fir (*Abies magnifica*), white fir (*Abies concolor*), and Jeffrey pine (*Pinus jeffreyi*) (fig. 31). The understory has



Figure 30.—This photo represents ecological site F022B1106CA—*Pinus jeffreyi*-*Abies/ Achnatherum* sp.-*Lupinus* spp. Sierra lodgepole pine (*Pinus contorta* var. *murrayana*) is an early colonizer on the devastated debris material.

a patchy cover of bush chinquapin (*Chrysolepis sempervirens*), western needlegrass (*Achnatherum occidentale*), and slender penstemon (*Penstemon gracilentus*). This forest site is in a transition zone that fluctuates in a band across the slopes. It occurs above the white fir forest types and below the red fir forest types. Environmental variables that influence the presence of particular conifer species are temperature, precipitation, aspect, snow depth, duration of snow pack, and length of growing season. Fire plays an important role in this forest type, influencing stand dynamics and composition. Associated with this ecological site are Cenplat, Sunhoff, and Badgerflat soils. These moderately deep, well drained soils have a very low available water capacity and occur on glaciated lava plateaus and moraines. They formed in tephra over till or in tephra over residuum from volcanic rocks. The surface layers are ashy loamy sand or very gravelly ashy sandy loam. The subsurface layers are primarily loamy sands or sandy loams that are extremely gravelly, cobbly, or stony. A root-resistant layer of indurated bedrock or dense till occurs at a depth of 20 to 40 inches. This site is at elevations between 5,980 and 7,600 feet (1,823 and 2,316 meters). Slopes range from 10 to 65 percent. The mean annual precipitation is between 25 and 65 inches (635 and 1,651 millimeters), and the mean annual temperature is between 41 and 44 degrees F (5 and 6.6 degrees C).

F022B1108CA—*Pinus contorta* var. *murrayana*/*Veratrum californicum* var. *californicum*—*Elymus glaucus*

This ecological site is on moist stream and lake terraces and is dominated by forests of Sierra lodgepole pine (*Pinus contorta* var. *murrayana*) (fig. 32). This site is associated with Typic Endoaquands, which consist of deep and very deep, poorly



Figure 31.—This photo represents ecological site F022BI107CA—*Abies magnifica*-*Abies concolor*/*Chrysolepis sempervirens*. California red fir (*Abies magnifica*), white fir (*Abies concolor*), and Jeffrey pine (*Pinus jeffreyi*) are visible in this photo. The forest is becoming increasingly dense because the firs continue to regenerate in the understory and are not removed by fire.

drained soils that formed in alluvium from volcanic rocks. There are a couple inches of litter and muck over an A horizon. The A and B horizons are gravelly medial sandy loam and have 12 to 15 percent clay and 20 to 25 percent gravel. The C horizons are coarse sandy loam and loamy coarse sand and have 1 to 2 percent clay, 50 to 60 percent gravel, and 10 percent cobbles. These soils have a low available water



Figure 32.—This photo represents ecological site F022B1108CA—*Pinus contorta* var. *murrayana*/*Veratrum californicum* var. *californicum*—*Elymus glaucus*. This is a moist forest of Sierra lodgepole pine (*Pinus contorta* var. *murrayana*). The dominant understory species are bluejoint reedgrass (*Calamagrostis Canadensis*), carex (*Carex* spp.), blue wildrye (*Elymus glaucus*), and California false hellebore (*Veratrum californicum* var. *californicum*).

capacity in the upper 60 inches. There are masses of oxidized iron around rock fragments below a depth of 29 inches and a duripan or petroferric contact at a depth of 40 to more than 60 inches. The iron concentrations indicate prolonged saturation, possibly due to a water table perched above the duripan or petroferric layer. This site is frequently flooded during spring snowmelt. It has a water table near the surface for several months that drops to below 60 inches by the end of summer. Sierra lodgepole pine is encroaching into nearby meadows in parts of this site. The meadows may be drying out due to changes in water flow or channel gradient. There is a lush and diverse understory associated with this moist forest type. It is dominated by grasses and forbs, including common yarrow (*Achillea millefolium*), mountain bent grass (*Agrostis humilis*), bluejoint reedgrass (*Calamagrostis canadensis*), carex (*Carex* spp.), tufted hairgrass (*Deschampsia cespitosa* ssp. *cespitosa*), blue wildrye (*Elymus glaucus*), meadow barley (*Hordeum brachyantherum*), tinker's penny (*Hypericum anagalloides*), bigleaf lupine (*Lupinus polyphyllus*), monkeyflowers (*Mimulus* spp.), tundra aster (*Oreostemma alpinum* var. *andersonii*), sweetcicely (*Osmorhiza berteroi*), alpine timothy (*Phleum alpinum*), gooseberry currant (*Ribes montigenum*), arrowleaf ragwort (*Senecio triangularis*), longstalk clover (*Trifolium longipes*), and California false hellebore (*Veratrum californicum* var. *californicum*). This site is at elevations between 5,900 and 6,900 feet (1,798 and 2,103 meters). Slopes range from 0 to 30 percent. The mean annual precipitation ranges from 35 to 65 inches (889 to 1,651 millimeters), and the mean annual temperature is about 41 degrees F (5 degrees C).



Figure 33.—This photo represents ecological site F022B1109CA—*Abies magnifica*-*Pinus jeffreyi*/*Arctostaphylos nevadensis*-*Achnatherum occidentale*. California red fir (*Abies magnifica*) dominates this forest. Jeffrey pine (*Pinus jeffreyi*) is a common associate but is not visible in this photo.

F022B1109CA—*Abies magnifica*-*Pinus jeffreyi*/*Arctostaphylos nevadensis*-*Achnatherum occidentale*

This ecological site is located on cinder cone volcanoes or on the side slopes of shield volcanoes. A forest of California red fir (*Abies magnifica*) and Jeffrey pine (*Pinus jeffreyi*) occurs that has pinemat manzanita (*Arctostaphylos nevadensis*) in canopy openings (fig. 33). This site is associated with Ashbutte and Prospectpeak soils. These

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soils are deep or very deep and well drained or somewhat excessively drained. They formed in tephra from cinder cone volcanoes or in tephra from Cinder Cone over residuum from andesite. They have a very low available water capacity. The surface layers are very gravelly ashy coarse sand and ashy coarse sand. The soils have coarse subsurface layers that are extremely gravelly or stony. Prospectpeak soils have a lithic contact at a depth of 40 to 60 inches (102 to 152 centimeters). California red fir can grow into very dense stands unless fire or other disturbances open up the canopy. This forest has very large old trees and a canopy cover ranging from 30 to 50 percent. Common understory species include western needlegrass (*Achnatherum occidentale*), rockcress (*Arabis* spp.), little prince's pine (*Chimaphila menziesii*), bush chinquapin (*Chrysolepis sempervirens*), and whitevein shinleaf (*Pyrola picta*). This site is generally at elevations between 6,300 and 8,000 feet (1,920 and 2,438 meters). Slopes range from 10 to 60 percent. The mean annual precipitation ranges from 27 to 57 inches (686 to 1,448 millimeters), and the mean annual temperature ranges from 41 to 44 degrees F (5 to 6.6 degrees C).

F022BI110CA—*Abies concolor*-*Calocedrus decurrens*/*Ceanothus cordulatus*/*Achnatherum* spp.

This ecological site is associated with a mixed conifer forest occurring in the southeast corner of the park. White fir (*Abies concolor*) is dominant with some Jeffrey pine (*Pinus jeffreyi*), incense cedar (*Calocedrus decurrens*), and sugar pine (*Pinus lambertiana*) (fig. 34). This forest occurs at some of the lowest elevations within the park boundary. This site is similar to the white fir ecological site (F022BI103CA) occurring around Manzanita Lake but does not include the dense areas of shrubs. This is most likely due to the fire history of the site: the area around Manzanita Lake has burned frequently compared to this site. Because this site is less exposed to winds and lower-elevation fires, it seems naturally less prone to fire and fire-dependent shrubs have not developed as extensively as in the Manzanita Lake area. The composition of this forest has shifted to favor white fir since fire has been excluded from the system. Common species in this forest are needlegrass (*Achnatherum* spp.), California brome (*Bromus carinatus*), Orcutt's brome (*Bromus orcuttianus*), Brainerd's sedge (*Carex brainerdii*), Ross' sedge (*Carex rossii*), whitethorn ceanothus (*Ceanothus cordulatus*), squirreltail (*Elymus elymoides*), naked buckwheat (*Eriogonum nudum*), and Sierra gooseberry (*Ribes roezlii*). This site is associated with the following soils: Kingsiron soils; Juniperlake soils; Humic Haploxerands, strath terrace; Humic Haploxerands, colluvium; and Humic Haploxerands, outwash terrace. These soils are moderately deep to very deep, are well drained, and have a very low or low available water capacity. They formed in colluvium, outwash, or glacial till or in alluvium over residuum from volcanic rocks. This site occurs on backslopes and base slopes of glacially carved U-shaped valleys, colluvial aprons and landslides, strath terraces, outwash terraces, and moraines. The surface layers are sandy loam, fine sandy loam, or gravelly ashy sandy loam, and the subsurface layers are coarse. This site is generally at elevations between 5,200 and 6,500 feet (1,585 and 1,981 meters) but is mapped in some higher areas. Slopes range from 2 to 80 percent but most of this site is on 2 to 40 percent slopes. The mean annual precipitation ranges from 43 to 91 inches (1,092 to 2,300 millimeters), and the mean annual temperature is about 42 degrees F (5.5 degrees C).

F022BI111CA—*Tsuga mertensiana*-*Abies magnifica*/*Lupinus obtusilobus*-*Eriogonum marifolium*

This ecological site occurs on glaciated mountain slopes and glaciated lava flows, on moraines, or in linear to concave positions on pyroclastic cones. It is associated with Shadowlake soils, Terracelake soils, and Xeric Vitricryands, ash over cinders.



Figure 34.—This photo represents ecological site F022BI110CA—*Abies concolor*-*Calocedrus decurrens*/*Ceanothus cordulatus*/*Achnatherum* spp. This is a mixed conifer forest with white fir (*Abies concolor*), Jeffrey pine (*Pinus jeffreyi*), incense cedar (*Calocedrus decurrens*), and sugar pine (*Pinus lambertiana*). The understory is generally sparse.

These soils are moderately deep to very deep, are well drained, and formed in tephra over till, colluvium, or residuum or in ash and colluvial cinders. The surface layers are gravelly ashy sandy loam or ashy sandy loam. The subsurface layers are predominantly sandy loam that is gravelly. Rock fragments generally increase in amount as depth increases; the soils have 2 to 20 percent cobbles and 0 to 40 percent



Figure 35.—This photo represents ecological site F022BI111CA—*Tsuga mertensiana*-*Abies magnifica*/*Lupinus obtusilobus*-*Eriogonum marifolium*. This is a sub-alpine mixed conifer forest that includes mountain hemlock (*Tsuga mertensiana*), Sierra lodgepole pine (*Pinus contorta* var. *murrayana*), California red fir (*Abies magnifica*), and western white pine (*Pinus monticola*). The understory is generally sparse.

stones in the lower horizons. A sub-alpine mixed conifer forest that includes mountain hemlock (*Tsuga mertensiana*), Sierra lodgepole pine (*Pinus contorta* var. *murrayana*), California red fir (*Abies magnifica*), and western white pine (*Pinus monticola*) is associated with this site (fig. 35). The understory is sparse and includes some grasses, dryland sedges, and, in some areas, pinemat manzanita (*Arctostaphylos nevadensis*). Total tree cover is between 40 to 60 percent. Understory species include western needlegrass (*Achnatherum occidentale*), pioneer rockcress (*Arabis platysperma*), carex (*Carex* spp.), Mt. Hood pussypaws (*Cistanthe umbellata* var. *umbellata*), squirreltail (*Elymus elymoides*), marumleaf buckwheat (*Eriogonum marifolium*), bluntlobe lupine (*Lupinus obtusilobus*), and Davis' knotweed (*Polygonum davisiae*). This site is at elevations between 6,400 and 8,300 feet (1,951 and 2,530 meters). Slopes range from 2 to 80 percent, but slopes of 2 to 30 percent are the most common. The mean annual precipitation ranges from 37 to 111 inches (940 to 2,819 millimeters), and the mean annual temperature ranges from 38 to 41 degrees F (3.3 to 5 degrees C).

F022BI112CA—*Abies magnifica*/*Penstemon gracilentus*-*Lupinus arbustus*

This ecological site occurs on moraines and dry lake terraces at elevations between 5,500 and 8,200 feet (1,676 and 2,499 meters). This site occurs on north slopes and in cool drainages at the lower elevations and in the warmer positions at the upper elevations. A forest of California red fir (*Abies magnifica*) occurs with white fir (*Abies concolor*) at the lower elevations and western white pine (*Pinus monticola*) intermixed



Figure 36.—This photo represents ecological site F022BI112CA—*Abies magnifica*/*Penstemon gracilentus*-*Lupinus arbustus*. This is a dense forest of California red fir (*Abies magnifica*). Longspur lupine (*Lupinus arbustus*) and slender penstemon (*Penstemon gracilentus*) are common in the understory.

at the higher elevations (fig. 36). California red fir can grow into very dense stands in the absence of fire. The understory tends to be sparse, but in some areas a cover of longspur lupine (*Lupinus arbustus*) and slender penstemon (*Penstemon gracilentus*) can be extensive. Other common species are needlegrass (*Achnatherum* spp.), pinemat manzanita (*Arctostaphylos nevadensis*), California brome (*Bromus carinatus*),



Figure 37.—This photo represents ecological site F022BI113CA—*Abies magnifica*/*Monardella odoratissima*-*Phlox diffusa*. This is an uneven-aged, open forest of California red fir (*Abies magnifica*) associated with the hydrothermally altered areas of Brokeoff Volcano. Spreading phlox (*Phlox diffusa*), mountain monardella (*Monardella odoratissima*), ragwort (*Senecio* spp.), and bluntlobe lupine (*Lupinus obtusilobus*) are in the understory.

Mt. Hood pussypaws (*Cistanthe umbellata* var. *umbellata*), and mountain monardella (*Monardella odoratissima*). This site is associated with Juniperlake soils and Humic Haploxerands, lake terrace. These soils are moderately deep to very deep and well drained. They formed in glacial till from andesite and basalt and in lake sediments. The surface layers are gravelly medial sandy loam and medial sandy loam, and the subsurface layers are gravelly and cobbly medial sandy loam or bouldery fine sandy loam. A restrictive layer of dense till or a duripan is encountered at a depth of 20 to more than 60 inches (51 to more than 152 centimeters). Slopes range from 1 to 40 percent. The mean annual precipitation ranges from 35 to 109 inches (889 to 2,769 millimeters), and the mean annual temperature is between 38 and 43 degrees F (3.3 and 6.1 degrees C).

F022BI113CA—*Abies magnifica*/*Monardella odoratissima*-*Phlox diffusa*

This ecological site occurs on mountain slopes in the hydrothermally altered areas of Brokeoff Volcano. Diamondpeak soils are associated with this site. These soils are very deep and well drained. They formed in tephra and colluvium over residuum from hydrothermally altered rocks. The surface layer is ashy loam, and the subsurface layers are very paragravelly clay loam and very paragravelly sandy clay loam. These soils are strongly acidic; they have a pH that is 4.7 at the surface and increases to 5.0 lower in the profile. A canopy cover of California red fir (*Abies magnifica*) ranges from 10 to 50 percent and in some areas includes western white pine (*Pinus monticola*) and mountain hemlock (*Tsuga mertensiana*) (fig. 37). White fir (*Abies concolor*) grows at



Figure 38.—This photo represents ecological site F022BI114CA—*Abies magnifica*-*Pinus monticola*/*Arctostaphylos nevadensis*-*Chrysolepis sempervirens*/*Angelica breweri*. This site has volcanic rubble exposed on the surface with an open forest of California red fir (*Abies magnifica*) and western white pine (*Pinus monticola*). Pinemat manzanita (*Arctostaphylos nevadensis*), bush chinquapin (*Chrysolepis sempervirens*), and Brewer's angelica (*Angelica breweri*) are common.

the lower elevations alongside California red fir. The forest is patchy and unevenly aged. Associated understory species include spreading phlox (*Phlox diffusa*), mountain monardella (*Monardella odoratissima*), ragwort (*Senecio* spp.), bluntlobe lupine (*Lupinus obtusilobus*), woolly mule-ears (*Wyethia mollis*), dusky onion (*Allium campanulatum*), and some pinemat manzanita (*Arctostaphylos nevadensis*). This site is at elevations between 5,700 and 8,500 feet (1,737 and 2,591 meters) on 10 to 80 percent slopes. The mean annual precipitation ranges from 63 to 119 inches (1,600 to 3,023 millimeters), and the mean annual temperature is between 38 and 42 degrees F (3.3 and 5.5 degrees C).

F022BI114CA—*Abies magnifica*-*Pinus monticola*/*Arctostaphylos nevadensis*-*Chrysolepis sempervirens*/*Angelica breweri*

This ecological site occurs on cinder cones and on shield volcanoes and has a high amount of volcanic rubble exposed on the surface. It is characterized by an open forest of California red fir (*Abies magnifica*) and western white pine (*Pinus monticola*) and an understory of pinemat manzanita (*Arctostaphylos nevadensis*) (fig. 38). The overstory canopy cover is usually less than 35 percent. Other plants include Brewer's angelica (*Angelica breweri*), bush chinquapin (*Chrysolepis sempervirens*), white hawkweed (*Hieracium albiflorum*), oceanspray (*Holodiscus discolor*), mountain monardella (*Monardella odoratissima*), and wax currant (*Ribes cereum*). This site is associated with Bearrubble soils and Vitrandic Xerothents. These soils are very deep



Figure 39.—This photo represents ecological site F022BI115CA—*Abies magnifica*-*Pinus monticola*/*Arctostaphylos nevadensis*/*Achnatherum occidentale*. This is an open forest of California red fir (*Abies magnifica*) and western white pine (*Pinus monticola*) that has pinemat manzanita (*Arctostaphylos nevadensis*) in the understory.

and somewhat excessively drained or well drained. They formed in ash over colluvium and residuum from volcanic rocks or in tephra over residuum from volcanic rocks. These soils have surface layers of ashy fine sand or very gravelly ashy loamy sand. The subsurface layers are sandy loam or ashy loamy sand that is extremely gravelly, cobbly, or stony. This site is at elevations between 6,500 and 8,000 feet (1,981 and 2,438 meters). Slopes range from 8 to 60 percent. The mean annual precipitation ranges from 27 to 83 inches (686 to 2,108 millimeters), and the mean annual temperature ranges from 41 to 44 degrees F (5 to 6.6 degrees C).

F022BI115CA—*Abies magnifica*-*Pinus monticola*/*Arctostaphylos nevadensis*/*Achnatherum occidentale*

This ecological site has an open forest of California red fir (*Abies magnifica*) and western white pine (*Pinus monticola*) and a 15 to 50 percent canopy cover (fig. 39). The cover of pinemat manzanita (*Arctostaphylos nevadensis*) ranges from 20 to 90 percent in the understory. Other common plants include western needlegrass (*Achnatherum occidentale*), squirreltail (*Elymus elymoides*), scarlet gilia (*Ipomopsis aggregata*), bluntlobe lupine (*Lupinus obtusilobus*), narrowleaf lupine (*Lupinus angustifolius*), and greenleaf manzanita (*Arctostaphylos patula*). This site is associated with nine soil components which straddle the cryic/frigid soil temperature boundary. Most of this site is associated with volcanic deposits such as ash, tephra, ash flow, and pyroclastic flow over till or colluvium. This site occurs on outwash terraces, moraines, cirques, mountain slopes, lava plateaus, and lava flows. The soils are



Figure 40.—This photo represents ecological site F022BI117CA—*Abies magnifica*-*Pinus contorta* var. *murrayana*/*Elymus elymoides*. This forest is currently dominated by Sierra lodgepole pine (*Pinus contorta* var. *murrayana*) but California red fir (*Abies magnifica*) will eventually prevail if the site is not disturbed. There is a low amount of understory cover.

moderately deep to very deep and moderately well drained to somewhat excessively drained. The surface layers are predominately gravelly ashy loamy coarse sand, gravelly sandy loam, and gravelly loamy sand. The subsurface layers have a high percentage of cobbles or stones and coarse textures. The majority of this site is at elevations between 6,200 and 7,500 feet (1,890 and 2,286 meters) but is mapped higher and lower in some areas. Slopes range from 0 to 80 percent. The mean annual precipitation ranges from 35 to 117 inches (889 to 2,972 millimeters), and the mean annual temperature ranges from 38 to 43 degrees F (3.3 to 6.1 degrees C).

F022BI117CA—*Abies magnifica*-*Pinus contorta* var. *murrayana*/*Elymus elymoides*

This ecological site is associated with a forest of Sierra lodgepole pine (*Pinus contorta* var. *murrayana*) and California red fir (*Abies magnifica*) on glacial outwash plains and outwash terraces (fig. 40). This site is correlated with Duric Vitraquands and Vitrixerands. These soils are moderately deep or deep and are somewhat poorly drained to well drained. They formed in volcanic ash over glaciolacustrine deposits on top of glacial outwash or in lake sediments over glacial outwash from volcanic rocks. The surface layer is gravelly ashy loamy coarse sand, and the subsurface layers are similar. These soils have a very low or low available water capacity in the upper 60 inches. A duripan occurs at a depth of 20 to 60 inches (51 to 152 centimeters). This forest is currently dominated by Sierra lodgepole pine (*Pinus contorta* var. *murrayana*) but California red fir (*Abies magnifica*) will eventually prevail if the site is not disturbed. The understory is sparse and includes carex (*Carex* spp.), little prince's pine



Figure 41.—This photo represents ecological site F022BI118CA—*Abies magnifica*/Carex sp.-*Hieracium albiflorum*. This is a forest of California red fir (*Abies magnifica*) occurring on landslides from hydrothermally altered volcanic rocks. The understory is sparse.

(*Chimaphila menziesii*), Mt. Hood pussypaws (*Cistanthe umbellata* var. *umbellata*), squirreltail (*Elymus elymoides*), sulphur-flower buckwheat (*Eriogonum umbellatum*), and white hawkweed (*Hieracium albiflorum*). This site occurs at elevations between 6,300 and 6,800 feet (1,920 and 2,073 meters). Slopes range from 0 to 15 percent. The mean annual precipitation ranges from 57 to 63 inches (1,499 to 1,600 millimeters), and the mean annual temperature is about 41 degrees F (5 degrees C).

F022BI118CA—*Abies magnifica*/Carex sp.-*Hieracium albiflorum*

This ecological site is associated with a forest of California red fir (*Abies magnifica*) (fig. 41). It occurs on landslides from hydrothermally altered volcanic rocks. Typical Dystroxerepts, landslides are associated with this site. These soils are very deep, are well drained, and have a moderate available water capacity. The surface layer is ashy fine sandy loam, and the subsurface layer is very stony ashy sandy clay loam. The surface pH is 5.0. The pH decreases to 4.3 in the lower horizons. California red fir grows fast and into dense stands on this site and produces a high canopy cover that shades out most of the understory. The understory species mountain monardella (*Monardella odoratissima*), western needlegrass (*Achnatherum occidentale*), Holboell's rockcress (*Arabis holboellii*), carex (*Carex* sp.), Ross' sedge (*Carex rossii*), squirreltail (*Elymus elymoides*), white hawkweed (*Hieracium albiflorum*), slender penstemon (*Penstemon gracilentus*), whitevein shinleaf (*Pyrola picta*), and gooseberry (*Ribes montigenum*) occur in some areas. This site is at elevations between 5,800 and 8,100 feet (1,768 and 2,469 meters). Slopes range from 10 to 50 percent. The mean annual precipitation ranges from 99 to 113 inches (2,515 to 2,870 millimeters), and the mean annual temperature is about 39 degrees F (3.9 degrees C).

F022BI119CA—*Abies concolor*-*Pinus jeffreyi*/*Elymus elymoides*

This ecological site occurs on moraines on the eastern side of Buttelake. It is associated with Buttelake soils on 35 to 70 percent slopes. Buttelake soils are deep and well drained and formed in tephra over glacial till from volcanic rocks. The surface layer is ashy sand, and the lower horizons are coarse sand. This site is similar to F022BI100CA, which has a forest of Jeffrey pine associated with Buttelake and Buttewash soils. This site is associated with steeper slopes and less solar radiation, which allow white fir (*Abies concolor*) to prevail over Jeffrey pine (*Pinus jeffreyi*) (fig. 42). Fire exclusion has allowed white fir to become dense in the understory. The understory cover is sparse and includes rabbitbrush (*Ericameria bloomeri*), slender penstemon (*Penstemon gracilentus*), little prince's pine (*Chimaphila menziesii*), whitevein shinleaf (*Pyrola picta*), lettuce wirelettuce (*Stephanomeria lactucina*), and bush chinquapin (*Chrysolepis sempervirens*). Total canopy cover ranges from 60 to 80 percent. This site is at elevations between 6,000 and 7,600 feet (1,829 to 2,316 meters). The mean annual precipitation ranges from 25 to 45 inches (635 to 1,143 millimeters), and the mean annual temperature is between 42 and 44 degrees F (5.5 and 6.6 degrees C).

F022BI120CA—*Abies concolor*-*Pinus contorta* var. *murrayana*/*Elymus glaucus*

This ecological site is associated with a forest of white fir (*Abies concolor*) and Sierra lodgepole pine (*Pinus contorta* var. *murrayana*) and occurs on outwash terraces and stream terraces along Hot Springs Creek (fig. 43). This site is associated with Aquic Haploxerands and Humic Haploxerands, stream terrace. These soils are moderately deep to very deep and somewhat poorly drained to well drained. Aquic Haploxerands formed in glacial outwash from volcanic rocks. Humic Haploxerands, stream terrace formed in ash-influenced alluvium from volcanic rocks. The soils have surface layers of gravelly medial sandy loam. Humic Haploxerands, stream terrace have 94 percent rock fragments in the lower horizons, 60 percent of which include boulders, stones, and cobbles. Aquic Haploxerands have subsurface layers of gravelly fine sandy loam that has about 5 percent cobbles and a duripan at a depth of 20 to 60 inches (51 to 152 centimeters). These soils have a very low or low available water capacity in the upper 60 inches. Jeffrey pine (*Pinus jeffreyi*) grows in the driest areas, and balsam poplar (*Populus balsamifera*) grows closer to stream channels. This forest has a grassy understory dominated by blue wild-rye (*Elymus glaucus*). Other species include common yarrow (*Achillea millefolium*), Columbia needlegrass (*Achnatherum nelsonii*), western needlegrass (*Achnatherum occidentale*), California brome (*Bromus carinatus*), Ross' sedge (*Carex rossii*), naked buckwheat (*Eriogonum nudum*), spreading groundsmoke (*Gayophytum diffusum*), white hawkweed (*Hieracium albiflorum*), and silverleaf phacelia (*Phacelia hastata*). This site occurs at elevations between 5,200 and 6,800 feet (1,585 and 2,073 meters). Slopes range from 2 to 30 percent. The mean annual precipitation ranges from 45 to 91 inches (1,143 to 2,311 millimeters), and the mean annual temperature ranges from 41 to 43 degrees F (5 to 6.1 degrees C).

F022BI121CA—*Pinus jeffreyi*/*Arctostaphylos patula*

This ecological site occurs on mountain slopes, shield volcanoes, and glacially scoured ridges and headlands. The site is associated with Scoured soils; Dittmar soils; Typic Vitrixerands, bouldery; and Typic Vitrixerands, unglaciated. These soils developed in ash mixed with colluvium over residuum, in tephra over colluvium and residuum, or in residuum from volcanic rock. They are shallow to very deep. In the shallow to deep soils lithic or paralithic bedrock occurs at a depth of 10 to 60 inches (25 to 152 centimeters). These soils are well drained to somewhat excessively drained, have a high amount of rock fragments, and have a very low or low available



Figure 42.—This photo represents ecological site F022BI119CA—*Abies concolor*-*Pinus jeffreyi*/*Elymus elymoides*. This is a dense forest of white fir (*Abies concolor*) and Jeffrey pine (*Pinus jeffreyi*) that has little understory vegetation.

water capacity. The surface layers are ashy fine sandy loam, very gravelly ashy sandy loam, very bouldery medial loamy sand, and ashy fine sand. An open forest of Jeffrey pine (*Pinus jeffreyi*) that has a heavy understory of greenleaf manzanita (*Arctostaphylos patula*), bush chinquapin (*Chrysolepis sempervirens*), and huckleberry oak (*Quercus vacciniifolia*) is associated with this site (fig. 44). This forest remains



Figure 43.—This photo represents ecological site F022BI120CA—*Abies concolor*-*Pinus contorta* var. *murrayana*/*Elymus glaucus*. This is a forest of white fir (*Abies concolor*) and Sierra lodgepole pine (*Pinus contorta* var. *murrayana*) that has a lush understory dominated by blue wild-rye (*Elymus glaucus*).

relatively open because of the high content of rock fragments within the soils, bedrock contact (in some areas), rock outcrops, and the consequential extremely droughty nature of the soils. These soils are commonly on the upper ridgelines where water drains earlier in the year and desiccating winds remove snow, drying out the soils. Other associated plants include western needlegrass (*Achnatherum occidentale*),



Figure 44.—This photo represents ecological site F022B1121CA—*Pinus jeffreyi*/*Arctostaphylos patula*. This is an open forest of Jeffrey pine (*Pinus jeffreyi*) that has a heavy understory of greenleaf manzanita (*Arctostaphylos patula*) and other shrubs.

western serviceberry (*Amelanchier utahensis*), prostrate ceanothus (*Ceanothus prostratus*), lace lipfern (*Cheilanthes gracillima*), Mt. Hood pussypaws (*Cistanthe umbellata* var. *umbellata*), spreading groundsmoke (*Gayophytum diffusum*), Sierra cliffbrake (*Pellaea brachyptera*), Plumas County beardtongue (*Penstemon neotericus*), and mountain pride (*Penstemon newberryi*). This site occurs primarily at elevations between 5,500 and 7,000 feet (1,676 and 2,134 meters). Slopes range from 5 to 90 percent. The mean annual precipitation ranges from 39 to 91 inches (991 to 2,311



Figure 45.—This photo represents ecological site F022B1122CA—*Pinus jeffreyi*-*Abies concolor*/*Holodiscus discolor*. In this photo, Sierra lodgepole pine (*Pinus contorta* var. *murrayana*) and Jeffrey pine (*Pinus jeffreyi*) are pioneering on the debris from the Chaos Crags rock avalanche.

millimeters), and the mean annual temperature is between 41 and 44 degrees F (5 and 6.6 degrees C).

F022B1122CA—*Pinus jeffreyi*-*Abies concolor*/*Holodiscus discolor*

This ecological site occurs on rockfall avalanche deposits and in colluvium from a series of avalanches that came from the northwest side of Chaos Crags approximately 300 years ago. Chaos soils are associated with this site. They are very deep and well drained. The surface layer is extremely gravelly ashy coarse sand, and the underlying layers are gravelly ashy sand. Most of the soil profile has more than 35 percent rock fragments, which are mostly gravel, while the percent of cobbles increases as depth increases. These soils have a very low available water capacity in the upper 60 inches. Trees have slowly pioneered this area from nearby seed sources. The perimeter has a mature forest of Jeffrey pine and white fir. The center is still in early development. It has a tree canopy cover of about 10 to 20 percent and jumbled stones, boulders, and coarse gravel on the surface (fig. 45). Many of the trees in the center are chlorotic because they do not have available plant nutrients. This site has a variety of conifer species, some of which are out of their usual elevation range. Sierra lodgepole pine (*Pinus contorta* var. *murrayana*) is generally the dominant tree species during primary succession but Jeffrey pine (*Pinus jeffreyi*), white fir (*Abies concolor*), California red fir (*Abies magnifica*), sugar pine (*Pinus lambertiana*), western white pine (*Pinus monticola*), and mountain hemlock (*Tsuga mertensiana*) also occur in small amounts. Common associated plants are western needlegrass (*Achnatherum occidentale*), rockcress (*Arabis* sp.), pinemat manzanita (*Arctostaphylos nevadensis*), greenleaf manzanita (*Arctostaphylos patula*), carex (*Carex* sp.), bush chinquapin

(*Chrysolepis sempervirens*), buckwheat (*Eriogonum* spp.), and oceanspray (*Holodiscus discolor*). This site is at elevations between 5,700 and 7,200 feet (1,737 and 2,195 meters). Slopes range from 2 to 30 percent. The mean annual precipitation ranges from 39 to 93 inches (991 to 2,362 millimeters), and the mean annual temperature is about 40 to 45 degrees F (4.4 to 7.2 degrees C).

F022BI123CA—*Abies concolor*-*Pinus contorta* var. *murrayana*/*Achnatherum occidentale*

This ecological site has a forest of Sierra lodgepole pine (*Pinus contorta* var. *murrayana*) (fig. 46). Some white fir (*Abies concolor*), Jeffrey pine (*Pinus jeffreyi*), and quaking aspen (*Populus tremuloides*) are in some areas on the drier outwash terraces. This site is associated with Vitrixerands, low elevation, which consist of moderately deep and deep, well drained soils that formed in tephra over glacial outwash from volcanic rocks. The surface layer is gravelly ashy loamy coarse sand, and the subsurface layers are sandy and sandy loam. There is more than 35 percent rock fragments in most of the profile; there is gravel in the upper horizons and stones and cobbles in the lower horizons. A duripan occurs at a depth of 20 to 60 inches (51 to 152 centimeters). This site is topographically higher in the valley bottom than the Sierra lodgepole pine/aspen forest ecological site (F022BI105CA) and does not have a water table. White fir eventually replaces Sierra lodgepole pine and aspen if the site is not disturbed. The understory of this site is less productive than that of the lower site and has more upland species. The understory includes western needlegrass (*Achnatherum occidentale*), squirreltail (*Elymus elymoides*), rabbitbush (*Ericameria bloomeri*), California stickseed (*Hackelia californica*), lupine (*Lupinus* spp.), and goosefoot violet (*Viola purpurea*). This site occurs at elevations between 6,100 and 6,400 feet (1,859 and 1,951 meters). Slopes range from 0 to 15 percent. The mean annual precipitation ranges from 43 to 61 inches (1,092 to 1,549 millimeters), and the mean annual temperature is between 41 and 44 degrees F (5 and 6.6 degrees C).

F022BI124CA—*Tsuga mertensiana*-*Pinus albicaulis*/*Holodiscus discolor*/*Lupinus obtusilobus*-*Polygonum davisiae*

This ecological site occurs on convex backslopes on high mountains and ridges. It is at elevations between 6,800 and about 9,000 feet (2,073 and 2,743 meters). Mountain hemlock (*Tsuga mertensiana*) and whitebark pine (*Pinus albicaulis*) provide about 25 percent canopy cover (fig. 47). In some areas they are growing as single stem upright trees to as tall as about 45 feet, and in other areas they are multistemmed and shrub-like. Readingpeak soils are associated with this site. They are deep, are well drained, and formed in tephra over colluvium and residuum. The surface layer is very gravelly ashy sandy loam, and the subsurface layers are sandy. There are more than 35 percent rock fragments in most of the soil profile; gravel occurs in the upper horizons and cobbles and stones are prominent in the lower horizons. The soils have a very low or low available water capacity in the upper 60 inches. Bedrock occurs at a depth of 40 to 60 inches (102 to 152 centimeters). In some areas there is 30 percent cover of bluntlobe lupine (*Lupinus obtusilobus*) but it is almost absent in other areas. Bare soil and gravel cover most of the surface, and vegetative ground cover (other than lupine) is between 1 and 3 percent. Other associated species include western needlegrass (*Achnatherum occidentale*), pinemat manzanita (*Arctostaphylos nevadensis*), pioneer rockcress (*Arabis platysperma*), squirreltail (*Elymus elymoides*), marumleaf buckwheat (*Eriogonum marifolium*), oceanspray (*Holodiscus discolor*), and Davis' knotweed (*Polygonum davisiae*). Slopes range from 5 to 95 percent. The mean annual precipitation ranges from 71 to 125 inches (1,803 to 3,175 millimeters), and the mean annual temperature is between 38 and 41 degrees F (3.3 and 5 degrees C).



Figure 46.—This photo represents ecological site F022B1123CA—*Abies concolor*-*Pinus contorta* var. *murrayana*/*Achnatherum occidentale*. This is a forest of Sierra lodgepole pine (*Pinus contorta* var. *murrayana*) which is gradually being replaced by white fir (*Abies concolor*).

F022B1125CA—*Pinus contorta* var. *murrayana*/*Elymus elymoides*

This ecological site encompasses a forest of Sierra lodgepole pine (*Pinus contorta* var. *murrayana*) that occurs on glacial outwash plains and on lake terraces (fig. 48). This site is associated with Badgerwash soils and Humic Haploxerands, moist lake terrace. These soils are moderately deep or deep, are moderately well drained or well



Figure 47.—This photo represents ecological site F022B1124CA—*Tsuga mertensiana*-*Pinus albicaulis*/*Holodiscus discolor*/*Lupinus obtusilobus*-*Polygonum davisiae*. This is a tree-line forest of mountain hemlock (*Tsuga mertensiana*) and whitebark pine (*Pinus albicaulis*). The cover of bluntlobe lupine (*Lupinus obtusilobus*) can be extensive and occurs with pioneer rockcress (*Arabis platysperma*), oceanspray (*Holodiscus discolor*), and Davis' knotweed (*Polygonum davisiae*).

drained, and formed in mixed tephra and outwash over outwash or in tephra over glaciolacustrine deposits from volcanic rocks. A duripan occurs at a depth of 20 to 60 inches (51 to 152 centimeters). The surface layer is very bouldery medial loamy coarse sand or ashy sand, and the subsurface layers are sandy. There is more than 35 percent rock fragments throughout the soil profile, including gravel, cobbles, and stones. These soils have a very low available water capacity in the upper 60 inches. Sierra lodgepole pine may dominate because cold air pools in the basins or is funneled down drainages. There is about 20 percent cover in the understory, which includes western needlegrass (*Achnatherum occidentale*), squirreltail (*Elymus elymoides*), carex (*Carex* sp.), narrowleaf lupine (*Lupinus angustifolius*), and granite prickly phlox (*Linanthus pungens*). This site is at elevations between 5,800 and 6,600 feet (1,768 and 2,012 meters). Slopes range from 0 to 15 percent. The mean annual precipitation ranges from 23 to 49 inches (594 to 1,245 millimeters), and the mean annual temperature is between 42 and 44 degrees F (5.5 and 6.6 degrees C).

F022B1126CA—*Pinus jeffreyi*-*Pinus contorta* var. *murrayana*/*Monardella odoratissima*

This ecological site occurs on ground moraines and is associated with Badgerflat soils. Large emergent Jeffrey pine (*Pinus jeffreyi*) and Ponderosa pine (*Pinus ponderosa*) occur above a younger canopy of Sierra lodgepole pine (*Pinus contorta* var. *murrayana*) (fig. 49). Badgerflat soils are moderately deep, are well drained, and



Figure 48.—This photo represents ecological site F022B1125CA—*Pinus contorta* var. *murrayana*/*Elymus elymoides*. This is a forest of Sierra lodgepole pine (*Pinus contorta* var. *murrayana*) that has western needlegrass (*Achnatherum occidentale*), squirreltail (*Elymus elymoides*), carex (*Carex* sp.), narrowleaf lupine (*Lupinus angustifolius*), and granite prickly phlox (*Linanthus pungens*) in the understory.

formed in tephra over till from volcanic rocks. The surface layer is very gravelly ashy sandy loam, and the subsurface layers are sandy. There are more than 35 percent rock fragments. This site has had several fires since the 1970's. In the wake of fire Sierra lodgepole pine has become dominant but it will eventually be replaced by the longer lived and taller growing Jeffrey pine and ponderosa pine. The understory cover is moderate in extent and includes western needlegrass (*Achnatherum occidentale*), smooth brome (*Bromus inermis*), carex (*Carex* sp.), Ross' sedge (*Carex rossii*), squirreltail (*Elymus elymoides*), rubber rabbitbrush (*Ericameria nauseosa* ssp. *nauseosa* var. *speciosa*), sulphur-flower buckwheat (*Eriogonum umbellatum*), Lamarck's bedstraw (*Galium divaricatum*), California stickseed (*Hackelia californica*), narrowleaf lupine (*Lupinus angustifolius*), mountain monardella (*Monardella odoratissima*), silverleaf phacelia (*Phacelia hastata*), wax currant (*Ribes cereum*), lettuce wirelettuce (*Stephanomeria lactucina*), goosefoot violet (*Viola purpurea*), and woolly mule-ears (*Wyethia mollis*). This site occurs at elevations between 6,100 and 6,900 feet (1,859 and 2,103 meters). Slopes range from 1 to 30 percent. The mean annual precipitation ranges from 39 to 57 inches (991 to 1,448 millimeters), and the mean annual temperature is between 41 and 44 degrees F (5 and 6.6 degrees C).

Rangeland Ecological Sites

Rangeland, sometimes referred to as wildland, has a native vegetation of grasses, grass-like plants, forbs, shrubs, and trees. It has a total tree canopy cover of less than



Figure 49.—This photo represents ecological site F022B1126CA—*Pinus jeffreyi*-*Pinus contorta* var. *murrayana*/*Monardella odoratissima*. Jeffrey pine (*Pinus jeffreyi*) and ponderosa pine (*Pinus ponderosa*) successional replace Sierra lodgepole pine (*Pinus contorta* var. *murrayana*) in this ecological site. Mountain monardella (*Monardella odoratissima*) and woolly mule-ears (*Wyethia mollis*) dominate the diverse understory.

25 percent. Vegetation on rangeland provides many habitat components, may be suitable for grazing or browsing by wildlife and domestic animals, aids in controlling soil erosion, and offers scenic and recreational opportunities. Rangeland is environmentally and economically important.



Figure 50.—This photo represents ecological site R022BI200CA—Talus slope. Jeffrey pine (*Pinus jeffreyi*) occurs on the rocky slopes along with oceanspray (*Holodiscus discolor*) and bush chinquapin (*Chrysolepis sempervirens*).

R022BI200CA—Talus slope

This ecological site occurs on colluvium on glacially scoured backslopes. Jeffrey pine (*Pinus jeffreyi*) occurs with a less than 8 percent cover, and it is very slow growing (fig. 50). Open shrub cover is dominated by oceanspray (*Holodiscus discolor*) and bush chinquapin (*Chrysolepis sempervirens*). This site is associated with Talved soils. These soils are very deep, are excessively drained, and formed in colluvium from volcanic rocks. The surface layer is extremely cobbly ashy loamy coarse sand, and the subsurface layers are coarse and intermixed with 60 to 80 percent stones and cobbles. Total canopy cover ranges from 10 to 20 percent. Common species include



Figure 51.—This photo represents ecological site R022BI201CA—Bedded tephra deposits. The Painted Dunes are mostly barren of vegetation but there is 1 to 5 percent canopy cover of forbs, low-lying subshrubs, and a few scattered trees.

western snakeroot (*Ageratina occidentalis*), prickly hawkweed (*Hieracium horridum*), and scabland penstemon (*Penstemon deustus*). This site is at elevations between 5,800 and 7,600 feet (1,768 and 2,316 meters). Slopes range from 3 to 65 percent. The mean annual precipitation ranges from 23 to 45 inches (584 to 1,143 millimeters), and the mean annual temperature ranges from 42 to 44 degrees F (5.5 to 7 degrees C).

R022BI201CA—Bedded tephra deposits

This ecological site is associated with the Painted Dunes, which developed from lava flows and ash deposits from the eruption of Cinder Cone around 1650 (Clyne and Muffler, 2005). The Painted Dunes are mostly barren of vegetation but there is about 1 to 5 percent canopy cover of forbs, low-lying subshrubs, and a few scattered trees (fig. 51). This site is going through a slow process of soil and forest development. Low-lying forbs, primarily buckwheat, are able to grow on the open soils. Small trees struggle for survival but, once established, provide the shade and organic matter needed in establishing more seedlings. Jeffrey pine cones roll down the slopes from Prospect Peak or are moved by animals to this area. As the seeds find suitable growing environments, the forest gradually moves further into the open dunes. It may take centuries, but the forest can establish across the dunes. The soils associated with the Painted Dunes are Typic Xerorthents, welded and Typic Xerorthents, tephra. Typic Xerorthents, welded are very shallow and shallow, are excessively drained, and have a welded root restriction at a depth of 10 to 20 inches (25 to 51 centimeters).



Figure 52.—This photo represents ecological site R022BI202CA—Frigid alluvial flats. This is a meadow complex in which sedges are dominant in the wetter areas. This site occurs primarily in Drakesbad Meadow.

Typic Xerorthents, tephra are very deep and excessively drained. Both soils formed in tephra or scoria from Cinder Cone. The surface layers are gravelly coarse sand or ashy loamy sand, and the subsurface layers are very gravelly coarse sand or ashy sand. Typic Xerorthents, welded are basically barren of vegetation, most likely because of the shallowness of the soils and a tendency for the surface to have a platy crust. Common species associated with Typic Xerorthents, tephra include sulphur-flower buckwheat (*Eriogonum polyanthum*), marumleaf buckwheat (*Eriogonum marifolium*), Douglas' dustymaiden (*Chaenactis douglasii*), western needlegrass (*Achnatherum occidentale*), and silverleaf phacelia (*Phacelia hastata*). Jeffrey pine (*Pinus jeffreyi*), western white pine (*Pinus monticola*), and Sierra lodgepole pine (*Pinus contorta* var. *murrayana*) grow in some areas. This site occurs at elevations between 6,100 and 6,600 feet (1,859 and 2,012 meters). Slopes range from 2 to 50 percent but are generally between 2 and 30 percent. The mean annual precipitation ranges from 31 to 35 inches (787 to 889 millimeters), and the mean annual temperature ranges from 43 to 44 degrees F (6.1 to 6.6 degrees C).

R022BI202CA—Frigid alluvial flats

This ecological site, occurring in Drakesbad Meadow, is associated with several plant communities and soil types (fig. 52). The meadow receives a substantial portion of its water from springs that emerge on the hillslopes just upslope (see ecological site R022BI211CA). The springs provide year-round flow, maintaining high water tables in some areas of the meadow throughout the year. The flow from the springs is crucial in maintaining the associated plant communities growing in this meadow. Change in the water input or water course would affect all the plant communities within this meadow;

the meadow is treated as one complex unit because of its common water source. The soils associated with this site are Terric Haplohemists, Histic Humaquepts, Aquandic Humaquepts, and Aquandic Endoaquepts. All of these soils are very deep, are somewhat poorly drained to very poorly drained, and formed in alluvium. The wettest part of this meadow fits the criteria for a fen because it has at least 40 centimeters of organic soil within the upper 80 centimeters of soil, supports hydrophytic vegetation, and is saturated to the surface for at least 1 month a year. The establishment of drainage ditches and the removal of Lemmon's willow (*Salix lemmonii*) and other shrubs have altered the vegetation and threatened the characteristics of the fen. Terric Haplohemists occur in the fen and have 20 inches of organic muck over 10 inches of a horizon of mucky ashy silty clay loam. The lower horizons are ashy silty loam and ashy silty clay loam. Depth to the water table fluctuates from 0 to 35 inches in the dry season. The vegetation is dominated by water sedge (*Carex aquatilis*), analogue sedge (*Carex simulata*), Northwest Territory sedge (*Carex utriculata*), and Nebraska sedge (*Carex nebrascensis*) along with other hydrophytic vegetation. A community of Nebraska sedge (*Carex nebrascensis*) occurs in the slightly drier locations surrounding the fen and is associated with Histic Humaquepts. These soils have 9 inches of organic muck over 19 inches of A and B horizons of ashy loam. The C horizons are cobbly ashy sandy clay loam and very cobbly ashy coarse sandy loam. The water table is at the surface in early summer and fluctuates from a depth of 10 to 60 inches during the dry season. A mixed sedge and grassland community occurs at the upper end of the meadow and is associated with Aquandic Humaquepts. These soils have 4 inches of mucky peat over a horizon of ashy very fine sandy loam. The subsurface layers are gravelly ashy sandy loam. The water table is near the surface in early summer and fluctuates from a depth of 10 to 60 inches in the dry season. Common plants include widefruit sedge (*Carex angustata*), tufted hairgrass (*Deschampsia cespitosa* ssp. *cespitosa*), Kentucky bluegrass (*Poa pratensis*), and timothy (*Phleum pratense*). The driest part of the meadow is associated with Aquandic Endoaquepts. These soils do not have an organic horizon and have a surface layer of gravelly ashy fine sandy loam. The subsurface layers include ashy fine sandy loam, ashy loamy fine sand, and ashy loam coarse sand. The soils have a high percentage of surface gravel and bare ground and about 70 percent cover from sedges (*Carex* spp.) and mountain rush (*Juncus arcticus* ssp. *littoralis*). This site is at elevations between 5,400 and 5,800 feet (1,646 and 1,768 meters). Slopes range from 1 to 5 percent. The mean annual precipitation ranges from 51 to 59 inches (1,295 to 1,499 millimeters), and the mean annual temperature ranges from 42 to 43 degrees F (5.5 to 6.1 degrees C).

R022BI203CA—Moderately deep fragmental slopes

This ecological site occurs on mountain slopes in hydrothermally altered areas within Brokeoff Volcano (fig. 53). This site is dominated by woolly mule-ears (*Wyethia mollis*), bluntlobe lupine (*Lupinus obtusilobus*), mountain monardella (*Monardella odoratissima*), arrowleaf balsamorhiza (*Balsamorhiza sagittata*), squirreltail (*Elymus elymoides*), and California stickseed (*Hackelia californica*). California red fir (*Abies magnifica*) and western white pine (*Pinus monticola*) grow in some areas. Other common species include western needlegrass (*Achnatherum occidentale*), dusky onion (*Allium campanulatum*), California brome (*Bromus carinatus*), blue wildrye (*Elymus glaucus*), naked buckwheat (*Eriogonum nudum*), Brewer's aster (*Eucephalus breweri*), sweetcicely (*Osmorhiza berteroi*), silverleaf phacelia (*Phacelia hastata*), and hairy brackenfern (*Pteridium aquilinum* var. *pubescens*). Brokeoff soils are associated with this site. They are moderately deep, are well drained, and formed in tephra and colluvium over residuum from hydrothermally altered rock. The surface layer is gravelly ashy loam, and the subsurface layers are loam and clay loam. These soils are fragmental and have a high percentage of gravel and cobbles. Bedrock occurs at a



Figure 53.—This photo represents ecological site R022BI203CA—Moderately deep fragmental slopes. This site occurs in hydrothermically altered areas within Brokeoff Volcano and is dominated by woolly mule-ears (*Wyethia mollis*).

depth of 20 to 40 inches (51 to 102 centimeters). This site is at elevations between 5,600 and 8,500 feet (1,707 and 2,591 meters). Slopes range from 10 to 80 percent. The mean annual precipitation ranges from 63 to 119 inches (2,515 to 2,870 millimeters), and the mean annual temperature ranges from 38 to 42 degrees F (3.3 to 5.5 degrees C).

R022BI204CA—Glaciated mountain slopes

This ecological site occurs on mountain slopes, glaciated lava flows, and scoured glacial-valley walls and floors. Pinemat manzanita (*Arctostaphylos nevadensis*) dominates these slopes, making up less than 25 percent tree cover (fig. 54). California red fir (*Abies magnifica*), western white pine (*Pinus monticola*), mountain hemlock (*Tsuga mertensiana*), and Sierra lodgepole pine (*Pinus contorta* var. *murrayana*) all grow on this site. This site is associated with Terracelake and Acroph soils. Terracelake soils are well drained, are moderately deep, and have bedrock at a depth of 20 to 40 inches. Acroph soils are well drained, are shallow, and have bedrock at a depth of 10 to 20 inches. These soils have tephra or ash deposits over or mixed in with the colluvium or residuum. The surface layers are ashy highly organic sand and gravelly ashy sandy loam, and the subsurface layers are loamy sand and sandy loam. These soils have a high percentage of rock fragments, primarily gravel. Cobbles and stones occur in the lower horizons. This site is generally at elevations between 6,000 and 8,000 feet (1,829 to 2,438 meters) but is mapped above and below these elevations in some areas. Slopes range from 5 to 80 percent. The mean annual precipitation ranges from 55 to 117 inches (1,397 to 2,972 millimeters), and the mean annual temperature ranges from 38 to 43 degrees F (3.3 to 6.1 degrees C).



Figure 54.—This photo represents ecological site R022BI204CA—Glaciated mountain slopes. Pinemat manzanita (*Arctostaphylos nevadensis*) dominates this bedrock-influenced site. There is less than 25 percent tree cover.

R022BI205CA—Cirque floor

This ecological site occurs at the upper elevations on moraines on cirque floors. It has a moderate cover of bluntlobe lupine (*Lupinus obtusilobus*), sulphur-flower buckwheat (*Eriogonum umbellatum*), Ross' sedge (*Carex rossii*), Mt. Hood pussypaws (*Cistanthe umbellata* var. *umbellata*), marumleaf buckwheat (*Eriogonum marifolium*), Parry's rush (*Juncus parryi*), and Davis' knotweed (*Polygonum davisiae*) (fig. 55). California red fir (*Abies magnifica*), western white pine (*Pinus monticola*), mountain hemlock (*Tsuga mertensiana*), and Sierra lodgepole pine (*Pinus contorta* var. *murrayana*) provide 5 to 10 percent cover. This site is associated with Xeric Vitricryands, cirque floor. These soils are well drained, are moderately deep, and formed in glacial till from dacite. Dense till occurs at a depth of 20 to 40 inches (51 to 102 centimeters). The surface layer is gravelly ashy sandy loam, and the subsurface layers are similar. The available water capacity is low. This site is at elevations between 6,975 and 9,160 feet (2,126 and 2,792 meters). Slopes range from 1 to 35 percent. The mean annual precipitation ranges from 81 to 125 inches (2,057 to 3,175 millimeters), and the mean annual temperature ranges from 38 to 40 degrees F (3 to 4 degrees C).

R022BI206CA—Cryic lacustrine flat

This ecological site is associated with sedge-dominated meadows occurring at the higher elevations (fig. 56). These meadows have developed in relict glacial lakes and have small Rosgen E type stream channels (Rosgen, 1996). The small meandering streams are deeper than they are wide and are stable due to the thick and matted



Figure 55.—This photo represents ecological site R022BI205CA—Cirque floor. Bluntnose lupine (*Lupinus obtusilobus*) and Davis' knotweed (*Polygonum davisiae*) dominate. California red fir (*Abies magnifica*) and mountain hemlock (*Tsuga mertensiana*) are in the photo's background.

structure of the sedge roots. In the wettest area Northwest Territory sedge (*Carex utriculata*) grows. Nebraska sedge (*Carex nebrascensis*) and analogue sedge (*Carex simulata*) are in the slightly less saturated areas. On the perimeter of the sedges there is a community of tundra aster (*Oreostemma alpigenum* var. *andersonii*) and rush (*Juncus* spp.). A mixed grass and sedge community dominated by tufted hairgrass (*Deschampsia cespitosa* ssp. *cespitosa*) is in the drier areas. Sierra lodgepole pine (*Pinus contorta* var. *murrayana*) often borders these meadows. This site is associated with Vitrandic Cryofluvents and Aquandic Cryaquents. These soils are very deep, are poorly drained and very poorly drained, and formed in glaciolacustrine deposits from volcanic rocks. Vitrandic Cryofluvents have a 3-inch-thick organic peat horizon and an A horizon of gravelly ashy sandy loam. Aquandic Cryaquents do not have an O horizon and have a surface layer of silty clay loam. These soils have several buried horizons; layers of coarse material occur under finer deposits. Vitrandic Cryofluvents have a buried O horizon at a depth of 11 to 13 inches that is mucky clay loam. Clay ranges from 12 to 45 percent in the multiple A horizons and from 1 to 33 percent in the multiple C horizons. Vitrandic Cryofluvents are slightly drier than Aquandic Cryaquents. Both of these soils are saturated to the surface until July or August, when the water table may drop to below a depth of 60 inches in some areas. When the soils were sampled in October of 2006, artesian water tables were encountered at a depth of 55 inches in Vitrandic Cryofluvents and at a depth of 28 inches in Aquandic Cryaquents. The artesian water table was in the coarse textured C horizons, which were capped with a fine textured A horizon. These soils remain moist most of the year. Gleyed soil occurs at the surface in Aquandic Cryaquents and at a depth of 16 inches in Vitrandic Cryofluvents. This site is at elevations between 6,280 and 7,510 feet (1,914 and 2,289 meters). Slopes range from 0 to 8 percent. The mean annual precipitation ranges from



Figure 56.—This photo represents ecological site R022BI206CA—Cryic lacustrine flat. This is an upper elevation meadow complex associated with small meandering stream channels. This photo shows Upper Kings Meadow.

57 to 111 inches (1,448 to 2,819 millimeters), and the mean annual air temperature ranges from 38 to 41 degrees F (3.3 to 5 degrees C).

R022BI207CA—Alpine slopes

This ecological site is confined to the upper elevations and occurs on exposed ridges, mountain peaks, mountain slopes, and cirque walls at tree line and above. The site has a significant amount of bare soil and rock fragments on the surface. There is less than 25 percent cover of scattered mountain hemlock (*Tsuga mertensiana*) and very little ground cover (fig. 57). The vegetation varies; Parry's rush (*Juncus parryi*), wood rush (*Luzula* sp.), and Cascade rockbrake (*Cryptogramma cascadiensis*) are common in one area and a cover of bluntlobe lupine (*Lupinus obtusilobus*) is more extensive in another. This site is associated with Terracelake soils, Readingpeak soils, Emeraldlake soils, and Vitrandic Cryorthents, debris flows. These soils formed from ash or tephra over colluvium and residuum or in debris flow deposits. They are moderately deep to very deep, are well drained, and have more than 35 percent rock fragments. The surface layers are gravelly ashy sandy loam, extremely gravelly ashy fine sandy loam, and very gravelly ashy loamy coarse sand, and the subsurface layers are coarse to medium. The percentage and size of rock fragments generally increases as depth increases. Bedrock occurs at a depth of 20 to 60 inches (51 to 152 centimeters) in the moderately deep and deep soils. All of these soils have a very low or low available water capacity. This site is generally at elevations between 7,000 and 10,000 feet (2,134 to 3,048 meters) but is mapped higher and lower in some areas. Slopes range from 20 to 95 percent. The mean annual precipitation ranges from 73 to



Figure 57.—This photo represents ecological site R022BI207CA—Alpine slopes. This rangeland site occurs at and above tree line and consists of scattered mountain hemlock (*Tsuga mertensiana*) and bluntnose lupine (*Lupinus obtusilobus*).

125 inches (1,854 to 3,175 millimeters), and the mean annual temperature ranges from 38 to 41 degrees F (3.3 to 5 degrees C).

R022BI208CA—Cryic pyroclastic cones

This ecological site occurs on shoulders of pyroclastic cones. The site is associated with Xeric Vitricryands, bedrock. These soils are well drained, are shallow to moderately deep, and have a very low available water capacity. They formed in ash and residuum from volcanic rocks. The A horizons are stony ashy loamy sand, and the subsurface layers are stony sandy loam. Indurated bedrock occurs at a depth of 10 to 40 inches (25 to 102 centimeters). This site is dominated by a mix of low-lying shrubs and forbs. The dominant shrubs are oceanspray (*Holodiscus discolor*), prostrate ceanothus (*Ceanothus prostratus*), and rubber rabbitbrush (*Ericameria nauseosa* ssp. *nauseosa* var. *speciosa*) (fig. 58). They grow with a mix of western needlegrass (*Achnatherum occidentale*), California brome (*Bromus carinatus*), squirreltail (*Elymus elymoides*), Lemmon's rockcress (*Arabis lemmonii*), wavyleaf Indian paintbrush (*Castilleja applegatei* ssp. *pinetorum*), naked buckwheat (*Eriogonum nudum*), sulphur-flower buckwheat (*Eriogonum polyanthum*), sulphur-flower buckwheat (*Eriogonum umbellatum* var. *nevadense*), granite prickly phlox (*Linanthus pungens*), and turpentine wavewing (*Pteryxia terebinthina* var. *terebinthina*). There is less than 10 percent cover of the larger montane shrubs such as greenleaf manzanita (*Arctostaphylos patula*), snowbrush ceanothus (*Ceanothus velutinus*), bush chinquapin (*Chrysolepis sempervirens*), and bitter cherry (*Prunus emarginata*). This site is at elevations between 6,900 and 8,300 feet (2,103 and 2,530 meters). Slopes range from 8 to 80 percent. The mean annual precipitation ranges from 37 to 81 inches (940 to 2,057



Figure 58.—This photo represents ecological site R022BI208CA—Cryic pyroclastic cones. This is a diverse upland rangeland site. The dominant plants are oceanspray (*Holodiscus discolor*), prostrate ceanothus (*Ceanothus prostrates*), rubber rabbitbrush (*Ericameria nauseosa* ssp. *nauseosa* var. *speciosa*), sulphur-flower buckwheat (*Eriogonum umbellatum*), and greenleaf manzanita (*Arctostaphylos patula*).

millimeters). The mean annual temperature ranges from 41 to 43 degrees F (5 to 6.1 degrees C).

R022BI209CA—Loamy seeps

This ecological site is associated with seeps, debris flows, and alluvial deposits in the thermal areas. The Endoaquepts associated with this site consist of very deep, poorly drained soils that formed in slope alluvium over colluvium over till from hydrothermally altered rocks. There is a thin layer of litter over an A horizon. The A horizon is gravelly ashy mucky fine sandy loam, and the subsurface layers are fine textured. Clay ranges from 8 to 40 percent. Redoximorphic features occur at a depth of 6 inches. The water table is near the surface in early summer and drops to below a depth of 6 feet in the drier months. The available water capacity is moderate in the upper 60 inches of soil. A variety of hydrophytic plant communities are associated with this site. Species composition varies according to soil stability and proximity to the stream or water table. Common plants include thinleaf alder (*Alnus incana* ssp. *tenuifolia*), sedges (*Carex* ssp.), arrowleaf ragwort (*Senecio triangularis*), California false hellbore (*Veratrum californicum* var. *californicum*), blue wildrye (*Elymus glaucus*), fowl mannagrass (*Glyceria striata*), common cowparsnip (*Heracleum maximum*), smallwing sedge (*Carex microptera*), analogue sedge (*Carex simulata*), Sierra rush (*Juncus nevadensis*), bluejoint reedgrass (*Calamagrostis Canadensis*), and white marsh marigold (*Caltha leptosepala*) (fig. 59). This site is at elevations between 5,700 and 8,400 feet (1,737 and 2,560 meters). Slopes range from 2 to 80 percent but are



Figure 59.—This photo represents ecological site R022BI209CA—Loamy seeps. This site is associated with seeps and springs in thermal areas. Species composition varies according to soil stability and proximity to the stream or water table. Common plants include arrowleaf ragwort (*Senecio triangularis*), thinleaf alder (*Alnus incana* ssp. *tenuifolia*), sedges (*Carex* spp.), California false hellbore (*Veratrum californicum* var. *californicum*), and blue wildrye (*Elymus glaucus*).

typically between 8 and 15 percent. The mean annual precipitation ranges from 63 to 119 inches (1,600 to 3,023 millimeters), and the mean annual temperature ranges from 38 to 42 degrees F (3.3 to 5.5 degrees C).

R022BI210CA—Loamy flood plains

This ecological site is associated with riparian sections of Hot Springs Creek that are classified as Rosgen C type channels (Rosgen, 1996). The site encompasses the entire valley bottom from the stream channel across the flood plains and terraces to the base of the colluvial hillslopes. Along the active channel is a community of thinleaf alder (*Alnus incana* ssp. *tenuifolia*) with a variety of associated species (fig. 60). On the upper terraces is a forest community dominated by Sierra lodgepole pine (*Pinus contorta* var. *murrayana*), white fir (*Abies concolor*), and black cottonwood (*Populus balsamifera* ssp. *trichocarpa*). Blue wildrye (*Elymus glaucus*) is dominant in the understory. The meandering channel creates new gravel bars, cutbanks, and stream channels. During these processes these plant communities shift in composition. Pioneer plant species establish on new gravel bars, and alders establish along new channels. The forest site can be flooded or dried out as a consequence of changes in the stream gradient or position. Common plants are bigleaf sedge (*Carex amplifolia*), fowl mannagrass (*Glyceria striata*), Jones' sedge (*Carex jonesii*), stinging nettle (*Urtica dioica*), western pearly everlasting (*Anaphalis margaritacea*), Lemmon's willow (*Salix lemmonii*), panicled bulrush (*Scirpus microcarpus*), widefruit sedge (*Carex*



Figure 60.—This photo represents ecological site R022BI210CA—Loamy flood plains. This ecological site is a riparian complex associated with sections of Hot Springs Creek. Several plant communities are included within this site. Thinleaf alder (*Alnus incana* ssp. *tenuifolia*), blue wildrye (*Elymus glaucus*), and several sedges (*Carex* spp.) are common.

angustata), carex (*Carex* spp.), California false hellbore (*Veratrum californicum* var. *californicum*), and mountain rush (*Juncus arcticus* ssp. *littoralis*). Aquandic Humaquepts, flood plains are associated with this site. They consist of very deep, poorly drained soils that formed in alluvium from volcanic rocks. The A horizons are stony ashy loam, and the subsurface layers are medium. There is a high percentage of rock fragments. Redoximorphic features, including masses of oxidized iron and gleyed soil colors, are at a depth of 7 inches. The water table is high after spring snowmelt but drops quickly. The soils have a moderate available water capacity in the upper 60 inches. This site occurs at elevations between 5,200 and 6,500 feet (1,585 and 1,981 meters). Slopes range from 0 to 3 percent. The mean annual precipitation ranges from 45 to 87 inches (1,143 to 2,210 millimeters), and the mean annual temperature ranges from 42 to 43 degrees F (5.5 to 6.1 degrees C).

R022BI211CA—Spring complex

This ecological site occurs on mountain slopes and side slopes of glacial-valley walls where springs and seeps emerge at a geologic contact. The springs create multiple small surface channels that remain active throughout the summer. Thinleaf alder (*Alnus incana* ssp. *tenuifolia*) tends to be thick in these areas (fig. 61). The understory of the alder includes blue wildrye (*Elymus glaucus*), fowl mannagrass (*Glyceria striata*), bugle hedgenettle (*Stachys rigida* var. *rigida*), and common cowparsnip (*Heracleum maximum*). There is a high diversity of species within these wet springs, and each spring is unique. Some of the more common species are carex (*Carex* spp.), smooth horsetail (*Equisetum laevigatum*), seep monkeyflower (*Mimulus*



Figure 61.—This photo represents ecological site R022BI211CA—Spring complex. Thinleaf alder (*Alnus incana* ssp. *tenuifolia*), seep monkeyflower (*Mimulus guttatus*), Douglas' thistle (*Cirsium douglasii*), streambank bird's-foot trefoil (*Lotus oblongifolius*), woollyhead parsnip (*Sphenosciadium capitellatum*), and mosses occur at this spring on the slopes above Drakesbad Meadow.

guttatus), Douglas' thistle (*Cirsium douglasii*), streambank bird's-foot trefoil (*Lotus oblongifolius*), woollyhead parsnip (*Sphenosciadium capitellatum*), tufted hairgrass (*Deschampsia cespitosa* ssp. *cespitosa*), Canadian reedgrass (*Calamagrostis canadensis*), and mosses. Aquepts and Typic Petraquepts, bedrock are associated with this site. Aquepts consist of deep and very deep, poorly drained soils that formed in slope alluvium over colluvium from volcanic rocks. These soils have a thin organic layer of leaves and twigs over a surface layer of very bouldery mucky ashy sandy loam. The subsurface layers are bouldery, cobbly, and stony and coarse. Gleyed soil colors occur at the surface. Typic Petraquepts, bedrock are shallow to moderately deep, are poorly drained, and formed in colluvium from volcanic rocks. These soils have 2 to 7 inches of leaf litter over a surface layer of very bouldery ashy loamy sand. The subsurface layers consist of extremely bouldery ashy coarse sandy loam and extremely bouldery ashy loamy coarse sand. Indurated bedrock occurs at a depth of 10 to 40 inches. Gleyed soil colors occur below the O horizons. The water table is at the surface for most of the year and drops to a depth of 50 inches during the drier months. This site is at elevations between 5,200 and 8,200 feet (1,585 and 2,499 meters). Slopes range from 2 to 50 percent. The mean annual precipitation is about 65 inches (1,651 millimeters), and the mean annual temperature ranges from 41 to 42 degrees F (5 to 5.5 degrees C).

R022BI212CA—Windy peak

This ecological site is an alpine scrubland with sagebrush and forbs on the glaciated mountain summit of Loomis Peak. This site is associated with Xeric



Figure 62.—This photo represents ecological site R022BI212CA—Windy peak. This site is on Loomis Peak. Common species on this site are antelope bitterbrush (*Purshia tridentata*), marumleaf buckwheat (*Eriogonum marifolium*), sulphur-flower buckwheat (*Eriogonum umbellatum*), rubber rabbitbrush (*Ericameria nauseosa* ssp. *nauseosa* var. *speciosa*), granite prickly phlox (*Linanthus pungens*), oceanspray (*Holodiscus discolor*), and scattered trees.

Vitricryands, which consist of deep and very deep, well drained soils that formed in till from rhyodacite. The surface layer is stony ashy loamy sand, and the subsurface layers are coarse. There are more than 35 percent rock fragments in most of this soil. A densic contact occurs at a depth of 40 to 80 inches (102 to 203 centimeters). The available water capacity is low. There is 5 to 10 percent cover of stunted trees, including whitebark pine (*Pinus albicaulis*), Jeffrey pine (*Pinus jeffreyi*), and California red fir (*Abies magnifica*). There is fair cover of low-growing subshrubs and forbs across this windy peak. Common plants include marumleaf buckwheat (*Eriogonum marifolium*), sulphur-flower buckwheat (*Eriogonum umbellatum*), rubber rabbitbrush (*Ericameria nauseosa* ssp. *nauseosa* var. *speciosa*), Pacific lupine (*Lupinus lepidus*), granite prickly phlox (*Linanthus pungens*), drawf alpinegold (*Hulsea nana*), antelope bitterbrush (*Purshia tridentata*), and oceanspray (*Holodiscus discolor*) (fig. 62). This site is at elevations between 7,740 and 8,655 feet (2,359 and 2,638 meters). Slopes range from 10 to 45 percent. The mean annual precipitation ranges from 81 to 99 inches (2,057 to 2,515 millimeters), and the mean annual temperature is 40 degrees F (4.4 degrees C).

R022BI213CA—Sandy flood plains

This ecological site is associated with small stream channels and their flood plains. This site is a willow scrub community on sections along Manzanita Creek, Lost Creek, and Hat Creek. It is associated with Typic Endoaquents and Typic Psammaquents.



Figure 63.—This photo represents ecological site R022BI213CA—Sandy flood plains. This riparian site is associated with small streams. Several community types occur along these channels. Lemmon’s willow (*Salix lemmonii*), shining willow (*Salix lucida*), and thinleaf alder (*Alnus incana* ssp. *tenuifolia*) occur along various portions of the channel. There are several understory plant communities.

These soils are poorly drained, are very deep, and formed in alluvium from redeposited debris flows. They are poorly developed and have a thin layer of fresh organic material over coarse textured C horizons. The surface layers are extremely gravelly ashy sand and ashy fine sand. Typic Endoaquents have several C horizons of ashy sand that are very gravelly or extremely gravelly. Typic Psammaquents have a thin buried A horizon at a depth of 4 to 5 inches. They have several stratified C horizons that alternate between ashy coarse sand and ashy sand. The available water capacity is low or very low in the upper 60 inches of soil. The water table fluctuates from a depth of 0 to 40 inches from December to May and drops to a depth of 40 to 60 inches in the drier months. Lemmon’s willow (*Salix lemmonii*), shining willow (*Salix lucida*), and thinleaf alder (*Alnus incana* ssp. *tenuifolia*) occur along the stream channels, and Sierra lodgepole pine (*Pinus contorta* var. *murrayana*) is just above the banks (fig. 63). The understory is dominated by graminoids and various forbs including western needlegrass (*Achnatherum occidentale*), Idaho bentgrass (*Agrostis idahoensis*), California brome (*Bromus carinatus*), carex (*Carex* spp.), slender hairgrass (*Deschampsia elongata*), squirreltail (*Elymus elymoides*), blue wildrye (*Elymus glaucus*), meadow barley (*Hordeum brachyantherum*), mountain rush (*Juncus arcticus* ssp. *littoralis*), meadow fescue (*Schedonorus pratensis*), pearly everlasting (*Anaphalis margaritacea*), and cinquefoil (*Potentilla* sp.). This site is at elevations between 5,800 and 6,400 feet (1,768 and 1,951 meters). Slopes range from 0 to 8 percent. The mean annual precipitation ranges from 45 to 75 inches (1,143 to 1,905



Figure 64.—This photo represents ecological site R022BI214CA—Pyroclastic flow. This area was buried with pumaceous pyroclastic flow and fall deposits from Chaos Crags. Dwarf alpine forbs grow on this site and include dwarf alpinegold (*Hulsea nana*), Davidson’s penstemon (*Penstemon davidsonii*), Nevada dustymaiden (*Chaenactis nevadensis*), blue dwarf fleabane (*Erigeron elegantulus*), and cushion buckwheat (*Eriogonum ovalifolium*).

millimeters), and the mean annual temperature ranges from 40 to 44 degrees F (4 to 6.5 degrees C).

R022BI214CA—Pyroclastic flow

This ecological site is associated with hanging valleys that are buried with pumaceous pyroclastic flow and fall deposits from Chaos Crags. Vitrandic Cryorthents are associated with this site. These soils are very deep and excessively drained. The surface layer is extremely gravelly ashy coarse sand and is above gravelly coarse material. These soils have a very low available water capacity. This site is very sparsely vegetated rangeland, having about 10 percent cover from compact forbs and subshrubs and 2 percent cover of western white pine (*Pinus monticola*). Common species include marumleaf buckwheat (*Eriogonum marifolium*), dwarf alpinegold (*Hulsea nana*), Davidson’s penstemon (*Penstemon davidsonii*), Nevada dustymaiden (*Chaenactis nevadensis*), cobwebby Indian paintbrush (*Castilleja arachnoidea*), Mt. Hood pussypaws (*Cistanthe umbellata* var. *umbellata*), squirreltail (*Elymus elymoides*), blue dwarf fleabane (*Erigeron elegantulus*), cushion buckwheat (*Eriogonum ovalifolium*), rockcress (*Arabis* sp.), silverleaf phacelia (*Phacelia hastata*), Pringle’s bluegrass (*Poa pringlei*), Shasta knotweed (*Polygonum shastense*), and Suksdorf’s silene (*Silene suksdorfii*) (fig. 64). This site occurs at elevations between 6,700 and 8,600 feet (2,042 and 2,621 meters). Slopes range from 5 to 60 percent. The mean annual precipitation ranges from 71 to 119 inches (1,803 to 3,023 millimeters), and the mean annual temperature is about 40 degrees F (4.4 degrees C).



Figure 65.—This photo represents ecological site R022BI215CA—Gravelly flood plain. This riparian site is associated with sections of Kings Creek. Several plant communities occur on this site. Common species include thinleaf alder (*Alnus incana* ssp. *tenuifolia*), black cottonwood (*Populus balsamifera* ssp. *trichocarpa*), Lemmon's willow (*Salix lemmonii*), and Sierra lodgepole pine (*Pinus contorta* var. *murrayana*).

R022BI215CA—Gravelly flood plain

This ecological site is riparian and associated with a Rosgen type C channel along Kings Creek (Rosgen, 1996). It is similar to the flood plain ecological site (R022BI210CA) but is associated with a higher volume channel that tends towards a type D channel in some areas. This site encompasses the whole valley bottom from the stream channel across the flood plains and terraces to the base of the colluvial hillslopes. Aeric Endoaquents are associated with this site. They consist of very deep, somewhat poorly drained soils that formed in recent alluvium from volcanic rocks. They have as much as 3 inches of fresh organic material over several C horizons. The surface layer is loamy very fine sand, and the subsurface layers are gravelly or cobbly and sandy. The size of rock fragments tends to increase as depth increases. This site has a very low available water capacity in the upper 60 inches of soil. Several plant communities are associated with this site. Along the active channel is a community of thinleaf alder (*Alnus incana* ssp. *tenuifolia*) with a variety of associated species (fig. 65). On the gravel bars is a forb-dominated community. On the higher flood plains, patches of Sierra lodgepole pine (*Pinus contorta* var. *murrayana*), white fir (*Abies concolor*), and black cottonwood (*Populus balsamifera* ssp. *trichocarpa*) are intermixed. A forest of white fir (*Abies concolor*) is on the stream terraces. The meandering channel creates new gravel bars, cutbanks, and new stream channels. During these processes the plant communities shift in composition. Pioneer plant species establish on the new gravel bars, and alders establish along the new channels. Without disturbance the forest communities encroach upon the flood plain.



Figure 66.—This photo represents ecological site R022BI216CA—Active hydrothermal areas. This site occurs on actively eroding backslopes and debris flows within the hydrothermally altered areas. The active areas are mostly unvegetated but, once stable, can establish a forest of California red fir (*Abies magnifica*), mountain hemlock (*Tsuga mertensiana*), and western white pine (*Pinus monticola*).

Other common plants are western pearly everlasting (*Anaphalis margaritacea*), rubber rabbitbrush (*Ericameria nauseosa* ssp. *nauseosa* var. *speciosa*), Douglas' sagewort (*Artemisia douglasiana*), common yarrow (*Achillea millefolium*), Douglas' thistle (*Cirsium douglasii*), Lemmon's willow (*Salix lemmonii*), and shining willow (*Salix lucida*). This site is at elevations between 5,244 and 5,525 feet (1,598 and 1,684 meters). Slopes range from 2 to 6 percent. The mean annual precipitation ranges from 49 to 53 inches (1,244 to 1,346 millimeters), and the mean annual temperature is 42 degrees F (6 degrees C).

R022BI216CA—Active hydrothermal areas

This ecological site occurs in hydrothermally altered areas on actively eroding backslopes and debris flows. The area is mostly unvegetated but, once stable, has the potential to establish a forest of red fir (fig. 66). This site is associated with Aquic Dystrocherepts, debris flows and Typic Dystrocherepts. Aquic Dystrocherepts, debris flows consist of very deep, somewhat poorly drained soils that formed in wet debris flow material from hydrothermally altered volcanic rocks. These soils have 1 to 2 inches of fresh organic material over a 3-inch-thick A horizon. The A horizon is ashy clay loam, and the subsurface layers are medium to fine textured. The content of clay ranges from 30 to 34 percent. Buried soil, consisting of very gravelly clay loam, occurs at a depth of 24 inches. Redoximorphic features occur at a depth of 9 inches. Typic Dystrocherepts consist of shallow to deep, well drained soils that formed in colluvium

and residuum from hydrothermally altered volcanic rocks. These soils have a 1-inch-thick A horizon of gravelly ashy sandy loam and subsurface layers of gravelly or paragravelly loam and clay loam. Paralithic contact occurs at a depth of 10 to 60 inches (25 to 152 centimeters). In stable areas forests of California red fir (*Abies magnifica*), mountain hemlock (*Tsuga mertensiana*), and western white pine (*Pinus monticola*) are established. The understory cover is sparse, but western needlegrass (*Achnatherum occidentale*), pinemat manzanita (*Arctostaphylos nevadensis*), squirreltail (*Elymus elymoides*), and mountain monardella (*Monardella odoratissima*) generally occur. In concave positions, where there is more soil movement and available water, the dominant species vary greatly. Documented species include California brome (*Bromus carinatus*), carex (*Carex* sp.), blue wildrye (*Elymus glaucus*), rush (*Juncus* sp.), lupine (*Lupinus* sp.), hairy brackenfern (*Pteridium aquilinum* var. *pubescens*), and California false hellebore (*Veratrum californicum* var. *californicum*). On the active slump faces there is very little vegetation. This site is tied together by the slow but continual movement of soil. As the landforms change, the vegetation is altered and readjusts to its new environment, whether it is in a moist basin, recently buried, or on a droughty slump face. This site is at elevations between 5,600 and 8,500 feet (1,707 and 2,591 meters). Slopes range from 10 to 80 percent. The mean annual precipitation ranges from 63 to 119 inches (1,600 to 3,023 millimeters), and the mean annual temperature is between 38 and 42 degrees F (3.3 and 5.5 degrees C).

R022BI217CA—Frigid lacustrine flat

This ecological site occurs on the wet meadows of relict glacial lakes (fig. 67). It is associated with Histic Humaquepts, lake sediments and Histic Humaquepts, frequently flooded. Histic Humaquepts, lake sediments consist of very deep, poorly drained soils that formed in volcanic ash over glaciolacustrine deposits. Histic Humaquepts, frequently flooded consist of very deep, very poorly drained soils that formed in stream channel alluvium over glaciolacustrine deposits. These soils have several organic horizons of herbaceous peat and herbaceous muck that range in total depth from 5 to 14 inches. These soils have stratified layers of fine and coarse sediments. Textures include ashy silt loam, ashy coarse sandy loam, and ashy loamy sand, among others. The available water capacity is moderate in the upper 60 inches of soil. There are gleyed colors below the organic horizons. The water table fluctuates from a depth of 0 to 35 inches during the summer and can drop to below 60 inches in fall. Free water occurs in the coarse textured horizons, creating an artesian aquifer. Northwest Territory sedge (*Carex utriculata*), Nebraska sedge (*Carex nebrascensis*), capitate sedge (*Carex capitata*), and tufted hairgrass (*Deschampsia cespitosa* ssp. *cespitosa*) are dominant on Histic Humaquepts, lake sediments. Other species include willowherb (*Epilobium* sp.), mountain rush (*Juncus arcticus* ssp. *littoralis*), Sierra rush (*Juncus nevadensis*), pullup muhly (*Muhlenbergia filiformis*), western mountain aster (*Symphotrichum spathulatum* var. *spathulatum*), willow (*Salix* sp.), and moss. Plants more common on Histic Humaquepts, frequently flooded are golden sedge (*Carex aurea*), blister sedge (*Carex vesicaria*), small floating mannagrass (*Glyceria borealis*), common rush (*Juncus effusus*), primrose monkeyflower (*Mimulus primuloides*), tundra aster (*Oreostemma alpigenum* var. *andersonii*), and longstalk clover (*Trifolium longipes*). This ecological site encompasses the meadow and its small channel. The plant communities may shift due to changes in channel location, channel gradient, water supply, and/or sediment supply. This site is at elevations between 5,900 and 6,800 feet (1,798 and 2,073 meters). Slope ranges from 0 to 3 percent. The mean annual precipitation ranges from 37 to 65 inches (940 to 1,651 millimeters), and the mean annual temperature ranges from about 41 to 44 degrees F (5.0 to 6.6 degrees C).



Figure 67.—This photo represents ecological site R022BI217CA—Frigid lacustrine flat. This is a wet meadow site which has developed in relict glacial lakes. A diversity of species may occur, but hydrophytic sedges dominate.

R022BI218CA—Thermal seeps

This ecological site occurs on the strath terraces south of Drakesbad Meadow, where hot springs seep out of the ground. Typical Petraquepts are associated with this site. These soils consist of shallow to moderately deep, poorly drained soils that formed in geothermal spring alluvium. The combined organic horizons are 2 to 7 inches thick and are peaty silt loam and mucky silt loam. The subsurface layers are ashy loam, gravelly ashy loam, or very gravelly ashy loam. There is a variety of species associated with this unique site, including whitetip clover (*Trifolium variegatum*), Douglas' thistle (*Cirsium douglasii*), brown sedge (*Carex subfusca*), lakeshore sedge (*Carex lenticularis*), smooth horsetail (*Equisetum laevigatum*), Howell's yampah (*Perideridia howellii*), California false hellebore (*Veratrum californicum* var. *californicum*), chairmaker's bulrush (*Schoenoplectus americanus*), bluejoint (*Calamagrostis Canadensis*), Jessica sticktight (*Hackelia micrantha*), monkeyflower (*Mimulus* sp.), and tule (*Scirpus acutus* var. *occidentalis*) (fig. 68). This site is at elevations between 5,600 and 6,800 feet (1,707 and 2,073 meters). Slopes range from 4 to 30 percent. The mean annual precipitation ranges from 63 to 91 inches (1,600 to 2,311 millimeters), and the mean annual temperature is about 41 degrees F (5 degrees C).

Land Management

In tables 15 through 18, interpretive ratings are given for various aspects of land management. The ratings are both verbal and numerical.

Some rating class terms indicate the degree to which the soils are suited to a

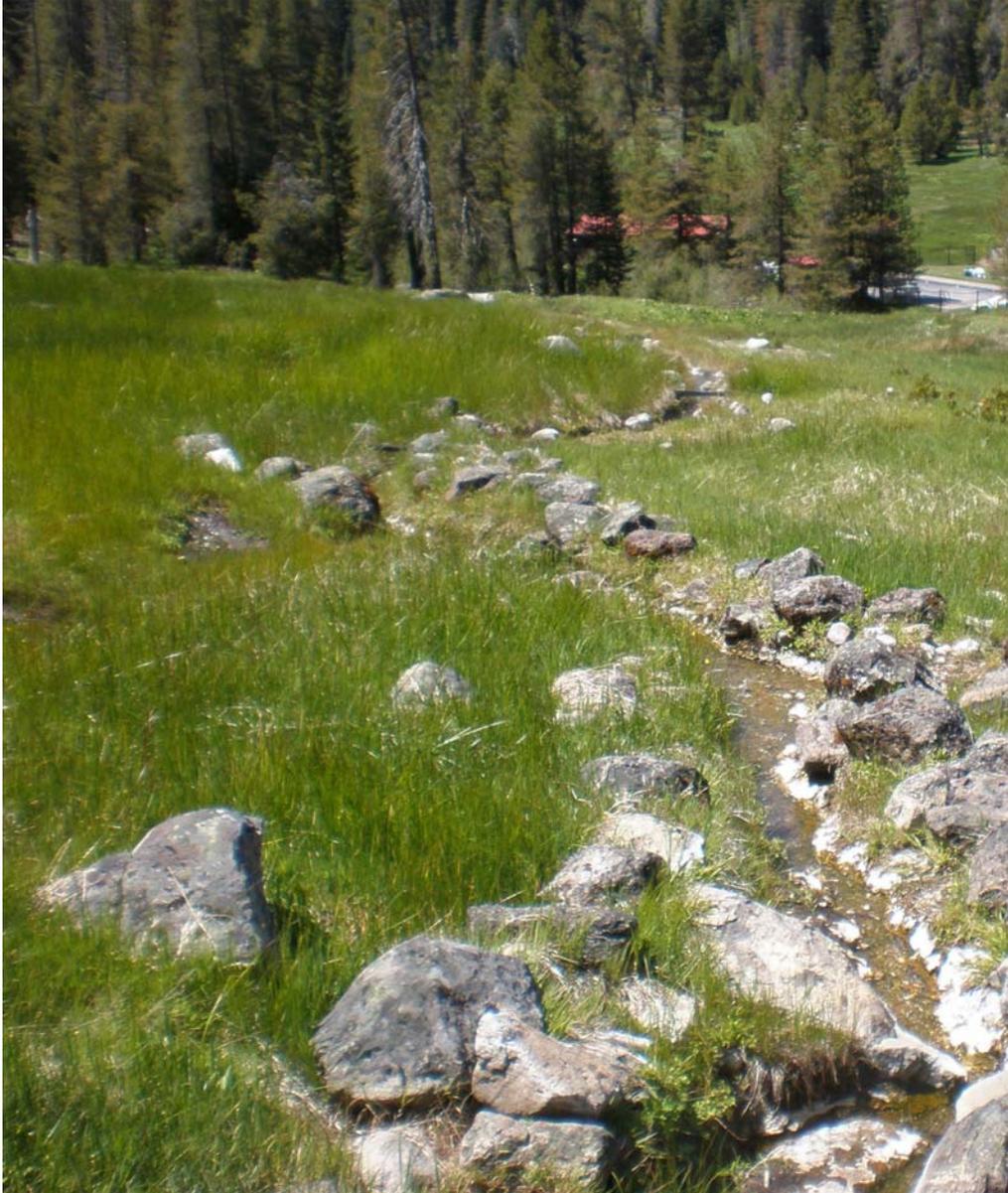


Figure 68.—This photo represents ecological site R022BI218CA—Thermal seeps. This site has developed in alluvium from geothermal springs. The springs often change course or dry up and reemerge in a new area. Several plant communities occur on this site. There is a variety of species associated with this unique site, including whitetip clover (*Trifolium variegatum*), several sedges (*Carex* spp.), smooth horsetail (*Equisetum laevigatum*), Howell's yampah (*Perideridia howellii*), California false hellebore (*Veratrum californicum* var. *californicum*), chairmaker's bulrush (*Schoenoplectus americanus*), monkeyflower (*Mimulus* spp.), and tule (*Scirpus actus* var. *occidentalis*).

specified land management practice. *Well suited* indicates that the soil has features that are favorable for the specified practice and has no limitations. Good performance can be expected, and little or no maintenance is needed. *Moderately suited* indicates that the soil has features that are moderately favorable for the specified practice. One or more soil properties are less than desirable, and fair performance can be expected. Some maintenance is needed. *Poorly suited* indicates that the soil has one or more

properties that are unfavorable for the specified practice. Overcoming the unfavorable properties requires special design, extra maintenance, and costly alteration. *Unsuited* indicates that the expected performance of the soil is unacceptable for the specified practice or that extreme measures are needed to overcome the undesirable soil properties.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the specified land management practice (1.00) and the point at which the soil feature is not a limitation (0.00).

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

The paragraphs that follow indicate the soil properties considered in rating the soils for land management practices. More detailed information about the criteria used in the ratings is available in the "National Forestry Manual," which is available in local offices of the Natural Resources Conservation Service or on the Internet (<http://nssc.nrcs.usda.gov/nfm/>).

In table 15, ratings in the column *hazard of erosion* are based on slope and on soil erodibility factor K. The soil loss is caused by sheet or rill erosion in areas where 50 to 75 percent of the surface has been exposed by disturbance. The hazard is described as slight, moderate, severe, or very severe. A rating of *slight* indicates that erosion is unlikely under ordinary climatic conditions; *moderate* indicates that some erosion is likely and that erosion-control measures may be needed; *severe* indicates that erosion is very likely and that erosion-control measures, including revegetation of bare areas, are advised; and *very severe* indicates that significant erosion is expected, loss of soil productivity and off-site damage are likely, and erosion-control measures are costly and generally impractical.

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

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

In table 16, ratings in the columns *suitability for hand planting* and *suitability for mechanical planting* are based on slope, depth to a restrictive layer, content of sand, plasticity index, rock fragments on or below the surface, depth to a water table, and ponding. The soils are described as well suited, moderately suited, poorly suited, or unsuited to these methods of planting. It is assumed that necessary site preparation is completed before seedlings are planted.

Ratings in the column *suitability for use of harvesting equipment* are based on slope, rock fragments on the surface, plasticity index, content of sand, the Unified classification, depth to a water table, and ponding. The soils are described as well suited, moderately suited, or poorly suited to this use.

In table 17, ratings in the column *suitability for mechanical site preparation (deep)* are based on slope, depth to a restrictive layer, rock fragments on or below the

surface, depth to a water table, and ponding. The soils are described as well suited, poorly suited, or unsuited to this management activity. The part of the soil from the surface to a depth of about 3 feet is considered in the ratings.

Ratings in the column *suitability for mechanical site preparation (surface)* are based on slope, depth to a restrictive layer, plasticity index, rock fragments on or below the surface, depth to a water table, and ponding. The soils are described as well suited, poorly suited, or unsuited to this management activity. The part of the soil from the surface to a depth of about 1 foot is considered in the ratings.

In table 18, ratings in the column *potential for damage to soil by fire* are based on texture of the surface layer, content of rock fragments and organic matter in the surface layer, thickness of the surface layer, and slope. The soils are described as having a low, moderate, or high potential for this kind of damage. The ratings indicate an evaluation of the potential impact of prescribed fires or wildfires that are intense enough to remove the duff layer and consume organic matter in the surface layer.

Ratings in the column *potential for seedling mortality* are based on flooding, ponding, depth to a water table, content of lime, reaction, salinity, available water capacity, soil moisture regime, soil temperature regime, aspect, and slope. The soils are described as having a low, moderate, or high potential for seedling mortality.

Recreation

The soils of the survey area are rated in table 19, parts I and II according to limitations that affect their suitability for recreation. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the recreational uses. *No limitations* indicate that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Limitations* with ratings between 0 and 1 can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Limitations* with a rating value of 1 indicate that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The ratings in the table are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils that are subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

The information in table 19 can be supplemented by other information in this survey, for example, interpretations for building site development, construction materials, sanitary facilities, and water management.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The ratings are based on the soil properties that affect the ease of developing picnic areas and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns

affecting the development of picnic areas. For good trafficability, the surface of picnic areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The ratings are based on the soil properties that affect the ease of developing camp areas and the performance of the areas after development. Slope, stoniness, and depth to bedrock or a cemented pan are the main concerns affecting the development of camp areas. The soil properties that affect the performance of the areas after development are those that influence trafficability and promote the growth of vegetation, especially in heavily used areas. For good trafficability, the surface of camp areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Foot traffic and equestrian trails for hiking and horseback riding should require little or no slope modification through cutting and filling. The ratings are based on the soil properties that affect trafficability and erodibility. These properties are stoniness, depth to a water table, ponding, flooding, slope, and texture of the surface layer.

Mountain bike and off-road vehicle trails require little or no site preparation. They are not covered with surfacing material or vegetation. Considerable compaction of the soil material is likely. The ratings are based on the soil properties that influence erodibility, trafficability, dustiness, and the ease of revegetation. These properties are stoniness, slope, depth to a water table, ponding, flooding, and texture of the surface layer.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the data in the tables described under the heading "Soil Properties."

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil between the surface and a depth of 5 to 7 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey,

determinations were made about particle-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 7 feet of the surface, soil wetness, depth to a water table, ponding, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Soil properties influence the development of building sites, including the selection of the site, the design of the structure, construction, performance after construction, and maintenance. Table 20, parts I and II show the degree and kind of soil limitations that affect dwellings with and without basements, small commercial buildings, local roads and streets, and shallow excavations.

The ratings in the table are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect building site development. *No limitations* indicate that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Limitations* with ratings between 0 and 1 can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Limitations* with a rating value of 1 indicate that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Dwellings are single-family houses of three stories or less. For dwellings without basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. For dwellings with basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7 feet. The ratings for dwellings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility. Compressibility is inferred from the Unified classification. The properties that affect the ease and amount of excavation include depth to a water table, ponding, flooding, slope, depth to

bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Small commercial buildings are structures that are less than three stories high and do not have basements. The foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. The ratings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility (which is inferred from the Unified classification). The properties that affect the ease and amount of excavation include flooding, depth to a water table, ponding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or soil material stabilized by lime or cement; and a surface of flexible material (asphalt), rigid material (concrete), or gravel with a binder. The ratings are based on the soil properties that affect the ease of excavation and grading and the traffic-supporting capacity. The properties that affect the ease of excavation and grading are depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, depth to a water table, ponding, flooding, the amount of large stones, and slope. The properties that affect the traffic-supporting capacity are soil strength (as inferred from the AASHTO group index number), subsidence, linear extensibility (shrink-swell potential), the potential for frost action, depth to a water table, and ponding.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for graves, utility lines, open ditches, or other purposes. The ratings are based on the soil properties that influence the ease of digging and the resistance to sloughing. Depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, the amount of large stones, and dense layers influence the ease of digging, filling, and compacting. Depth to the seasonal high water table, flooding, and ponding may restrict the period when excavations can be made. Slope influences the ease of using machinery. Soil texture, depth to the water table, and linear extensibility (shrink-swell potential) influence the resistance to sloughing.

Sanitary Facilities

Table 21 shows the degree and kind of soil limitations that affect septic tank absorption fields and sewage lagoons. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *No limitations* indicate that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Limitations* with ratings between 0 and 1 can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Limitations* with a rating value of 1 indicate that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of

the soil between depths of 24 and 60 inches is evaluated. The ratings are based on the soil properties that affect absorption of the effluent, construction and maintenance of the system, and public health. Permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, and flooding affect absorption of the effluent. Stones and boulders, ice, and bedrock or a cemented pan interfere with installation. Subsidence interferes with installation and maintenance. Excessive slope may cause lateral seepage and surfacing of the effluent in downslope areas.

Some soils are underlain by loose sand and gravel or fractured bedrock at a depth of less than 4 feet below the distribution lines. In these soils the absorption field may not adequately filter the effluent, particularly when the system is new. As a result, the ground water may become contaminated.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Considered in the ratings are slope, permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, flooding, large stones, and content of organic matter.

Soil permeability is a critical property affecting the suitability for sewage lagoons. Most porous soils eventually become sealed when they are used as sites for sewage lagoons. Until sealing occurs, however, the hazard of pollution is severe. Soils that have a permeability rate of more than 2 inches per hour are too porous for the proper functioning of sewage lagoons. In these soils, seepage of the effluent can result in contamination of the ground water. Ground-water contamination is also a hazard if fractured bedrock is within a depth of 40 inches, if the water table is high enough to raise the level of sewage in the lagoon, or if floodwater overtops the lagoon.

A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor. If the lagoon is to be uniformly deep throughout, the slope must be gentle enough and the soil material must be thick enough over bedrock or a cemented pan to make land smoothing practical.

Construction Materials

Table 22, parts I and II give information about the soils as potential sources of gravel, sand, topsoil, reclamation material, and roadfill. Normal compaction, minor processing, and other standard construction practices are assumed.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 22, only the likelihood of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material. The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the Unified classification of the soil), the thickness of suitable material, and the content of rock fragments. If the bottom layer of the soil contains sand or gravel, the soil is considered a likely source regardless of thickness. The assumption is that the sand or gravel layer below the depth of observation exceeds the minimum thickness.

The soils are rated *good*, *fair*, or *poor* as potential sources of sand and gravel. A rating of *good* or *fair* means that the source material is likely to be in or below the soil. The bottom layer and the thickest layer of the soils are assigned numerical ratings. These ratings indicate the likelihood that the layer is a source of sand or gravel. The numbers 0.00 to 0.07 indicate that the layer is a poor source. The numbers 0.75 to

1.00 indicate that the layer is a good source. The numbers 0.08 to 0.74 indicate the degree to which the layer is a likely source.

The soils are rated *good*, *fair*, or *poor* as potential sources of topsoil, reclamation material, and roadfill. The features that limit the soils as sources of these materials are specified in the table. The numerical ratings given after the specified features indicate the degree to which the features limit the soils as sources of topsoil, reclamation material, or roadfill. The lower the number, the greater the limitation.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area. The ratings are based on the soil properties that affect plant growth; the ease of excavating, loading, and spreading the material; and reclamation of the borrow area. Toxic substances, soil reaction, and the properties that are inferred from soil texture, such as available water capacity and fertility, affect plant growth. The ease of excavating, loading, and spreading is affected by rock fragments, slope, depth to a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, depth to a water table, rock fragments, depth to bedrock or a cemented pan, and toxic material.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Reclamation material is used in areas that have been drastically disturbed by surface mining or similar activities. When these areas are reclaimed, layers of soil material or unconsolidated geological material, or both, are replaced in a vertical sequence. The reconstructed soil favors plant growth. The ratings in the table do not apply to quarries and other mined areas that require an offsite source of reconstruction material. The ratings are based on the soil properties that affect erosion and stability of the surface and the productive potential of the reconstructed soil. These properties include the content of sodium, salts, and calcium carbonate; reaction; available water capacity; erodibility; texture; content of rock fragments; and content of organic matter and other features that affect fertility.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the whole soil, from the surface to a depth of about 5 feet. It is assumed that soil layers will be mixed when the soil material is excavated and spread.

The ratings are based on the amount of suitable material and on soil properties that affect the ease of excavation and the performance of the material after it is in place. The thickness of the suitable material is a major consideration. The ease of excavation is affected by large stones, depth to a water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the AASHTO classification of the soil) and linear extensibility (shrink-swell potential).

Water Management

Table 23 provides information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for embankments, dikes, and levees and for pond reservoir areas. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *No limitations* indicate that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Limitations* with ratings between 0 and 1 can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Limitations* with a rating

value of 1 indicate that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. Embankments that have zoned construction (core and shell) are not considered. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey.

Soil properties are ascertained by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine particle-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties are shown in tables. They include engineering index properties, physical and chemical properties, and pertinent soil and water features.

Table 24 lists pedons that were analyzed by the Soil Survey Laboratory, United States Department of Agriculture, Natural Resources Conservation Service, Lincoln, Nebraska. This table lists the correlated name, pedon type, sampled as name (if there was a name when sampled), user site ID, user pedon ID, lab source, and lab pedon number. The results of physical and chemical analyses of these pedons are available on the Internet (<http://ssldata.nrcs.usda.gov/querypage.asp>).

Engineering Index Properties

Table 25 gives the engineering classifications and the range of index properties for the layers of each soil in the survey area.

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (ASTM, 2001) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2000).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1

through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an oven-dry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and plasticity index (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of particle-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is generally omitted in the table.

Physical Properties

Table 26 shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In table 26, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (oven-dry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $1/3$ - or $1/10$ -bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root

penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Saturated hydraulic conductivity refers to the ability of a soil to transmit water or air. The term “permeability,” as used in soil surveys, indicates saturated hydraulic conductivity (K_{sat}). The estimates in the table indicate the rate of water movement, in micrometers per second (um/sec), when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at $1/3$ - or $1/10$ -bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. Volume change is influenced by the amount and type of clay minerals in the soil.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 26, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained by returning crop residue to the soil. Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

Erosion Properties

Erosion factors are shown in table 27 as the K factor (K_w and K_f) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of several factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and permeability. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Depth to the upper and lower boundaries of each layer is indicated.

Erosion factor K_w indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Erosion factor K_f indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion

by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. A description of the wind erodibility groups is available in the National Soil Survey Handbook (<http://soils.usda.gov/technical/handbook/>).

Wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

Chemical Properties

Table 28 shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Cation-exchange capacity is the total amount of extractable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations reduces the hazard of ground-water pollution.

Effective cation-exchange capacity refers to the sum of extractable cations plus aluminum expressed in terms of milliequivalents per 100 grams of soil. It is determined for soils that have pH of less than 5.5.

Soil reaction is a measure of acidity or alkalinity. The pH of each soil horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Water Features

Table 29 gives estimates of various water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

The *months* in the table indicate the portion of the year in which the feature is most likely to be a concern.

Water table refers to a saturated zone in the soil. Table 29 indicates, by month, depth to the top (*upper limit*) and base (*lower limit*) of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

Ponding is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. Table 29 indicates *surface water depth* and the *duration* and *frequency* of ponding. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, rare, occasional, and frequent. *None* means that ponding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of ponding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of ponding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of ponding is more than 50 percent in any year).

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Duration and *frequency* are estimated. Duration is expressed as *extremely brief* if 0.1 hour to 4 hours, *very brief* if 4 hours to 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. *None* means that flooding is not probable; *very rare* that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); *frequent* that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and *very frequent* that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

Soil Features

Table 30 gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

A *restrictive layer* is a nearly continuous layer that has one or more physical,

chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers. The table indicates the hardness of the restrictive layer, which significantly affects the ease of excavation. *Depth to top* is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

Potential for frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel or concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel or concrete in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (Soil Survey Staff, 1999 and 2006). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 31 shows the classification of the soils in the survey area, and table 32 arranges the taxonomic units by order, suborder, great group, and subgroup. The categories are defined in the following paragraphs.

ORDER. Twelve soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Andisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Xerand (*Xer*, meaning dry, plus *and*, from Andisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haploxerands (*Haplo*, meaning minimal horizonation, plus *xerand*, the suborder of the Andisols that has a xeric moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Haploxerands.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineralogy class, cation-exchange activity class, soil temperature regime, soil depth, and reaction class. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is medial-skeletal, amorphic, frigid Typic Haploxerands.

SERIES. The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile.

Soil Series and Their Morphology

In this section, each soil component recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified for each component. A pedon, a small three-dimensional area of soil, that is typical of the component in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" (Soil Survey Division Staff, 1993). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (Soil Survey Staff, 1999) and in "Keys to Soil Taxonomy" (Soil Survey Staff, 2006). Unless otherwise indicated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

Acroph Series

The Acroph series consists of shallow, well drained soils that formed in tephra over residuum from andesite, dacite, and rhyodacite. Acroph soils are on scoured glacial-valley walls and floors and roche moutonnées in the Southern Cascade Mountains. Slopes range from 5 to 80 percent. The mean annual precipitation is about 107 inches (2,718 millimeters), and the mean annual air temperature is about 40 degrees F (5 degrees C).

Taxonomic Classification

Ashy-skeletal, glassy Lithic Vitricryands

Typical Pedon

Acroph ashy highly organic sand (fig. 69) on a south-facing (180 degrees) slope of 18 percent under a cover of pinemat manzanita, California red fir, western white pine, and mountain hemlock at an elevation of 7,958 feet (2,426 meters). When described on 7/24/2007, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

- Oi—0 to 1 inch (0 to 3 centimeters); slightly decomposed twigs, cones, needles, and leaf litter; abrupt smooth boundary.
- A1—1 to 2 inches (3 to 6 centimeters); dark grayish brown (10YR 4/2) ashy highly organic sand, very dark gray (10YR 3/1) moist; 1 percent clay; moderate thick and very thick platy structure parting to weak very fine and fine granular; soft, very friable, nonsticky, nonplastic; common very fine and fine and few medium to very coarse roots; common fine tubular and many very fine and fine interstitial and irregular pores; 2 percent subangular fine gravel; strongly acid, pH 5.6 by Hellige-Truog; NaF pH 9.0; abrupt smooth boundary.
- A2—2 to 5 inches (6 to 12 centimeters); grayish brown (10YR 5/2) ashy highly organic loamy sand, very dark grayish brown (10YR 3/2) moist; 3 percent clay; moderate thick and very thick platy structure parting to weak very fine and fine granular; soft, very friable, nonsticky, nonplastic; many very fine to very coarse roots; many very fine irregular and interstitial pores; 1 percent subangular medium and coarse gravel and 3 percent subangular fine gravel; strongly acid, pH 5.6 by Hellige-Truog; NaF pH 9.2; abrupt wavy boundary.
- 2Bw1—5 to 11 inches (12 to 29 centimeters); light yellowish brown (2.5Y 6/3) very cobbly ashy loamy sand, brown (10YR 4/3) moist; 2 percent clay; weak thick and very thick platy structure parting to weak very fine and fine subangular blocky; soft, very friable, nonsticky, nonplastic; common very fine and many fine to very coarse roots; many very fine and fine irregular and common fine vesicular pores; 7 percent subangular fine gravel, 11 percent subangular medium and coarse gravel,



Figure 69.—Typical profile of Acroph soil. Depth is marked in centimeters.

15 percent subangular cobbles, and 5 percent subangular stones; moderately acid, pH 5.9 by Hellige-Truog; NaF pH 11.5; abrupt wavy boundary.

2Bw2—11 to 15 inches (29 to 37 centimeters); pale yellow (2.5Y 7/4) extremely cobbly ashy loamy sand, brown (10YR 4/3) moist; 3 percent clay; weak very fine subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; common fine and medium and few very fine roots; many very fine and fine irregular and interstitial and few fine vesicular pores; 10 percent subangular fine gravel, 20 percent subangular medium and coarse gravel, 25 percent subangular cobbles, and 5 percent subangular stones; moderately acid, pH 6.0 by Hellige-Truog; NaF pH 11.5; abrupt wavy boundary.

2R—15 inches (37 centimeters); andesite bedrock.

Type Location

Shasta County, California; about 0.5 mile northeast of Soda Lake, approximately 950 feet south and 450 feet east of the northwest corner of sec. 10, T. 30 N., R. 4 E.; 40 degrees 28 minutes 47 seconds north latitude and 121 degrees 31 minutes 57 seconds west longitude, NAD83; USGS Quad: Lassen Peak, California.

Range in Characteristics

Depth to restrictive feature: 10 to 20 inches (25 to 51 centimeters) to lithic contact

Mean annual soil temperature: 38 to 42 degrees F (3 to 6 degrees C)

Mean summer soil temperature: 43 to 46 degrees F (6 to 8 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (thickest part): 2 to 5 percent clay and 35 to 62 percent rock fragments

Surface fragments: 5 to 66 percent gravel, 3 to 15 percent cobbles, 2 to 6 percent stones, and 2 to 5 percent boulders

A horizon:

Color (dry)—10YR 4/2, 5/2, 6/2

Color (moist)—10YR 3/1, 3/2

Texture—ashy highly organic sand, ashy highly organic loamy sand, gravelly ashy highly organic sandy loam, gravelly ashy highly organic coarse sandy loam

Clay content—1 to 3 percent

Rock fragments—2 to 13 percent fine gravel, 0 to 6 percent medium to coarse gravel, 2 to 19 percent total gravel

Organic matter—13 to 35 percent

Base saturation by ammonium acetate—8 to 20 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.30 to 0.75

P retention—40 to 100 percent

Glass content—55 to 65 percent

NaF pH—9.0 to 11.2

Soil reaction—moderately acid to neutral

2Bw horizon:

Color (dry)—10YR 7/3; 2.5Y 6/3, 7/4

Color (moist)—10YR 4/3, 5/3

Texture—gravelly ashy sandy loam, very cobbly ashy loamy sand, extremely cobbly ashy loamy sand

Clay content—2 to 5 percent

Rock fragments—7 to 22 percent fine gravel, 8 to 20 percent medium to coarse gravel, 18 to 30 percent total gravel, 5 to 25 percent cobbles, 0 to 5 percent stones, 30 to 70 percent total rock fragments

Organic matter—1.2 to 2.5 percent

Base saturation by ammonium acetate—3 to 10 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.82 to 0.93

P retention—45 to 55 percent

Glass content—65 to 75 percent

NaF pH—11.0 to 11.5

Soil reaction—moderately acid to neutral

Aeric Endoaquents

Aeric Endoaquents consist of very deep, somewhat poorly drained soils that formed in recent alluvium from volcanic rocks. These soils are on bars and in channels of flood plains along Kings Creek where the stream gradient decreases and allows lateral deposition. Slopes range from 2 to 10 percent. The mean annual precipitation is about 51 inches (1,295 millimeters), and the mean annual air temperature is about 42 degrees F (5.6 degrees C).

Taxonomic Classification

Frigid Aeric Endoaquents

Typical Pedon

Aeric Endoaquents loamy very fine sand on a southeast-facing (135 degrees) slope of 4 percent under a cover of white fir, thinleaf alder, incense cedar, and black cottonwood at an elevation of 5,353 feet (1,632 meters). When described on 7/10/07, the soil was dry to a depth of 38 inches (96 centimeters) and very slightly moist at a

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depth of 38 to 63 inches (96 to 160 centimeters). (Colors are for dry soil unless otherwise noted.)

- Oi—0 to 2 inches (0 to 4 centimeters); slightly decomposed needles and twigs; abrupt smooth boundary.
- Oe—2 to 3 inches (4 to 7 centimeters); moderately decomposed needles and twigs; few very fine roots; abrupt wavy boundary.
- C1—3 to 5 inches (7 to 13 centimeters); light brownish gray (10YR 6/2) loamy very fine sand, dark grayish brown (10YR 4/2) moist; 3 percent clay; single grain; loose, nonsticky, nonplastic; common very fine and fine and few medium to very coarse roots; many very fine interstitial pores; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 9.0; abrupt wavy boundary.
- C2—5 to 7 inches (13 to 19 centimeters); light brownish gray (10YR 6/2) sand, dark grayish brown (10YR 4/2) moist; 1 percent clay; single grain; loose, nonsticky, nonplastic; many very fine and common fine to very coarse roots; many very fine interstitial pores; 2 percent rounded medium and coarse gravel and 4 percent rounded fine gravel; slightly acid, pH 6.6 by Hellige-Truog; NaF pH 9.0; abrupt wavy boundary.
- C3—7 to 13 inches (19 to 33 centimeters); light brownish gray (10YR 6/2) very gravelly coarse sand, dark grayish brown (10YR 4/2) moist; 0 percent clay; single grain; loose, nonsticky, nonplastic; many very fine to very coarse roots; many very fine to medium interstitial pores; 2 percent rounded cobbles, 10 percent rounded fine gravel, and 40 percent rounded medium and coarse gravel; slightly acid, pH 6.6 by Hellige-Truog; NaF pH 7.3; abrupt smooth boundary.
- C4—13 to 24 inches (33 to 60 centimeters); light brownish gray (10YR 6/2) extremely gravelly sand, very dark grayish brown (10YR 3/2) moist; 1 percent clay; single grain; loose, nonsticky, nonplastic; many very fine, fine, common medium, and few coarse and very coarse roots; many very fine to medium interstitial pores; 1 percent rounded fine gravel, 5 percent rounded stones, 20 percent rounded cobbles, and 57 percent rounded medium and coarse gravel; slightly acid, pH 6.6 by Hellige-Truog; NaF pH 9.5; abrupt smooth boundary.
- C5—24 to 30 inches (60 to 76 centimeters); light brownish gray (10YR 6/2) stony fine sand, dark grayish brown (10YR 4/2) moist; 1 percent clay; massive parting to single grain; loose, nonsticky, nonplastic; few very fine to medium roots; many very fine interstitial pores; 5 percent rounded fine gravel, 5 percent rounded medium and coarse gravel, 5 percent rounded cobbles, and 5 percent rounded stones; slightly acid, pH 6.5 by Hellige-Truog; NaF 9.6; abrupt smooth boundary.
- C6—30 to 33 inches (76 to 84 centimeters); gray (10YR 5/1) very gravelly fine sand, very dark gray (10YR 3/1) moist; 1 percent clay; single grain; loose, nonsticky, nonplastic; common fine and few very fine and medium roots; many very fine and fine interstitial pores; 5 percent rounded stones, 10 percent rounded cobbles, 21 percent rounded fine gravel, and 21 percent rounded medium and coarse gravel; slightly acid, pH 6.6 by Hellige-Truog; NaF pH 9.8; abrupt smooth boundary.
- C7—33 to 38 inches (84 to 96 centimeters); light brownish gray (10YR 6/2) extremely gravelly coarse sand, dark grayish brown (10YR 4/2) moist; 1 percent clay; single grain; loose, nonsticky, nonplastic; common very fine and fine and few medium roots; many very fine to medium interstitial pores; 5 percent rounded stones, 15 percent rounded fine gravel, 15 percent rounded cobbles, and 40 percent rounded medium and coarse gravel; slightly acid, pH 6.6 by Hellige-Truog; NaF pH 10.9; clear wavy boundary.
- C8—38 to 63 inches (96 to 160 centimeters); light gray (10YR 7/2) extremely cobbly coarse sand, dark grayish brown (10YR 4/2) moist; 0 percent clay; single grain; loose, nonsticky, nonplastic; few very fine and medium and common fine roots; many very fine to medium interstitial pores; 5 percent masses of oxidized iron (7.5YR 5/4) on rock fragments; 5 percent rounded stones, 10 percent rounded fine

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gravel, 30 percent rounded cobbles, and 42 percent rounded medium and coarse gravel; neutral, pH 6.8 by Hellige-Truog; NaF pH 9.8.

Type Location

Plumas County, California; about 0.38 mile north of Kelly Camp, approximately 200 feet north and 2,100 feet east of the southwest corner of sec. 19, T. 30 N., R. 6 E.; 40 degrees 26 minutes 19 seconds north latitude and 121 degrees 21 minutes 27 seconds west longitude, NAD83; USGS Quad: Mount Harkness, California.

Range in Characteristics

Depth to restrictive feature: More than 60 inches (152 centimeters) to bedrock

Mean annual soil temperature: 45 to 47 degrees F (7 to 8 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (weighted average): 1 percent clay and 66 percent rock fragments

Surface fragments: 0 to 80 percent gravel, 0 to 20 percent cobbles, 0 to 10 percent stones, and 0 to 2 percent boulders

Depth to fluctuating water table (if it occurs): 13 to more than 80 inches (33 to 203 centimeters) from December to June

Redoximorphic features: Masses of oxidized iron on rock fragments

Upper C horizon:

Color (dry)—10YR 6/2

Color (moist)—10YR 4/2

Texture—loamy very fine sand, sand, very gravelly coarse sand

Clay content—0 to 3 percent

Rock fragments—0 to 10 percent fine gravel, 0 to 40 percent medium and coarse gravel, 0 to 50 percent total gravel, 0 to 5 percent cobbles, 0 to 2 percent stones, 0 to 55 percent total rock fragments

Organic matter—0.5 to 3 percent

Soil reaction—slightly acid or neutral

Lower C horizon:

Color (dry)—10YR 5/1, 6/2, 7/2

Color (moist)—10YR 3/1, 3/2, 4/2

Texture—extremely gravelly sand, stony fine sand, very gravelly fine sand, extremely gravelly coarse sand, extremely cobbly coarse sand

Clay content—0 to 1 percent

Rock fragments—0 to 25 percent fine gravel, 5 to 60 percent medium and coarse gravel, 10 to 60 percent total gravel, 5 to 30 percent cobbles, 0 to 10 percent stones, 0 to 5 percent boulders, 20 to 89 percent total rock fragments

Organic matter—0 to 0.5 percent

Soil reaction—slightly acid or neutral

Andic Durixerepts

Andic Durixerepts consist of moderately deep, well drained soils that formed in ash over outwash from volcanic rocks. These soils are on outwash terraces. Slopes range from 3 to 20 percent. The mean annual precipitation is about 63 inches (1,600 millimeters), and the mean annual air temperature is about 41 degrees F (5 degrees C).

Taxonomic Classification

Frigid Andic Durixerepts



Figure 70.—Typical profile of Andic Durixerepts. Depth is marked in centimeters.

Typical Pedon

Andic Durixerepts gravelly ashy loamy coarse sand (fig. 70) on a east-facing (80 degrees) slope of 7 percent under a cover of California red fir, western white pine, and pinemat manzanita at an elevation of 6,810 feet (2,076 meters). When described on 6/7/07, the soil was slightly moist at a depth of 0 to 3 inches (0 to 8 centimeters), very slightly moist at a depth of 3 to 19 inches (8 to 49 centimeters), and dry at a depth of 19 to 24 inches (49 to 60 centimeters). (Colors are for dry soil unless otherwise noted.)

- Oi—0 to 1 inch (0 to 2 centimeters); fresh and slightly decomposed twigs, needles, and leaves; abrupt smooth boundary.
- A—1 to 3 inches (2 to 8 centimeters); light brownish gray (10YR 6/2) gravelly ashy loamy coarse sand, very dark grayish brown (10YR 3/2) moist; 2 percent clay; weak fine and medium subangular blocky structure parting to single grain; soft, very friable, nonsticky, nonplastic; common very fine and fine roots; many very fine and fine interstitial pores; 10 percent subangular medium gravel and 15 percent subangular fine gravel; moderately acid, pH 5.7 by pH meter 1:1 water; NaF pH 9.9; abrupt smooth boundary.
- 2Bw1—3 to 12 inches (8 to 31 centimeters); pale brown (10YR 6/3) extremely cobbly ashy coarse sandy loam, brown (10YR 4/3) moist; 3 percent clay; weak very fine and fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine, fine, and very coarse and many medium and coarse roots; many very fine and fine irregular and tubular pores; 14 percent subangular fine gravel, 25 percent subangular medium and coarse gravel, and 30 percent cobbles; slightly acid, pH 6.1 by pH meter 1:1 water; NaF pH 10.5; clear smooth boundary.
- 2Bw2—12 to 19 inches (31 to 49 centimeters); very pale brown (10YR 7/3) extremely gravelly ashy coarse sandy loam, brown (10YR 4/3) moist; 4 percent clay; weak

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very fine to medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine and fine and few medium to very coarse roots; many very fine and fine tubular and irregular pores; 12 percent subangular fine gravel, 20 percent cobbles, and 32 percent subangular medium and coarse gravel; slightly acid, pH 6.2 by pH meter 1:1 water; NaF pH 10.6; abrupt smooth boundary.

2Bq—19 to 24 inches (49 to 60 centimeters); very pale brown (10YR 7/3) extremely gravelly ashy loamy coarse sand, brown (10YR 4/3) moist; 3 percent clay; massive; loose, nonsticky, nonplastic; few very fine to very coarse roots; common very fine and fine tubular and many very fine and fine interstitial pores; 15 percent threadlike silica masses around rock fragments; 10 percent cobbles, 30 percent subangular medium and coarse gravel, and 30 percent subangular fine gravel; slightly acid, pH 6.3 by pH meter 1:1 water; NaF pH 10.7; abrupt irregular boundary.

2Bqm—24 to 31 inches (60 to 80 centimeters); white (2.5Y 8/1) cemented extremely gravelly ashy coarse sandy loam, grayish brown (2.5Y 5/2) moist; 2 percent clay; moderate medium and thick platy structure; extremely hard, slightly rigid, strongly cemented, nonsticky, nonplastic; common very fine and fine tubular and many very fine and fine interstitial pores; 15 percent threadlike silica masses on horizontal faces of peds; 5 percent cobbles, 30 percent subangular medium and coarse gravel, and 30 percent subangular fine gravel; slightly acid, pH 6.5 by pH meter 1:1 water; NaF pH 10.7.

Type Location

Shasta County, California; about 0.25 mile southwest of Summit Lake, approximately 2,000 feet west and 2,500 feet north of the southeast corner of sec. 4, T. 30 N., R. 5 E.; 40 degrees 29 minutes 23 seconds north latitude and 121 degrees 25 minutes 43 seconds west longitude, NAD83; USGS Quad: Reading Peak, California.

Range in Characteristics

Depth to restrictive feature: 20 to 40 inches (51 to 102 centimeters) to duripan

Mean annual soil temperature: 40 to 41 degrees F (4.6 to 5 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (thickest part): 3 to 4 percent clay and 64 to 70 percent rock fragments

Surface fragments: 5 to 50 percent gravel, 1 to 5 percent cobbles, 0 to 3 percent stones, and 0 to 3 percent boulders

A horizon:

Color (dry)—10YR 5/2, 6/2

Color (moist)—10YR 3/2, 4/2

Texture—gravelly ashy loamy coarse sand, gravelly ashy loamy sand, gravelly ashy sandy loam

Clay content—1 to 3 percent

Rock fragments—10 to 20 percent fine gravel, 5 to 10 percent medium and coarse gravel, 20 to 30 percent total gravel

Organic matter—3 to 5 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.3 to 0.5

P retention—15 to 25 percent

Glass content—15 to 25 percent

NaF pH—9.8 to 10.5

Soil reaction—moderately acid or slightly acid

2Bw horizon:

Color (dry)—10YR 5/3, 6/3, 6/4, 7/3, 7/4

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Color (moist)—10YR 3/3, 4/3, 4/4

Texture—extremely cobbly ashy coarse sandy loam, extremely gravelly ashy coarse sandy loam, very gravelly ashy coarse sandy loam, very cobbly ashy coarse sandy loam

Clay content—1 to 5 percent

Rock fragments—10 to 20 percent fine gravel, 10 to 35 percent medium and coarse gravel, 20 to 40 percent total gravel, 0 to 30 percent cobbles, 35 to 70 percent total rock fragments

Organic matter—1.7 to 3.5 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.5 to 2

P retention—50 to 75 percent

Glass content—20 to 40 percent

NaF pH—10.5 to 11.5

Soil reaction—moderately acid or slightly acid

2Bq horizon:

Color (dry)—10YR 7/1, 7/3

Color (moist)—10YR 4/2, 4/3

Texture—extremely gravelly ashy loamy coarse sand

Clay content—1 to 4 percent

Rock fragments—15 to 35 percent fine gravel, 15 to 35 percent medium and coarse gravel, 25 to 65 percent total gravel, 5 to 10 percent cobbles, 60 to 80 percent total rock fragments

Organic matter—0.5 to 2 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.5 to 2.5

P retention—70 to 95 percent

Glass content—20 to 40 percent

NaF pH—10.5 to 11.5

Soil reaction—slightly acid

2Bqm horizon:

Color (dry)—2.5Y 8/1; 10YR 7/1

Color (moist)—2.5Y 5/2; 10YR 5/1

Texture—cemented extremely gravelly ashy coarse sandy loam

Clay content—1 to 2 percent

Rock fragments—15 to 35 percent fine gravel, 10 to 35 percent medium and coarse gravel, 25 to 60 percent total gravel, 5 to 10 percent cobbles

Organic matter—0.2 to 0.5 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1 to 2

P retention—60 to 70 percent

Glass content—20 to 40 percent

NaF pH—10.5 to 11.5

Rupture resistance—weakly to strongly cemented

Soil reaction—slightly acid or neutral

Aquandic Cryaquents

Aquandic Cryaquents consist of very deep, very poorly drained soils that formed in glaciolacustrine deposits from volcanic rocks. These soils are in meadows that formed in glacial lakes. Slopes range from 0 to 8 percent. The mean annual precipitation is about 59 inches (1,499 millimeters), and the mean annual air temperature is about 40.6 degrees F (4.75 degrees C).

Taxonomic Classification

Aquandic Cryaquents



Figure 71.—Typical profile of Aquandic Cryaquents. Depth is marked in centimeters.

Typical Pedon

Aquandic Cryaquents silty clay loam (fig. 71) on a northwest-facing (320 degrees) slope of 1 percent under a cover of sedges at an elevation of 6,623 feet (2,019 meters). When described on 10/10/06, the soil was moist between a depth of 0 to 14 inches (36 centimeters), saturated between a depth of 14 to 20 inches (36 to 50 centimeters), moist between a depth of 20 to 28 inches (50 to 70 centimeters), and saturated at a depth of 28 to more than 47 inches (70 to 120 centimeters). An artesian water table was at a depth of 28 inches (70 centimeters) and filled the pit up to 20 inches (50 centimeters). (Colors are for dry soil unless otherwise noted.)

Ag1—0 to 7 inches (0 to 18 centimeters); light gray (10YR 7/2) silty clay loam, dark grayish brown (10YR 4/2) moist; 30 percent clay; massive; hard, friable, slightly sticky, slightly plastic; many very fine to medium roots; many very fine and fine irregular and many very fine and fine tubular pores; slightly acid, pH 6.5 by Hellige-Truog; clear smooth boundary.

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- Ag2—7 to 12 inches (18 to 30 centimeters); light gray (10YR 7/2) silty clay loam, dark grayish brown (10YR 4/2) moist; 30 percent clay; massive; hard, friable, slightly sticky, slightly plastic; many very fine to medium roots; many very fine and fine tubular and many very fine and fine irregular pores; slightly acid, pH 6.5 by Hellige-Truog; abrupt smooth boundary.
- Cg1—12 to 14 inches (30 to 36 centimeters); white (10YR 8/1) ashy silt loam, grayish brown (2.5Y 5/2) moist; 19 percent clay; massive; slightly hard, friable, slightly sticky, slightly plastic; many very fine to medium roots; many very fine and fine tubular and many very fine and fine irregular pores; slightly acid, pH 6.5 by Hellige-Truog; abrupt smooth boundary.
- Cg2—14 to 20 inches (36 to 50 centimeters); light gray (2.5Y 7/1) very gravelly ashy coarse sand, gray (2.5Y 6/1) moist; 0 percent clay; single grain; loose, nonsticky, nonplastic; many very fine and fine roots; many very fine to medium interstitial pores; 15 percent subangular medium and coarse gravel and 25 percent subangular fine gravel; neutral, pH 6.7 by Hellige-Truog; very abrupt smooth boundary.
- Agb—20 to 28 inches (50 to 70 centimeters); light gray (10YR 7/1) mucky silty clay loam, dark grayish brown (10YR 4/2) moist; 30 percent clay; massive; hard, friable, slightly sticky, slightly plastic; many very fine and fine roots; many very fine and fine irregular and common very fine to medium tubular pores; neutral, pH 6.7 by Hellige-Truog; abrupt wavy boundary.
- Cg3—28 to 34 inches (70 to 87 centimeters); white (2.5Y 8/1) very gravelly ashy coarse sandy loam, dark gray (2.5Y 4/1) moist; 10 percent clay; massive; hard, very friable, nonsticky, nonplastic; many very fine and fine roots; many very fine to medium interstitial pores; 20 percent subangular fine gravel and 20 percent subangular medium and coarse gravel; neutral, pH 6.8 by Hellige-Truog; abrupt smooth boundary.
- Cg4—34 to 47 inches (87 to 120 centimeters); white (2.5Y 8/1) very gravelly ashy coarse sand, gray (2.5Y 5/1) moist; 0 percent clay; single grain; loose, nonsticky, nonplastic; few very fine and fine roots; many very fine to medium interstitial pores; 5 percent subangular cobbles, 10 percent subangular medium and coarse gravel, and 20 percent subangular fine gravel; neutral, pH 7.0 by Hellige-Truog.

Type Location

Shasta County, California; about 0.38 mile north of Summit Lake, approximately 2,500 feet west and 450 feet north of the southeast corner of sec. 33, T. 31 N., R. 5 E.; 40 degrees 29 minutes 56 seconds north latitude and 121 degrees 25 minutes 38 seconds west longitude, NAD83; USGS Quad: Reading Peak, California.

Range in Characteristics

Depth to restrictive feature: More than 60 inches (152 centimeters) to bedrock

Mean annual soil temperature: 38 to 42 degrees F (3.3 to 5.6 degrees C)

Soil moisture control section: Moist all year

Particle-size control section (thickest part): 0 to 10 percent clay and 35 to 45 percent rock fragments

Depth to fluctuating water table (if it occurs): 0 to 40 inches (0 to 102 centimeters)

Ag horizon:

Color (dry)—10YR 7/2

Color (moist)—10YR 4/2

Texture—silty clay loam, ashy silt loam

Clay content—20 to 35 percent

Rock fragments—0 to 5 percent fine gravel, 0 to 5 percent medium and coarse gravel, 0 to 5 percent total gravel

Organic matter—5 to 10 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.15 to 0.20

P retention—15 to 20 percent

Glass content—20 to 30 percent

NaF pH—8.0 to 9.0

Soil reaction—strongly acid to slightly acid

Cg horizon:

Color (dry)—10YR 8/1; 2.5Y 7/1

Color (moist)—2.5Y 5/2, 6/1

Texture—ashy silt loam, very gravelly ashy coarse sand, very gravelly ashy coarse sandy loam

Clay content—0 to 20 percent

Rock fragments—0 to 25 percent fine gravel, 0 to 20 percent medium and coarse gravel, 0 to 40 percent total gravel, 0 to 5 percent cobbles, 0 to 45 percent total rock fragments

Organic matter—0.2 to 1.5 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.05 to 0.2

P retention—0 to 40 percent

Glass content—20 to 40 percent

NaF pH—7.5 to 9.5

Soil reaction—moderately acid to neutral

Agb horizon:

Color (dry)—10YR 7/1

Color (moist)—10YR 4/2

Texture—mucky silty clay loam

Clay content—27 to 40 percent

Organic matter—10 to 30 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.3 to 0.6

P retention—25 to 55 percent

Glass content—10 to 20 percent

NaF pH—7.5 to 8.5

Soil reaction—moderately acid to neutral

Aquandic Endoaquepts

Aquandic Endoaquepts consist of very deep, somewhat poorly drained soils that formed in alluvium from volcanic rocks. These soils are in meadows on bars on stream terraces. Slopes range from 1 to 5 percent. The mean annual precipitation is about 65 inches (1,651 millimeters), and the mean annual air temperature is about 42 degrees F (5.4 degrees C).

Taxonomic Classification

Frigid Aquandic Endoaquepts

Typical Pedon

Aquandic Endoaquepts gravelly ashy fine sandy loam on a northeast-facing (40 degrees) slope of 4 percent under a cover of sedges, grasses, and bare ground at an elevation of 5,692 feet (1,735 meters). When described on 9/11/07, the soil was dry at a depth of 0 to 35 inches (89 centimeters), slightly moist at a depth of 35 to 41 inches (89 to 105 centimeters), moist at a depth of 41 to 49 inches (105 to 124 centimeters), and saturated at a depth of 49 to more than 59 inches (124 to 150 centimeters). A water table was at a depth of 49 inches (124 centimeters). (Colors are for dry soil unless otherwise noted.)

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- A1—0 to 4 inches (0 to 10 centimeters); grayish brown (10YR 5/2) gravelly ashy fine sandy loam, very dark grayish brown (10YR 3/2) moist; 8 percent clay; moderate very fine and fine granular structure; slightly hard, very friable, nonsticky, nonplastic; many very fine and fine and common medium roots; many very fine and fine irregular and many very fine to medium tubular pores; 7 percent subangular fine gravel and 8 percent subangular medium gravel; slightly acid, pH 6.2 by Hellige-Truog; NaF pH 9.0; abrupt smooth boundary.
- A2—4 to 12 inches (10 to 31 centimeters); light brownish gray (10YR 6/2) ashy very fine sandy loam, very dark grayish brown (10YR 3/2) moist; 7 percent clay; moderate fine subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; common very fine to medium roots; many very fine and fine irregular and many very fine to medium tubular pores; 4 percent subangular medium and coarse gravel and 8 percent subangular fine gravel; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 9.8; clear smooth boundary.
- Bw1—12 to 22 inches (31 to 56 centimeters); light brownish gray (10YR 6/2) gravelly ashy very fine sandy loam, dark grayish brown (10YR 4/2) moist; 11 percent clay; moderate fine and medium subangular blocky structure; moderately hard, very friable, nonsticky, nonplastic; common fine, few medium, and few very fine roots; many very fine and fine irregular and many very fine to medium tubular pores; 5 percent fine irregular brownish yellow (10YR 6/6), dry, masses of oxidized iron on surfaces along pores; 3 percent subangular cobbles, 9 percent subangular medium and coarse gravel, and 18 percent subangular fine gravel; slightly acid, pH 6.6 by Hellige-Truog; NaF pH 9.8; clear smooth boundary.
- Bw2—22 to 35 inches (56 to 89 centimeters); white (10YR 8/1) gravelly ashy very fine sandy loam, pale brown (10YR 6/3) moist; 9 percent clay; moderate fine to very coarse subangular blocky structure; moderately hard, very friable, nonsticky, nonplastic; common fine and few medium and very fine roots; common very fine and fine irregular and many very fine to medium tubular pores; 10 percent fine irregular brownish yellow (10YR 6/6), dry, masses of oxidized iron on surfaces along pores; 5 percent subangular cobbles, 10 percent subangular fine gravel, and 10 percent subangular medium and coarse gravel; neutral, pH 6.7 by Hellige-Truog; NaF pH 9.0; abrupt smooth boundary.
- Cg1—35 to 41 inches (89 to 105 centimeters); white (10YR 8/1) gravelly ashy very fine sandy loam, light brownish gray (10YR 6/2) moist; 12 percent clay; massive parting to moderate very fine to medium subangular blocky structure; moderately hard, very friable, nonsticky, nonplastic; common very fine and fine roots; many very fine tubular and many very fine irregular pores; 20 percent fine irregular brownish yellow (10YR 6/6), dry, masses of oxidized iron on surfaces along pores; 3 percent subangular cobbles, 7 percent subangular fine gravel, and 7 percent subangular medium and coarse gravel; neutral, pH 6.7 by Hellige-Truog; NaF pH 9.0; abrupt smooth boundary.
- Cg2—41 to 49 inches (105 to 124 centimeters); white (10YR 8/1) ashy loamy fine sand, gray (10YR 6/1) moist; 8 percent clay; massive; moderately hard, very friable, nonsticky, nonplastic; few very fine and fine roots; few very fine and fine tubular and few very fine and fine irregular pores; 2 percent subangular fine gravel and 2 percent subangular medium gravel; neutral, pH 6.8 by Hellige-Truog; NaF pH 9.0; abrupt smooth boundary.
- Cg3—49 to 59 inches (124 to 150 centimeters); white (10YR 8/1) extremely gravelly ashy loamy coarse sand, gray (10YR 5/1) moist; 2 percent clay; single grain; loose, nonsticky, nonplastic; few very fine and fine roots; many very fine to medium interstitial pores; 5 percent subangular cobbles, 15 percent subangular fine gravel, and 50 percent subangular medium and coarse gravel; neutral, pH 6.7 by Hellige-Truog; NaF pH 9.0.

Type Location

Plumas County, California; about 0.25 mile west of Drakesbad, approximately 2,900 feet east and 1,400 feet north of the southwest corner of sec. 22, T. 30 N., R. 5 E.; 40 degrees 26 minutes 37 seconds north latitude and 121 degrees 24 minutes 35 seconds west longitude, NAD83; USGS Quad: Reading Peak, California.

Range in Characteristics

Depth to restrictive feature: More than 60 inches (152 centimeters) to bedrock

Mean annual soil temperature: 45 to 47 degrees F (7 to 8 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (weighted average): 9 percent clay and 24 percent rock fragments

Surface fragments: 0 to 10 percent gravel

Depth to fluctuating water table (if it occurs): 12 to 50 inches (30 to 127 centimeters)

Redoximorphic features: Masses of oxidized iron on ped faces and in pores in the Bw horizon and upper part of the Cg horizon

A horizon:

Color (dry)—10YR 5/2, 6/2

Color (moist)—10YR 3/2

Texture—gravelly ashy fine sandy loam, ashy very fine sandy loam, ashy fine sandy loam

Clay content—4 to 8 percent

Rock fragments—5 to 10 percent fine gravel, 0 to 10 percent medium and coarse gravel, 5 to 15 percent total gravel

Organic matter—2 to 8 percent

Base saturation by ammonium acetate—40 to 50 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.3 to 0.4

P retention—30 to 45 percent

Glass content—15 to 30 percent

NaF pH—8.0 to 10.0

Soil reaction—moderately acid to neutral

Bw horizon:

Color (dry)—10YR 6/2, 8/1

Color (moist)—10YR 4/2, 6/3

Texture—gravelly ashy very fine sandy loam

Clay content—5 to 12 percent

Rock fragments—10 to 20 percent fine gravel, 5 to 15 percent medium and coarse gravel, 20 to 30 percent total gravel, 0 to 5 percent cobbles, 20 to 30 percent total rock fragments

Organic matter—1 to 2 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.2 to 0.25

P retention—15 to 25 percent

Glass content—15 to 25 percent

NaF pH—9.0 to 10.0

Soil reaction—slightly acid or neutral

Upper Cg horizon:

Color (dry)—10YR 8/1

Color (moist)—10YR 6/1, 6/2

Texture—gravelly ashy very fine sandy loam, ashy loamy fine sand

Clay content—5 to 15 percent

Rock fragments—2 to 20 percent fine gravel, 2 to 20 percent medium and coarse

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gravel, 4 to 30 percent total gravel, 0 to 5 percent cobbles, 4 to 30 percent total rock fragments
Organic matter—1 to 3 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.10 to 0.20
Glass content—15 to 25 percent
NaF pH—8.5 to 9.5
Soil reaction—slightly acid or neutral

Lower Cg horizon:

Color (dry)—10YR 8/1
Color (moist)—10YR 5/1
Texture—extremely gravelly ashy loamy coarse sand
Clay content—0 to 3 percent
Rock fragments—10 to 25 percent fine gravel, 40 to 60 percent medium and coarse gravel, 50 to 75 percent total gravel, 2 to 15 percent cobbles, 60 to 80 percent total rock fragments
Organic matter—0.5 to 2 percent
Glass content—15 to 25 percent
NaF pH—8.5 to 9.5
Soil reaction—slightly acid or neutral

Aquandic Humaquepts

Aquandic Humaquepts consist of very deep, poorly drained soils that formed in alluvium from volcanic rocks. These soils are in meadows on stream terraces. Slopes range from 1 to 5 percent. The mean annual precipitation is about 65 inches (1,651 millimeters), and the mean annual air temperature is about 42 degrees F (5.4 degrees C).

Taxonomic Classification

Frigid Aquandic Humaquepts

Typical Pedon

Aquandic Humaquepts ashy mucky peat (fig. 72) on a southeast-facing (144 degrees) slope of 2 percent under a cover of sedges and grasses at an elevation of 5,719 feet (1,743 meters). When described on 9/6/06, the soil was moist at a depth of 0 to 38 inches (96 centimeters) and saturated below a depth of 38 inches (96 centimeters). A water table was at a depth of 38 inches (96 centimeters). (Colors are for dry soil unless otherwise noted.)

- Oe—0 to 4 inches (0 to 9 centimeters); very dark gray (10YR 3/1) ashy mucky peat, black (10YR 2/1) moist; 8 percent clay; moderate fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine to medium roots; many very fine irregular pores; slightly acid, pH 6.4 by Hellige-Truog; NaF pH 9.0; abrupt smooth boundary.
- A1—4 to 11 inches (9 to 27 centimeters); gray (10YR 5/1) ashy very fine sandy loam, black (10YR 2/1) moist; 8 percent clay; moderate fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine and fine and common medium roots; many very fine irregular pores; 5 percent subangular medium and coarse gravel and 5 percent subangular fine gravel; slightly acid, pH 6.4 by Hellige-Truog; NaF pH 9.0; abrupt smooth boundary.
- A2—11 to 22 inches (27 to 57 centimeters); gray (10YR 5/1) very gravelly ashy very fine sandy loam, black (10YR 2/1) moist; 10 percent clay; moderate medium granular structure; slightly hard, friable, nonsticky, nonplastic; many very fine and fine and common medium roots; common very fine and fine tubular and common



Figure 72.—Typical profile of Aquandic Humaquepts. Depth is marked in centimeters.

very fine irregular pores; 20 percent subangular fine gravel and 20 percent subangular medium and coarse gravel; slightly acid, pH 6.4 by Hellige-Truog; NaF pH 9.0; abrupt smooth boundary.

Bw1—22 to 28 inches (57 to 70 centimeters); grayish brown (10YR 5/2) extremely gravelly ashy sandy loam, very dark gray (10YR 3/1) moist; 12 percent clay; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky, nonplastic; common very fine to medium roots; common very fine

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and fine tubular and common very fine irregular pores; 30 percent subangular fine gravel and 45 percent subangular medium and coarse gravel; slightly acid, pH 6.6 by Hellige-Truog; NaF 9.0; abrupt smooth boundary.

Bw2—28 to 38 inches (70 to 96 centimeters); light brownish gray (10YR 6/2) extremely gravelly ashy sandy loam, very dark grayish brown (10YR 3/2) moist; 13 percent clay; weak fine subangular blocky structure; slightly hard, friable, nonsticky, nonplastic; common very fine and fine and few medium roots; common very fine and fine tubular and common very fine irregular pores; 35 percent subangular fine gravel and 45 percent subangular medium and coarse gravel; slightly acid, pH 6.6 by Hellige-Truog; NaF pH 9.2; abrupt smooth boundary.

Cg—38 to 52 inches (96 to 132 centimeters); light gray (10YR 7/1) gravelly ashy sandy loam, dark grayish brown (10YR 4/2) moist; 10 percent clay; massive; slightly hard, friable, nonsticky, nonplastic; few very fine to medium roots; common very fine and fine tubular and common very fine irregular pores; 15 percent subangular fine gravel and 15 percent subangular medium and coarse gravel; slightly acid, pH 6.6 by Hellige-Truog; NaF pH 9.2.

Type Location

Plumas County, California; about 0.5 mile west of Drakesbad, approximately 1,600 feet east and 1,200 feet north of sec. 22, T. 30 N., R. 5 E.; 40 degrees 26 minutes 37 seconds north latitude and 121 degrees 24 minutes 47 seconds west longitude, NAD83; USGS Quad: Reading Peak, California.

Range in Characteristics

Depth to restrictive feature: More than 60 inches (152 centimeters) to bedrock

Mean annual soil temperature: 45 to 47 degrees F (7 to 8 degrees C)

Soil moisture control section: Moist throughout the year

Particle-size control section (weighted average): 11 percent clay and 58 percent rock fragments

Depth to fluctuating water table (if it occurs): 0 to 60 inches (152 centimeters)

O_e horizon:

Color (dry)—10YR 3/1

Color (moist)—10YR 2/1

Texture—ashy mucky peat

Clay content—0 to 10 percent

Organic matter—20 to 30 percent

Base saturation by ammonium acetate—40 to 50 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.3 to 0.45

P retention—35 to 50 percent

Glass content—15 to 25 percent

NaF pH—7.5 to 9.0

Soil reaction—moderately acid or slightly acid

A horizon:

Color (dry)—10YR 5/1

Color (moist)—10YR 2/1

Texture—ashy very fine sandy loam, very gravelly ashy very fine sandy loam

Clay content—5 to 10 percent

Rock fragments—5 to 20 percent fine gravel, 5 to 20 percent medium and coarse gravel, 10 to 40 percent total gravel

Organic matter—5 to 10 percent

Base saturation by ammonium acetate—45 to 60 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.3 to 0.4

P retention—30 to 45 percent

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Glass content—15 to 30 percent
NaF pH—8.0 to 9.0
Soil reaction—moderately acid or slightly acid

Bw horizon:

Color (dry)—10YR 5/2, 6/2
Color (moist)—10YR 3/1, 3/2
Texture—extremely gravelly ashy sandy loam
Clay content—10 to 15 percent
Rock fragments—20 to 40 percent fine gravel, 35 to 50 percent medium and coarse gravel, 60 to 80 percent total gravel
Organic matter—3 to 5 percent
Base saturation by ammonium acetate—15 to 25 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.2 to 0.3
P retention—15 to 25 percent
Glass content—15 to 25 percent
NaF pH—8.5 to 9.2
Soil reaction—slightly acid or neutral

Cg horizon:

Color (dry)—10YR 7/1
Color (moist)—10YR 4/2
Texture—gravelly ashy sandy loam
Clay content—10 to 20 percent
Rock fragments—10 to 20 percent fine gravel, 15 to 25 percent medium and coarse gravel, 25 to 35 percent total gravel, 0 to 5 percent cobbles, 25 to 35 percent total rock fragments
Organic matter—1 to 3 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.1 to 0.2
Glass content—15 to 25 percent
NaF pH—8.0 to 9.2
Soil reaction—slightly acid or neutral

Aquandic Humaquepts, flood plains

Aquandic Humaquepts, flood plains consist of very deep, poorly drained soils that formed in alluvium from volcanic rocks. These soils are on flood plains. Slopes range from 0 to 3 percent. The mean annual precipitation is about 51 inches (1,295 millimeters), and the mean annual air temperature is about 42 degrees F (6 degrees C).

Taxonomic Classification

Frigid Aquandic Humaquepts

Typical Pedon

Aquandic Humaquepts, flood plains, stony mucky ashy loam on a southeast-facing (130 degrees) slope of 3 percent under a cover of sedges, mountain alder, lodgepole pine, Jeffrey pine, and white fir at an elevation of 5,311 feet (1,619 meters). When described on 9/7/2006, the soil was dry at a depth of 0 to 31 inches (78 centimeters), slightly moist at a depth of 31 to 47 inches (78 to 120 centimeters), wet at a depth of 47 to 51 inches (120 to 130 centimeters), and saturated below a depth of 51 inches (130 centimeters). A water table was at a depth of 51 inches (130 centimeters). (Colors are for dry soil unless otherwise noted.)

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- Oi—0 to 1 inch (0 to 3 centimeters); slightly decomposed leaf matter; abrupt smooth boundary.
- A1—1 to 4 inches (3 to 9 centimeters); grayish brown (10YR 5/2) stony mucky ashy loam, very dark brown (10YR 2/2) moist; 13 percent clay; moderate fine and medium granular structure; slightly hard, friable, slightly sticky, slightly plastic; common fine, few medium, and many very fine roots; many very fine to medium irregular pores; 5 percent subrounded fine gravel, 5 percent subrounded medium and coarse gravel, and 5 percent subrounded stones; slightly acid, pH 6.4 by Hellige-Truog; NaF pH 9.0; abrupt smooth boundary.
- A2—4 to 7 inches (9 to 17 centimeters); grayish brown (10YR 5/2) stony mucky ashy loam, very dark grayish brown (10YR 3/2) moist; 15 percent clay; strong fine and medium granular structure; slightly hard, friable, slightly sticky, slightly plastic; common very fine to medium roots; many very fine to medium irregular pores; 2 percent subrounded fine gravel, 2 percent subrounded medium and coarse gravel, 5 percent subrounded cobbles, and 10 percent nonflat subrounded stones; slightly acid, pH 6.4 by Hellige-Truog; NaF pH 9.0; clear smooth boundary.
- Bg1—7 to 16 inches (17 to 40 centimeters); grayish brown (10YR 5/2) stony ashy loam, very dark grayish brown (10YR 3/2) moist; 18 percent clay; strong fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; common very fine to medium roots; many very fine to medium irregular pores; 20 percent yellowish red (5YR 4/6), moist, and strong brown (7.5YR 5/8), dry, masses of oxidized iron throughout; 2 percent subrounded fine gravel, 2 percent subrounded medium and coarse gravel, 5 percent subrounded cobbles, and 15 percent subrounded stones; slightly acid, pH 6.4 by Hellige-Truog; NaF pH 9.0; clear smooth boundary.
- Bg2—16 to 25 inches (40 to 64 centimeters); pale brown (10YR 6/3) very stony ashy loam, dark grayish brown (10YR 4/2) moist; 20 percent clay; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few very fine and common fine and medium roots; many very fine and fine irregular and many very fine to medium tubular pores; 60 percent yellowish red (5YR 4/6), moist, and strong brown (7.5YR 5/6), dry, masses of oxidized iron throughout; 2 percent subangular fine gravel, 22 percent subangular medium and coarse gravel, 10 percent subrounded cobbles, and 15 percent subrounded stones; slightly acid, pH 6.2 by Hellige-Truog; NaF pH 9.0; clear wavy boundary.
- Bg3—25 to 31 inches (64 to 78 centimeters); light gray (10YR 7/1) cobbly ashy loam, gray (10YR 5/1) moist; 25 percent clay; moderate fine to coarse subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few very fine and common fine and medium roots; many very fine and fine irregular and tubular pores; 30 percent strong brown (7.5YR 5/8), moist, and yellowish red (5YR 5/8), dry, masses of oxidized iron on surfaces along root channels; 2 percent subrounded fine gravel, 7 percent subrounded medium and coarse gravel, 15 percent subrounded cobbles, and 10 percent subrounded stones; slightly acid, pH 6.2 by Hellige-Truog; NaF pH 9.0; clear wavy boundary.
- Bg4—31 to 47 inches (78 to 120 centimeters); light gray (10YR 7/2) cobbly ashy loam, greenish gray (10Y 6/1) moist; 23 percent clay; weak medium and coarse subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few very fine to medium roots; many very fine and fine tubular pores; 30 percent strong brown (7.5YR 5/8), moist and dry, masses of oxidized iron throughout; 2 percent subrounded fine gravel, 2 percent subrounded medium and coarse gravel, 20 percent subrounded cobbles, and 10 percent subrounded stones; slightly acid, pH 6.4 by Hellige-Truog; NaF pH 9.0; abrupt smooth boundary.
- Cg—47 to 60 inches (120 to 152 centimeters); light gray (10YR 7/1) extremely gravelly ashy sandy loam, greenish gray (5BG 6/1) moist; 15 percent clay; massive; slightly hard, friable, nonsticky, nonplastic; few very fine and fine roots; common

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very fine and fine irregular and tubular pores; 12 percent subrounded fine gravel, 32 percent subrounded medium and coarse gravel, and 20 percent subrounded cobbles; slightly acid, pH 6.6 by Hellige-Truog; NaF pH 9.0.

Type Location

Plumas County, California; about 0.38 mile west of Kelly Camp, approximately 800 feet east and 200 feet south of the northwest corner of sec. 30, T. 30 N., R. 6 E.; 40 degrees 25 minutes 58 seconds north latitude and 121 degrees 21 minutes 45 seconds west longitude, NAD83; USGS Quad: Mount Harkness, California.

Range in Characteristics

Depth to restrictive feature: More than 60 inches (152 centimeters) to bedrock

Mean annual soil temperature: 38 to 43 degrees F (3.5 to 6 degrees C)

Soil moisture control section: Dry in the upper part from July to October (about 90 days)

Particle-size control section (weighted average): 20 to 23 percent clay and 35 to 40 percent rock fragments

Surface fragments: 0 to 5 percent gravel

Depth to fluctuating water table (if it occurs): 0 to 51 inches (130 centimeters)

Redoximorphic features: Masses of oxidized iron at a depth of 7 to 47 inches (17 to 120 centimeters)

A horizon:

Color (dry)—10YR 4/2, 5/1, 5/2, 5/3

Color (moist)—10YR 2/3, 3/1, 3/2, 3/3

Texture—stony mucky ashy loam, mucky ashy loam, mucky ashy silt loam, mucky ashy loam

Clay content—12 to 20 percent

Rock fragments—0 to 8 percent fine gravel, 0 to 8 percent medium and coarse gravel, 0 to 15 percent total gravel, 0 to 5 percent cobbles, 0 to 15 percent stones, 0 to 25 percent total rock fragments

Organic matter—20 to 30 percent

Base saturation by ammonium acetate—40 to 50 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.3 to 0.45

P retention—35 to 50 percent

Glass content—15 to 25 percent

NaF pH—9.0 to 9.2

Soil reaction—strongly acid to slightly acid

Upper Bg horizon:

Color (dry)—10YR 5/2, 6/3

Color (moist)—7.5YR 4/1; 10YR 3/2, 4/2

Texture—stony ashy loam, very stony ashy loam, very gravelly ashy loam

Clay content—15 to 20 percent

Rock fragments—2 to 5 percent fine gravel, 2 to 25 percent medium and coarse gravel, 4 to 30 percent total gravel, 5 to 10 percent cobbles, 10 to 20 percent stones, 20 to 55 percent total rock fragments

Organic matter—3 to 10 percent

Base saturation by ammonium acetate—15 to 25 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.2 to 0.3

P retention—15 to 25 percent

Glass content—20 to 35 percent

NaF pH—9.0

Soil reaction—slightly acid

Lower Bg horizon:

Color (dry)—10YR 7/1, 7/2
Color (moist)—10YR 5/1, 6/1; 10Y 6/1
Texture—stony ashy loam, very stony ashy loam, cobbly ashy loam
Clay content—22 to 25 percent
Rock fragments—2 to 5 percent fine gravel, 2 to 10 percent medium and coarse gravel, 4 to 15 percent total gravel, 15 to 20 percent cobbles, 10 to 15 percent stones, 30 to 45 percent total rock fragments
Organic matter—1 to 2 percent
Base saturation by ammonium acetate—35 to 80 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.2 to 0.25
P retention—15 to 25 percent
Glass content—15 to 25 percent
NaF pH—9.0
Soil reaction—slightly acid

Cg horizon:

Color (dry)—10YR 6/2, 7/1
Color (moist)—5BG 6/1; 10BG 6/1; 10YR 5/1; 2.5Y 2.5/1
Texture—very gravelly ashy loam, extremely gravelly ashy sandy loam
Clay content—12 to 15 percent
Rock fragments—10 to 20 percent fine gravel, 20 to 35 percent medium and coarse gravel, 35 to 55 percent total gravel, 0 to 20 percent cobbles, 35 to 75 percent total rock fragments
Organic matter—1 to 3 percent
Base saturation by ammonium acetate—35 to 80 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.10 to 0.20
P retention—15 to 25 percent
Glass content—15 to 25 percent
NaF pH—9.0 to 9.5
Soil reaction—slightly acid or neutral

Aquepts

Aquepts consist of deep and very deep, poorly drained soils that formed in slope alluvium over colluvium from volcanic rocks. These soils are in seeps on glacial-valley walls and floors. Slopes range from 2 to 50 percent. The mean annual precipitation is about 65 inches (1,651 millimeters), and the mean annual air temperature is about 5 degrees F (41 degrees C).

Taxonomic Classification

Aquepts

Typical Pedon

Aquepts very bouldery mucky ashy sandy loam (fig. 73) on a south-southeast-facing (150 degrees) slope of 45 percent under a cover of mountain alder and blue wildrye at an elevation of 5,855 feet (1,758 meters). When described on 9/12/2007, the soil was dry from the surface to a depth of 16 inches (40 centimeters), slightly moist at a depth of 16 to 26 inches (40 to 65 centimeters), moist from a depth of 26 to 45 inches (65 to 155 centimeters), and saturated below a depth of 45 inches (115 inches). A water table was at a depth of 43 inches (110 centimeters). (Colors are for dry soil unless otherwise noted.)

Oi—0 to 2 inches (0 to 6 centimeters); slightly decomposed roots, twigs, and leaf litter; many very fine and fine roots; abrupt smooth boundary.



Figure 73.—Typical profile of Aquepts. Depth is marked in centimeters.

- Ag—2 to 6 inches (6 to 15 centimeters); very dark gray (10YR 3/1) very bouldery mucky ashy sandy loam, black (10YR 2/1) moist; 4 percent clay; weak fine to coarse subangular blocky structure; soft, very friable, nonsticky, nonplastic; many very fine and fine, common medium, and few coarse roots; common very fine tubular and irregular pores; 6 percent subrounded fine gravel, 12 percent subrounded medium and coarse gravel, and 20 percent subrounded boulders; very strongly acid, pH 5.0 by Hellige-Truog; NaF pH 9.0; abrupt smooth boundary.
- 2Agb—6 to 11 inches (15 to 28 centimeters); dark gray (10YR 4/1) extremely bouldery ashy sandy loam, black (10YR 2/1) moist; 4 percent clay; weak very fine and fine subangular blocky structure; soft, very friable, slightly sticky, nonplastic; many very fine to medium, common coarse, and few very coarse roots; many very fine irregular pores; 5 percent subrounded fine gravel, 10 percent subrounded medium

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- and coarse gravel, 15 percent subrounded cobbles, 10 percent subrounded stones, and 20 percent subrounded boulders; slightly acid, pH 6.3 by Hellige-Truog; NaF pH 9.0; abrupt smooth boundary.
- 2Cg—11 to 16 inches (28 to 40 centimeters); gray (10YR 5/1) extremely bouldery ashy sandy loam, very dark gray (10YR 3/1) moist; 6 percent clay; single grain; soft, very friable, slightly sticky, nonplastic; common very fine to medium and few coarse and very coarse roots; common very fine and fine interstitial pores; 10 percent subrounded fine gravel, 22 percent subrounded medium and coarse gravel, 15 percent subrounded cobbles, 10 percent subrounded stones, and 20 percent subrounded boulders; slightly acid, pH 6.6 by Hellige-Truog; NaF pH 9.0; abrupt smooth boundary.
- 2A'gb—16 to 26 inches (40 to 65 centimeters); gray (10YR 5/1) extremely cobbly ashy sandy loam, very dark gray (10YR 3/1) moist; 5 percent clay; weak very fine and fine subangular blocky structure parting to single grain; soft, very friable, slightly sticky, nonplastic; common very fine to medium and few coarse roots; common very fine irregular and tubular pores; 15 percent subrounded fine gravel, 20 percent subrounded medium and coarse gravel, 20 percent subrounded cobbles, 5 percent subrounded stones, and 5 percent subrounded boulders; neutral, pH 6.7 by Hellige-Truog; NaF pH 9.0; abrupt wavy boundary.
- 2C'g—26 to 45 inches (65 to 115 centimeters); light gray (10YR 7/2) extremely stony ashy sandy loam, dark grayish brown (10YR 4/2) moist; 3 percent clay; massive; soft, very friable, slightly sticky, nonplastic; few very fine to medium roots; common very fine interstitial and tubular pores; 10 percent subrounded fine gravel, 25 percent nonflat subrounded medium and coarse gravel, 10 percent subrounded cobbles, 15 percent subrounded stones, and 5 percent subrounded boulders; neutral, pH 6.7 by Hellige-Truog; NaF pH 9.0.

Type Location

Plumas County, California; about 0.25 mile northwest of Drakesbad, approximately 2,300 feet west and 1,900 feet north of the southwest corner of sec. 22, T. 30 N., R. 5 E.; 40 degrees 26 minutes 43 seconds north latitude and 121 degrees 24 minutes 30 seconds west longitude, NAD83; USGS Quad: Reading Peak, California.

Range in Characteristics

Depth to restrictive feature: 40 to more than 60 inches (102 to more than 152 centimeters) to bedrock

Mean annual soil temperature: 38 to 43 degrees F (3.5 to 6 degrees C)

Mean summer soil temperature: 41 to 50 degrees F (5 to 10 degrees C)

Soil moisture control section: Moist throughout the year

Particle-size control section (weighted average): 3 to 6 percent clay and 65 to 80 percent rock fragments

Surface fragments: 5 to 20 percent stones and 0 to 15 percent boulders

Depth to fluctuating water table (if it occurs): 0 to 49 inches (125 centimeters)

Ag horizon:

Color (dry)—10YR 3/1, 4/2

Color (moist)—10YR 2/1, 3/1

Texture—very bouldery mucky ashy sandy loam, peaty ashy sandy loam

Clay content—2 to 4 percent

Rock fragments—0 to 10 percent fine gravel, 5 to 15 percent medium and coarse gravel, 5 to 20 percent total gravel, 0 to 25 percent boulders, 10 to 45 percent total rock fragments

Organic matter—15 to 30 percent

Base saturation by ammonium acetate—40 to 50 percent

Glass content—15 to 25 percent

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NaF pH—9.0 to 9.1

Soil reaction—very strongly acid to moderately acid

2Agb horizon:

Color (dry)—10YR 4/1, 4/2

Color (moist)—10YR 2/1, 3/1

Texture—extremely bouldery ashy sandy loam, ashy sandy loam, stony ashy sandy loam, very stony ashy sandy loam

Clay content—2 to 4 percent

Rock fragments—1 to 5 percent fine gravel, 0 to 10 percent medium and coarse gravel, 1 to 15 percent total gravel, 0 to 15 percent cobbles, 0 to 10 percent stones, 0 to 20 percent boulders, 1 to 60 percent total rock fragments

Organic matter—5 to 15 percent

Base saturation by ammonium acetate—45 to 60 percent

Glass content—15 to 30 percent

NaF pH—9.0 to 9.1

Soil reaction—slightly acid

2Cg horizon:

Color (dry)—10YR 4/2, 5/1

Color (moist)—10YR 3/1

Texture—extremely bouldery ashy sandy loam, extremely stony ashy sandy loam

Clay content—2 to 6 percent

Rock fragments—5 to 15 percent fine gravel, 20 to 35 percent medium and coarse gravel, 25 to 45 percent total gravel, 15 to 20 percent cobbles, 10 to 20 percent stones, 0 to 20 percent boulders, 60 to 80 percent total rock fragments

Organic matter—3 to 5 percent

Base saturation by ammonium acetate—15 to 25 percent

Glass content—20 to 35 percent

NaF pH—9.0 to 9.5

Soil reaction—slightly acid or neutral

2A'gb horizon:

Color (dry)—10YR 4/2, 5/1

Color (moist)—10YR 2/1, 3/1

Texture—extremely cobbly ashy sandy loam, very gravelly ashy sandy loam, very cobbly ashy sandy loam, cobbly ashy sandy loam

Clay content—2 to 5 percent

Rock fragments—10 to 20 percent fine gravel, 15 to 25 percent medium and coarse gravel, 25 to 40 percent total gravel, 0 to 25 percent cobbles, 0 to 5 percent stones, 0 to 5 percent boulders, 25 to 70 percent total rock fragments

Organic matter—1 to 5 percent

Base saturation by ammonium acetate—15 to 25 percent

Glass content—20 to 35 percent

NaF pH—9.0 to 9.1

Soil reaction—slightly acid or neutral

2C'g horizon:

Color (dry)—10YR 4/2, 7/2

Color (moist)—10YR 3/1, 4/2

Texture—extremely gravelly ashy sandy loam, very gravelly ashy sandy loam, very cobbly ashy sandy loam, very stony ashy sandy loam, extremely stony ashy sandy loam

Clay content—2 to 4 percent

Rock fragments—5 to 10 percent fine gravel, 20 to 35 percent medium and coarse

gravel, 30 to 40 percent total gravel, 10 to 20 percent cobbles, 15 to 20 percent stones, 0 to 5 percent boulders, 55 to 85 percent total rock fragments
Organic matter—1 to 3 percent
Glass content—15 to 25 percent
NaF pH—9.0 to 9.5
Soil reaction—slightly acid or neutral

Aquic Dystroxerepts, debris flows

Aquic Dystroxerepts, debris flows consist of very deep, poorly drained soils that formed in wet debris flow material from hydrothermally altered volcanic rocks. These soils are on debris flows in drainageways below slumps in hydrothermally altered areas. Slopes range from 10 to 80 percent. The mean annual precipitation is about 55 inches (7,684 millimeters), and the mean annual air temperature is about 39 degrees F (4 degrees C).

Taxonomic Classification

Frigid Aquic Dystroxerepts

Typical Pedon

Aquic Dystroxerepts, debris flows, clay loam (fig. 74) on a south-facing (180 degrees) slope of 18 percent under a cover of mountain hemlock, California red fir, western white pine, and bracken fern at an elevation of 7,641 feet (2,329 meters). When described on 8/29/2007, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

Oi—0 to 1 inch (0 to 2 centimeters); slightly decomposed twig and needle litter; abrupt smooth boundary.

Oe—1 to 2 inches (2 to 6 centimeters); moderately decomposed twig and needle litter; abrupt smooth boundary.

A—2 to 5 inches (6 to 12 centimeters); light yellowish brown (10YR 6/4) clay loam, yellowish brown (10YR 5/4) moist; 28 percent clay; moderate very fine to coarse subangular blocky structure; slightly hard, friable, nonsticky, moderately plastic; common very fine and fine roots; few very fine tubular and many very fine interstitial pores; 2 percent subangular fine gravel and 2 percent subangular medium and coarse gravel; moderately acid, pH 6.0 by Hellige-Truog; NaF pH 9.0; abrupt smooth boundary.

Bw1—5 to 9 inches (12 to 24 centimeters); very pale brown (10YR 7/4) clay loam, light yellowish brown (10YR 6/4) moist; 34 percent clay; moderate very fine to coarse subangular blocky structure; moderately hard, firm, nonsticky, moderately plastic; common very fine and fine and few medium roots; common very fine tubular and many very fine interstitial pores; 2 percent subangular fine gravel and 10 percent subangular medium and coarse gravel; very strongly acid, pH 4.8 by Hellige-Truog; NaF pH 9.0; abrupt wavy boundary.

Bw2—9 to 24 inches (24 to 60 centimeters); 80 percent very pale brown (10YR 7/3), 10 percent strong brown (7.5YR 5/6), and 10 percent reddish yellow (7.5YR 6/6) very gravelly clay loam, very pale brown (10YR 7/3) moist; 30 percent clay; moderate very fine to very coarse subangular blocky structure; moderately hard, firm, slightly sticky, moderately plastic; few very fine, common fine and medium, and few coarse and very coarse roots; many very fine and fine irregular and tubular pores; 5 percent fine light brownish gray (10YR 6/2), moist, and light gray (10YR 7/2), dry, iron depletions and 25 percent fine masses of oxidized iron lining pores; 20 percent subangular fine gravel, 20 percent subangular medium and



Figure 74.—Typical profile of Aquic Dystrochrepts, debris flows. Depth is marked in centimeters.

coarse gravel, and 15 percent subangular cobbles; extremely acid, pH 4.2 by Hellige-Truog; NaF pH 9.0; abrupt smooth boundary.
Ab—24 to 30 inches (60 to 77 centimeters); light yellowish brown (10YR 6/4) very gravelly clay loam, yellowish brown (10YR 5/4) moist; 30 percent clay; moderate

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fine and medium subangular blocky structure; soft, very friable, slightly sticky, moderately plastic; common very fine and fine and few medium to very coarse roots; many very fine and fine tubular and interstitial pores; 20 percent subangular fine gravel, 20 percent subangular medium and coarse gravel, 5 percent subangular cobbles, and 10 percent subangular stones; extremely acid, pH 4.2 by Hellige-Truog; NaF pH 9.0; abrupt smooth boundary.

Bwb1—30 to 48 inches (77 to 121 centimeters); white (10YR 8/1) extremely gravelly clay loam, white (10YR 8/1) moist; 27 percent clay; moderate very fine to coarse subangular blocky structure; hard, very firm, slightly sticky, moderately plastic; few very fine, common fine, and few medium to very coarse roots; common very fine and fine tubular and interstitial pores; 20 percent fine yellowish red (5YR 4/6), moist and dry, masses of oxidized iron lining pores; 20 percent subangular fine gravel, 40 percent subangular medium and coarse gravel, and 5 percent subangular cobbles; extremely acid, pH 4.2 by Hellige-Truog; NaF pH 9.0; clear smooth boundary.

Bwb2—48 to 60 inches (121 to 152 centimeters); brown (10YR 5/3) very gravelly clay loam, brown (10YR 5/3) moist; 30 percent clay; moderate very fine to coarse subangular blocky structure; hard, very firm, slightly sticky, moderately plastic; few very fine, common fine, and few medium roots; common very fine and fine tubular and interstitial pores; 20 percent fine reddish yellow (7.5YR 7/6), moist and dry, masses of oxidized iron lining pores; 10 percent subangular fine gravel, 30 percent subangular medium and coarse gravel, and 5 percent subangular cobbles; extremely acid, pH 4.0 by Hellige-Truog; NaF pH 9.0.

Type Location

Shasta County, California; about 0.7 mile north-northeast of the Sulphur Works parking lot, approximately 1,750 feet north and 650 feet east of the southwest corner of sec. 15, T. 30 N., R. 4 E.; 40 degrees 27 minutes 31 seconds north latitude and 121 degrees 31 minutes 54 seconds west longitude, NAD83; USGS Quad: Lassen Peak, California.

Range in Characteristics

Depth to restrictive feature: More than 60 inches (152 centimeters) to paralithic contact

Mean annual soil temperature: 42 to 47 degrees F (6 to 8 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (weighted average): 25 to 32 percent clay and 40 to 60 percent rock fragments

Surface fragments: 2 to 12 percent gravel, 0 to 8 percent cobbles, and 0 to 4 percent stones

Depth to fluctuating water table (if it occurs): 0 to more than 80 inches (203 centimeters)

A horizon:

Color (dry)—10YR 5/4, 6/3, 6/4

Color (moist)—10YR 4/3, 4/4, 5/3, 5/4

Texture—loam, clay loam

Clay content—25 to 32 percent

Rock fragments—0 to 5 percent fine gravel, 0 to 5 percent medium and coarse gravel, 2 to 10 percent total gravel

Organic matter—14 to 20 percent

Base saturation by ammonium acetate—35 to 45 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.55 to 0.62

P retention—48 to 55 percent

Glass content—0 to 1 percent

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NaF pH—9.0
Soil reaction—moderately acid or slightly acid

Bw horizon:

Color (dry)—10YR 6/3, 6/4, 7/3, 7/4, 8/1, 8/2
Color (moist)—10YR 5/4, 6/3, 6/4, 7/3
Texture—clay loam, loam, gravelly clay loam, gravelly loam, very gravelly clay loam, very gravelly loam
Clay content—25 to 38 percent
Rock fragments—0 to 22 percent fine gravel, 5 to 22 percent medium and coarse gravel, 5 to 42 percent total gravel, 0 to 15 percent cobbles, 5 to 57 percent total rock fragments
Organic matter—0.9 to 2.3 percent
Base saturation by ammonium acetate—16 to 35 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.58 to 0.82
P retention—65 to 80 percent
Glass content—0 to 1 percent
NaF pH—9.0
Redoximorphic features—iron masses or iron depletions
Soil reaction—extremely acid or very strongly acid

Ab horizon:

Color (dry)—10YR 5/4, 6/3, 6/4
Color (moist)—10YR 4/3, 4/4, 5/3, 5/4
Texture—very gravelly clay loam, very gravelly loam
Clay content—25 to 35 percent
Rock fragments—10 to 25 percent fine gravel, 10 to 25 percent medium and coarse gravel, 20 to 45 percent total gravel, 0 to 10 percent cobbles, 0 to 10 percent stones, 35 to 59 percent total rock fragments
Organic matter—10 to 15 percent
Base saturation by ammonium acetate—25 to 40 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.55 to 0.62
P retention—48 to 55 percent
Glass content—5 to 10 percent
NaF pH—9.0
Soil reaction—extremely acid or very strongly acid

Bwb horizon:

Color (dry)—10YR 5/3, 6/1, 6/2, 7/1, 7/2, 7/3, 8/1, 8/2
Color (moist)—10YR 5/3, 6/1, 6/2, 7/1, 7/2, 7/3, 8/1, 8/2
Texture—very gravelly loam, extremely gravelly loam, very gravelly clay loam, extremely gravelly clay loam
Clay content—23 to 32 percent
Rock fragments—5 to 25 percent fine gravel, 20 to 40 percent medium and coarse gravel, 25 to 60 percent total gravel, 2 to 10 percent cobbles, 30 to 70 percent total rock fragments
Organic matter—0.5 to 1.2 percent
Base saturation by ammonium acetate—8 to 15 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.95 to 1.10
P retention—90 to 95 percent
Glass content—0 to 1 percent
NaF pH—9.0
Redoximorphic features—iron masses
Soil reaction—extremely acid or very strongly acid

Aquic Haploxerands

Aquic Haploxerands consist of moderately deep and deep, somewhat poorly drained and moderately well drained soils that formed in outwash from volcanic rocks. These soils are on outwash terraces around lower Hot Springs Creek. Slopes range from 2 to 30 percent. The mean annual precipitation is about 73 inches (1,854 millimeters), and the mean annual air temperature is about 41 degrees F (5 degrees C).

Taxonomic Classification

Frigid Aquic Haploxerands

Typical Pedon

Aquic Haploxerands gravelly medial sandy loam (fig. 75) on an east-facing (80 degrees) slope of 4 percent under a cover of white fir, lodgepole pine, western white pine, incense cedar, and Jeffrey pine at an elevation of 5,839 feet (1,780 meters). When described on 9/12/07, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

- Oi—0 to 1 inch (0 to 2 centimeters); slightly decomposed needles, bark, cones, and twig litter; abrupt wavy boundary.
- A1—1 to 2 inches (2 to 4 centimeters); dark grayish brown (10YR 4/2) gravelly medial sandy loam, very dark brown (10YR 2/2) moist; 5 percent clay; moderate thick platy structure; soft, very friable, nonsticky, nonplastic; common very fine roots; common very fine and fine interstitial and common fine tubular pores; 20 percent subangular fine gravel and 12 percent subangular medium and coarse gravel; strongly acid, pH 5.2 by Hellige-Truog; NaF pH 11.2; abrupt smooth boundary.
- A2—2 to 4 inches (4 to 11 centimeters); brown (10YR 5/3) gravelly medial sandy loam, very dark grayish brown (10YR 3/2) moist; 6 percent clay; weak very fine subangular blocky structure parting to single grain; soft, very friable, nonsticky, nonplastic; many very fine and fine, common medium, and few coarse and very coarse roots; many very fine and fine interstitial pores; 16 percent subangular fine gravel, 13 percent subangular medium and coarse gravel and 5 percent subangular cobbles; moderately acid, pH 5.7 by Hellige-Truog; NaF pH 11.3; abrupt smooth boundary.
- A3—4 to 9 inches (11 to 24 centimeters); brown (10YR 5/3) gravelly medial fine sandy loam, dark brown (10YR 3/3) moist; 6 percent clay; moderate medium and coarse subangular blocky structure; soft, very friable, nonsticky, nonplastic; many very fine and fine, common medium and coarse, and few very coarse roots; common very fine and fine tubular and many very fine irregular pores; 10 percent subangular fine gravel, 10 percent subangular medium and coarse gravel, and 5 percent subangular cobbles; slightly acid, pH 6.3 by Hellige-Truog; NaF pH 11.0; abrupt wavy boundary.
- Bw1—9 to 16 inches (24 to 41 centimeters); yellowish brown (10YR 5/4) gravelly medial fine sandy loam, dark yellowish brown (10YR 3/4) moist; 9 percent clay; weak very fine and fine subangular blocky structure parting to single grain; soft, very friable, nonsticky, nonplastic; many very fine and fine, common medium and coarse, and few very coarse roots; common very fine and fine tubular and many very fine interstitial pores; 8 percent subangular fine gravel, 19 percent subangular medium and coarse gravel, and 5 percent subangular cobbles; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 11.0; abrupt smooth boundary.
- Bw2—16 to 24 inches (41 to 60 centimeters); very pale brown (10YR 7/4) gravelly medial fine sandy loam, dark yellowish brown (10YR 4/4) moist; 8 percent clay; moderate very fine to medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine to medium and few coarse and very



Figure 75.—Typical profile of Aquic Haploxerands. Depth is marked in centimeters.

coarse roots; common very fine and fine tubular and many very fine irregular pores; 5 percent fine strong brown (7.5YR 5/8), dry, masses of oxidized iron on surfaces along root channels; 10 percent subangular fine gravel, 12 percent subangular medium and coarse gravel, and 5 percent subangular cobbles; neutral, pH 6.7 by Hellige-Truog; NaF pH 11.1; abrupt smooth boundary.
Bq—24 to 39 inches (60 to 99 centimeters); brownish yellow (10YR 6/6) very gravelly medial coarse sandy loam, dark yellowish brown (10YR 4/6) moist; 5 percent clay; massive parting to weak fine subangular blocky structure; soft, very friable,

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nonsticky, nonplastic; common very fine and fine and few medium and coarse roots; many very fine and fine interstitial and few medium interstitial pores; 60 percent medium strong brown (7.5YR 5/8), dry, masses of oxidized iron throughout; 10 percent fine threadlike silica masses around rock fragments; 23 percent subangular fine gravel, 25 percent subangular medium and coarse gravel, and 10 percent subangular cobbles; neutral, pH 6.9 by Hellige-Truog; NaF pH 11.0; abrupt smooth boundary.

Bqm—39 to 47 inches (99 to 119 centimeters); very pale brown (10YR 7/3) cemented very gravelly sandy loam, brown (10YR 5/3) moist; 7 percent clay; massive; very hard, extremely firm, moderately cemented, nonsticky, nonplastic; few very fine and fine roots on top of the horizon; common fine interstitial, vesicular, and irregular pores; 30 percent platy yellowish red (5YR 4/6) dry masses of oxidized iron along lamina or strata surfaces; 10 percent fine threadlike silica masses around rock fragments; 20 percent subangular fine gravel, 23 percent subangular medium and coarse gravel, and 8 percent subangular cobbles; neutral, pH 6.7 by Hellige-Truog; NaF pH 11.0.

Type Location

Plumas County, California; about 1 mile west of Drakesbad, approximately 500 feet west and 700 feet north of the southwest corner of sec. 21, T. 30 N., R. 5 E.; 40 degrees 26 minutes 28 seconds north latitude and 121 degrees 23 minutes 17 seconds west longitude, NAD83; USGS Quad: Reading Peak, California.

Range in Characteristics

Depth to restrictive feature: 20 to 60 inches (51 to 152 centimeters) to duripan

Mean annual soil temperature: 42 to 44 degrees F (3 to 5 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (thickest part): 5 to 8 percent clay and 25 to 34 percent rock fragments

Surface fragments: 0 to 5 percent gravel and 0 to 5 percent cobbles

Depth to fluctuating water table (if it occurs): From the duripan to 16 inches (41 centimeters)

Redoximorphic features: Masses of oxidized iron in the lower part of the Bw horizon and in the Bq and Bqm horizons around roots, in bands, and on rock fragments

A horizon:

Color (dry)—10YR 4/2, 4/3, 5/3

Color (moist)—10YR 2/2, 3/2, 3/3

Texture—gravelly medial sandy loam, gravelly medial fine sandy loam, very gravelly medial sandy loam

Clay content—5 to 6 percent

Rock fragments—5 to 25 percent fine gravel, 5 to 15 percent medium and coarse gravel, 15 to 35 percent total gravel, 0 to 8 percent cobbles, 15 to 40 percent total rock fragments

Organic matter—5.0 to 14.0 percent

Base saturation by ammonium acetate—12 to 65 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—2.00 to 2.75

P retention—80 to 95 percent

Glass content—15 to 30 percent

NaF pH—11.0 to 11.3

Soil reaction—strongly acid to slightly acid

Bw horizon:

Color (dry)—10YR 5/4, 6/4, 7/4

Color (moist)—10YR 3/4, 4/4

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Texture—gravelly medial fine sandy loam, very gravelly medial fine sandy loam
Clay content—7 to 8 percent
Rock fragments—5 to 15 percent fine gravel, 10 to 20 percent medium and coarse gravel, 15 to 32 percent total gravel, 2 to 8 percent cobbles, 20 to 40 percent total rock fragments
Organic matter—4.3 to 8.5 percent
Base saturation by ammonium acetate—10 to 55 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—3.35 to 5.25
P retention—90 to 100 percent
Glass content—3 to 15 percent
NaF pH—11.0 to 11.1
Soil reaction—slightly acid or neutral

Bq horizon:

Color (dry)—10YR 6/5, 6/6
Color (moist)—10YR 4/5, 4/6
Texture—very gravelly medial coarse sandy loam, extremely gravelly medial coarse sandy loam
Clay content—5 to 6 percent
Rock fragments—20 to 25 percent fine gravel, 20 to 30 percent medium and coarse gravel, 35 to 55 percent total gravel, 5 to 15 percent cobbles, 40 to 65 percent total rock fragments
Organic matter—0.7 to 1.2 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.60 to 1.85
P retention—65 to 78 percent
Glass content—10 to 20 percent
NaF pH—11.0
Soil reaction—neutral

Bqm horizon:

Color (dry)—10YR 7/2, 7/3
Color (moist)—10YR 5/3
Texture—cemented very gravelly sandy loam
Clay content—6 to 7 percent
Rock fragments—15 to 25 percent fine gravel, 15 to 25 percent medium and coarse gravel, 35 to 50 percent total gravel, 5 to 10 percent cobbles, 40 to 60 percent total rock fragments
Organic matter—0 to 0.9 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.10 to 1.45
P retention—65 to 100 percent
Glass content—10 to 20 percent
NaF pH—11.0
Rupture resistance—very weakly to strongly cemented
Soil reaction—neutral

Ashbutte Series

The Ashbutte series consists of very deep, somewhat excessively drained soils that formed in tephra from cinder cone volcanoes. Ashbutte soils are on cinder cone volcanoes in the Southern Cascade Mountains. Slopes range from 15 to 70 percent. The mean annual precipitation is about 51 inches (1,295 millimeters), and the mean annual air temperature is about 41 degrees F (5 degrees C).

Taxonomic Classification

Ashy over medial-skeletal, amorphic, frigid Typic Vitrixerands



Figure 76.—Typical profile of Ashbutte soil. Depth is marked in centimeters.

Typical Pedon

Ashbutte very gravelly ashy coarse sand (fig. 76) on a south-facing (193 degrees) slope of 54 percent under a cover of California red fir, Jeffrey pine, bush chinquapin, and snowbrush ceanothus at an elevation of 7,567 feet (2,306 meters). When

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described on 8/16/06, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

- Oi—0 to 2 inches (0 to 5 centimeters); slightly decomposed fir needles and twig litter; few very fine roots; abrupt smooth boundary.
- A1—2 to 6 inches (5 to 14 centimeters); brown (10YR 5/3) very gravelly ashy coarse sand, brown (10YR 4/3) moist; 1 percent clay; single grain; loose, nonsticky, nonplastic; many very fine and fine, common medium, and few coarse roots; many very fine to medium interstitial pores; 20 percent subangular fine gravel and 20 percent subangular medium and coarse gravel; slightly acid, pH 6.6 by Hellige-Truog; NaF pH 10.4; abrupt smooth boundary.
- A2—6 to 11 inches (14 to 28 centimeters); yellowish brown (10YR 5/4) gravelly ashy coarse sand, dark yellowish brown (10YR 3/4) moist; 1 percent clay; single grain; loose, nonsticky, nonplastic; common very fine and fine, many medium, and few coarse and very coarse roots; many very fine to medium interstitial pores; 11 percent subangular fine gravel and 14 percent subangular medium and coarse gravel; neutral, pH 6.8 by Hellige-Truog; NaF pH 11.4; clear smooth boundary.
- C1—11 to 15 inches (28 to 39 centimeters); brown (7.5YR 5/4) gravelly ashy loamy coarse sand, dark brown (7.5YR 3/3) moist; 1 percent clay; single grain; loose, nonsticky, nonplastic; few very fine and fine, many medium, few coarse, and many very coarse roots; many very fine to medium interstitial pores; 14 percent subangular fine gravel and 11 percent subangular medium and coarse gravel; neutral, pH 7.0 by Hellige-Truog; NaF pH 11.0; clear smooth boundary.
- C2—15 to 24 inches (39 to 60 centimeters); dark yellowish brown (10YR 4/4) gravelly ashy loamy coarse sand, dark brown (10YR 3/3) moist; 1 percent clay; single grain; loose, nonsticky, nonplastic; few very fine and fine, common medium and coarse, and many very coarse roots; many very fine to medium interstitial pores; 11 percent subangular fine gravel, 11 percent subangular medium and coarse gravel, and 10 percent subangular cobbles; neutral, pH 7.2 by Hellige-Truog; NaF pH 11.3; abrupt smooth boundary.
- C3—24 to 36 inches (60 to 92 centimeters); yellowish brown (10YR 5/6) extremely cobbly sandy loam, brown (7.5YR 4/4) moist; 2 percent clay; single grain; loose, nonsticky, nonplastic; few very fine, common fine and medium, many coarse, and common very coarse roots; many very fine to medium interstitial pores; 7 percent subangular fine gravel, 35 percent subangular medium and coarse gravel, and 30 percent subangular cobbles; neutral, pH 7.0 by Hellige-Truog; NaF pH 11.3; clear smooth boundary.
- C4—36 to 60 inches (92 to 152 centimeters); yellowish brown (10YR 5/4) gravel, dark brown (7.5YR 3/4) moist; 1 percent clay; single grain; loose, nonsticky, nonplastic; few very fine, common fine and medium, and many coarse roots; many very fine to medium interstitial pores; 5 percent subangular fine gravel, 63 percent subangular medium and coarse gravel, and 30 percent subangular cobbles; neutral, pH 6.9 by Hellige-Truog; NaF pH 11.5.

Type Location

Lassen County California; about 0.38 mile south-southeast of the summit of Red Cinder Cone, approximately 1,300 feet east and 700 feet north of the center of sec. 1, T. 30 N., R. 6 E.; 40 degrees 29 minutes 29 seconds north latitude and 121 degrees 15 minutes 23 seconds west longitude, NAD83; USGS Quad: Mount Harkness, California.

Range in Characteristics

Depth to restrictive feature: More than 60 inches (152 centimeters) to bedrock

Mean annual soil temperature: 42 to 44 degrees F (5.5 to 7 degrees C)

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Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section: Ashy part—1 percent clay and 32 percent rock fragments;
sandy-skeletal part—2 percent clay and 72 percent rock fragments, mainly cinders

Surface fragments: 5 to 80 percent gravel, 0 to 50 percent cobbles, and 0 to 20 percent stones

A horizon:

Color (dry)—10YR 5/3, 5/4, 6/3, 6/4; 2.5Y 5/3

Color (moist)—10YR 3/3, 3/4, 4/2, 4/3; 7.5YR 4/3

Texture—gravelly ashy loamy sand, very gravelly ashy loamy sand, very gravelly ashy loamy coarse sand, gravelly ashy coarse sand, very gravelly ashy coarse sand

Clay content—1 to 3 percent

Rock fragments—11 to 30 percent fine gravel, 8 to 25 percent medium and coarse gravel, 25 to 50 percent total gravel, 0 to 5 percent cobbles, 25 to 50 percent total rock fragments

Organic matter—4 to 5 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.95 to 1.3

P retention—30 to 45 percent

Glass content—6 to 10 percent

NaF pH—10.5 to 11.0

Soil reaction—neutral

Upper C horizon:

Color (dry)—10YR 4/4, 5/4, 6/6; 7.5YR 5/4

Color (moist)—10YR 3/3, 4/4; 7.5YR 3/3, 4/4

Texture—gravelly ashy loamy coarse sand, extremely gravelly ashy loamy sand, extremely gravelly ashy loamy coarse sand, extremely gravelly ashy coarse sandy loam

Clay content—1 to 3 percent

Rock fragments—11 to 30 percent fine gravel, 11 to 50 percent medium and coarse gravel, 20 to 80 percent total gravel, 0 to 30 percent cobbles, 20 to 80 percent total rock fragments

Organic matter—2 to 3.5 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.5 to 2.25

P retention—55 to 70 percent

Glass content—6 to 12 percent

NaF pH—10.3 to 11.3

Soil reaction—neutral to slightly alkaline

Lower C horizon:

Color (dry)—10YR 2/2, 5/4, 5/6, 6/6; 2.5Y 4/1, 7/4, 8/6; 7.5YR 5/4, 7/6

Color (moist)—7.5YR 2.5/1, 3/4, 4/4, 4/6, 5/3, 5/8; 10YR 3/2, 4/4; 2.5Y 4/2, 4/3; 5YR 3/4

Texture—extremely cobbly sandy loam, extremely gravelly coarse sand, gravel

Clay content—0 to 3 percent

Rock fragments—5 to 40 percent fine gravel, 28 to 63 percent medium and coarse gravel, 40 to 80 percent total gravel, 0 to 30 percent cobbles, 0 to 10 percent stones, 60 to 98 percent total rock fragments

Organic matter—1 to 3 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—3.5 to 4.7

P retention—65 to 90 percent

Glass content—2 to 5 percent

NaF pH—9.8 to 11.5

Soil reaction—neutral



Figure 77.—Typical profile of Badgerflat soil. Depth is marked in centimeters.

Badgerflat Series

The Badgerflat series consists of moderately deep, well drained soils that formed in tephra over till from volcanic rocks. Badgerflat soils are on ground moraines and lava plateau backslopes in the Southern Cascade Mountains. Slopes range from 2 to 60 percent. The mean annual precipitation is about 45 inches (1,143 millimeters), and the mean annual air temperature is about 43 degrees F (6 degrees C).

Taxonomic Classification

Ashy-skeletal, mixed, frigid Typic Vitrixerands

Typical Pedon

Badgerflat very gravelly ashy sandy loam (fig. 77) on a south-facing (170 degrees) slope of 6 percent under a cover of lodgepole pine, Jeffrey pine, white fir, lupine, squirreltail, and mountain monardella at an elevation of 6,361 feet (1,939 meters). When described on 9/18/2007, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

Oi—0 to 1 inch (0 to 2 centimeters); slightly decomposed needles, grass, and bark litter; abrupt wavy boundary.

A1—1 to 4 inches (2 to 9 centimeters); grayish brown (10YR 5/2) very gravelly ashy sandy loam, very dark grayish brown (10YR 3/2) moist; 3 percent clay; weak thick platy structure parting to weak fine granular parting to single grain; soft, very friable, nonsticky, nonplastic; many very fine and common fine roots; many very fine and fine interstitial and irregular pores; 22 percent subangular fine gravel and

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- 22 percent subangular medium and coarse gravel; slightly acid, pH 6.3 by Hellige-Truog; NaF pH 9.2; abrupt wavy boundary.
- A2—4 to 7 inches (9 to 18 centimeters); grayish brown (10YR 5/2) gravelly ashy sandy loam, very dark grayish brown (10YR 3/2) moist; 3 percent clay; moderate very fine to coarse subangular blocky structure parting to single grain; soft, very friable, nonsticky, nonplastic; common very fine and few fine roots; many very fine and fine irregular and few very fine vesicular pores; 20 percent subangular fine gravel, 10 percent subangular medium and coarse gravel, and 2 percent subangular stones; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 10.4; abrupt wavy boundary.
- 2Bwb1—7 to 11 inches (18 to 29 centimeters); yellowish brown (10YR 5/4) extremely stony medial loamy sand, dark yellowish brown (10YR 3/4) moist; 4 percent clay; weak very fine and fine granular and moderate fine and medium subangular blocky structure; slightly hard, friable, nonsticky, nonplastic; many very fine to medium and common coarse and very coarse roots; many very fine and fine irregular pores; 17 percent subangular fine gravel, 16 percent subangular medium and coarse gravel, 8 percent subangular cobbles, and 20 percent subangular stones; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 11.3; clear smooth boundary.
- 2Bwb2—11 to 23 inches (29 to 58 centimeters); light yellowish brown (10YR 6/4) extremely stony medial loamy sand, dark yellowish brown (10YR 3/4) moist; 4 percent clay; weak very fine to medium subangular blocky structure parting to single grain; soft, very friable, nonsticky, nonplastic; many very fine to medium and common coarse and very coarse roots; many very fine irregular and interstitial and common very fine vesicular pores; 10 percent subangular fine gravel, 15 percent subangular medium and coarse gravel, 15 percent subangular cobbles, 25 percent subangular stones, and 10 percent subangular boulders; neutral, pH 6.7 by Hellige-Truog; NaF pH 11.5; gradual wavy boundary.
- 2BCb—23 to 33 inches (58 to 84 centimeters); pale brown (10YR 6/3) extremely stony ashy loamy sand, brown (10YR 4/3) moist; 3 percent clay; massive and weak very fine and fine subangular blocky structure parting to single grain; soft, very friable, nonsticky, nonplastic; many very fine and fine and few medium roots; many very fine and fine interstitial and common very fine vesicular pores; 15 percent subangular fine gravel, 15 percent subangular medium and coarse gravel, 10 percent subangular cobbles, 25 percent subangular stones, and 10 percent subangular boulders; neutral, pH 7.0 by Hellige-Truog; NaF pH 10.3; abrupt wavy boundary.
- 2Cd—33 inches (84 centimeters); light brownish gray (10YR 6/2) extremely gravelly ashy loamy coarse sand, dark brown (7.5YR 3/2) moist; 3 percent clay; massive; extremely hard, slightly rigid, nonsticky, nonplastic; few fine and medium roots; common very fine vesicular and irregular pores; 25 percent subangular fine gravel, 25 percent subangular medium and coarse gravel, and 10 percent subangular cobbles; neutral, pH 7.0 by Hellige-Truog; NaF pH 10.0.

Type Location

Shasta County, California; about 1.3 miles west-northwest from the western edge of Soap Lake, approximately 1,500 feet west and 1,000 feet north of the southwest corner of sec. 10, T. 31 N., R. 5 E.; 40 degrees 33 minutes 31 seconds north latitude and 121 degrees 24 minutes 19 seconds west longitude, NAD83; USGS Quad: West Prospect Peak, California.

Range in Characteristics

Depth to restrictive feature: 20 to 40 inches (51 to 102 centimeters) to densic contact
Mean annual soil temperature: 44 to 47 degrees F (7 to 8 degrees C)
Period that soil moisture control section is dry: July to October (about 90 days)

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Particle-size control section (thickest part): 3 to 4 percent clay and 60 to 75 percent rock fragments

Surface fragments: 15 to 65 percent gravel, 2 to 10 percent cobbles, 3 to 10 percent stones, and 0 to 10 percent boulders

A horizon:

Color (dry)—10YR 5/2, 5/3, 6/2, 6/3

Color (moist)—10YR 3/1, 3/2, 3/3

Texture—gravelly ashy sandy loam, very gravelly ashy sandy loam, gravelly ashy loamy coarse sand, gravelly ashy loamy sand, very gravelly ashy coarse sandy loam

Clay content—1 to 5 percent

Rock fragments—15 to 25 percent fine gravel, 10 to 25 percent medium and coarse gravel, 25 to 50 percent total gravel, 0 to 5 percent stones, 25 to 50 percent total rock fragments

Organic matter—4 to 6.5 percent

Base saturation by ammonium acetate—43 to 68 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.20 to 2.00

P retention—75 to 90 percent

Glass content—22 to 29 percent

NaF pH—9.0 to 11.2

Soil reaction—slightly acid

2Bwb horizon:

Color (dry)—10YR 5/4, 6/4

Color (moist)—10YR 3/4

Texture—very stony medial loamy sand, extremely stony medial loamy sand, very gravelly medial sandy loam, extremely gravelly medial sandy loam, very gravelly medial loamy coarse sand, very cobbly medial loamy coarse sand

Clay content—1 to 4 percent

Rock fragments—10 to 20 percent fine gravel, 10 to 20 percent medium and coarse gravel, 20 to 35 percent total gravel, 5 to 15 percent cobbles, 15 to 30 percent stones, 0 to 10 percent boulders, 35 to 80 percent total rock fragments

Organic matter—3 to 5.5 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—2.25 to 3.75

P retention—85 to 100 percent

Glass content—4 to 14 percent

NaF pH—11.0 to 11.5

Soil reaction—slightly acid or neutral

2BCb horizon:

Color (dry)—10YR 6/2, 6/3

Color (moist)—10YR 4/3, 4/4

Texture—very stony ashy loamy sand, extremely stony ashy loamy sand, very bouldery ashy loamy sand, extremely bouldery ashy loamy sand, very cobbly ashy loamy coarse sand, very gravelly ashy sandy loam

Clay content—1 to 3 percent

Rock fragments—10 to 20 percent fine gravel, 10 to 20 percent medium and coarse gravel, 20 to 35 percent total gravel, 5 to 15 percent cobbles, 20 to 30 percent stones, 5 to 15 percent boulders, 50 to 80 percent total rock fragments

Organic matter—0.5 to 4 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.25 to 3.75

P retention—50 to 90 percent

Glass content—5 to 14 percent

NaF pH—10.0 to 11.2

Soil reaction—neutral



Figure 78.—Profile of Badgerwash soil. Depth is marked in centimeters.

2Cd horizon:

Color (dry)—10YR 5/3, 6/2

Color (moist)—7.5YR 3/2; 10YR 3/2

Texture—very gravelly ashy loamy coarse sand, extremely gravelly ashy loamy coarse sand

Clay content—0 to 3 percent

Rock fragments—20 to 30 percent fine gravel, 20 to 30 percent medium and coarse gravel, 40 to 55 percent total gravel, 5 to 15 percent cobbles, 45 to 70 percent total rock fragments

Organic matter—0 to 0.7 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.25 to 1.60

P retention—45 to 60 percent

NaF pH—10.0 to 10.8

Rupture resistance—very hard or extremely hard

Soil reaction—neutral

Badgerwash Series

The Badgerwash series consists of moderately deep, well drained soils that formed in mixed tephra and outwash over outwash from volcanic rocks (fig. 78). Badgerwash soils are on outwash plains. Slopes range from 2 to 15 percent. The mean annual precipitation is about 45 inches (1,143 millimeters), and the mean annual air temperature is about 43 degrees F (6 degrees C).

Taxonomic Classification

Ashy-skeletal, mixed, frigid Humic Vitrixerands

Typical Pedon

Badgerwash very bouldery medial loamy coarse sand on a west-northwest-facing (315 degrees) slope of 2 percent under a cover of lodgepole pine, lupine, sedges, western needlegrass, and squirreltail at an elevation of 6,325 feet (1,928 meters). When described on 6/18/2008, the soil was dry from the surface to a depth of 13 inches (33 centimeters) and very slightly moist at a depth of 13 to 45 inches (33 to 114 centimeters). (Colors are for dry soil unless otherwise noted.)

- Oi—0 to 1 inch (0 to 2 centimeters); slightly decomposed needles, twigs, cones, and leaf litter; abrupt wavy boundary.
- A1—1 to 4 inches (2 to 9 centimeters); dark grayish brown (10YR 4/2) very bouldery medial loamy coarse sand, very dark gray (10YR 3/1) moist; 2 percent clay; weak very fine subangular blocky structure parting to single grain; soft, very friable, nonsticky, nonplastic; many very fine and common fine roots; many very fine interstitial pores; 12 percent subangular fine gravel, 9 percent subangular medium and coarse gravel, 7 percent subangular stones, and 10 percent subangular boulders; moderately acid, pH 6.0 by Hellige-Truog; NaF pH 10.0; abrupt wavy boundary.
- A2—4 to 9 inches (9 to 24 centimeters); grayish brown (10YR 5/2) very bouldery medial loamy coarse sand, very dark gray (10YR 3/1) moist; 2 percent clay; weak very fine to medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; many very fine and fine, common medium, and few coarse and very coarse roots; many very fine and fine interstitial and common fine tubular pores; 12 percent subangular fine gravel, 9 percent subangular medium and coarse gravel, 7 percent subangular stones, and 10 percent subangular boulders; slightly acid, pH 6.4 by Hellige-Truog; NaF pH 11.0; abrupt wavy boundary.
- AC—9 to 13 inches (24 to 33 centimeters); grayish brown (10YR 5/2) very bouldery medial coarse sand, very dark grayish brown (10YR 3/2) moist; 1 percent clay; weak fine subangular blocky structure and single grain; soft, very friable, nonsticky, nonplastic; many very fine and fine, common medium and coarse, and few very coarse roots; many very fine and fine and few medium interstitial pores; 17 percent subangular fine gravel, 21 percent subangular medium and coarse gravel, 7 percent subangular stones, and 10 percent subangular boulders; slightly acid, pH 6.3 by Hellige-Truog; NaF pH 11.5; abrupt wavy boundary.
- 2Ab—13 to 20 inches (33 to 51 centimeters); brown (10YR 4/3) extremely stony medial sandy loam, very dark grayish brown (10YR 3/2) moist; 3 percent clay; weak very fine and fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; many very fine and fine, common medium and coarse, and few very coarse roots; many very fine and fine interstitial and common fine tubular pores; 10 percent subangular fine gravel, 10 percent subangular medium and coarse gravel, 20 percent subangular cobbles, 15 percent subangular stones, and 5 percent subangular boulders; slightly acid, pH 6.6 by Hellige-Truog; NaF pH 11.3; clear wavy boundary.
- 2Bwb—20 to 35 inches (51 to 89 centimeters); brown (10YR 5/3) extremely stony medial sandy loam, dark grayish brown (10YR 4/2) moist; 3 percent clay; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; many very fine to coarse and common very coarse roots; common very fine interstitial and irregular and few fine tubular pores; 10 percent subangular fine gravel, 10 percent subangular medium and coarse gravel, 20 percent subangular cobbles, 15 percent subangular stones, and 5 percent subangular boulders; neutral, pH 6.7 by Hellige-Truog; NaF pH 11.2; abrupt wavy boundary.
- 2Bqmb—35 to 45 inches (89 to 114 centimeters); light brownish gray (2.5Y 6/2) cemented extremely bouldery ashy loamy coarse sand, dark grayish brown (10YR 4/2) moist; 2 percent clay; massive; extremely hard, slightly rigid, strongly

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cemented, nonsticky, nonplastic; few fine to very coarse roots in cracks; common very fine interstitial and few fine tubular pores; 5 percent threadlike silica masses around rock fragments; 12 percent subangular fine gravel, 35 percent subangular medium and coarse gravel, 10 percent subangular cobbles, 5 percent subangular stones, and 5 percent subangular boulders; neutral, pH 6.7 by Hellige-Truog; NaF pH 11.0.

Type Location

Shasta County, California; about 1.6 miles west-northwest from the western edge of Soap Lake, approximately 2,200 feet east and 100 feet north of the southwest corner of sec. 10, T. 31 N., R. 5 E.; 40 degrees 33 minutes 22 seconds north latitude and 121 degrees 24 minutes 38 seconds west longitude, NAD83; USGS Quad: West Prospect Peak, California.

Range in Characteristics

Depth to restrictive feature: 20 to 40 inches (52 to 102 centimeters) to duripan

Mean annual soil temperature: 44 to 47 degrees F (7 to 8 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (thickest part): 1 to 3 percent clay and 38 to 60 percent rock fragments

Surface fragments: 25 to 70 percent gravel, 0 to 5 percent cobbles, 2 to 10 percent stones, and 0 to 5 percent boulders

A horizon:

Color (dry)—10YR 4/2, 5/2; 2.5Y 5/2, 5/3

Color (moist)—10YR 3/1; 2.5Y 3/2

Texture—gravelly medial loamy coarse sand, very bouldery medial loamy coarse sand, very gravelly medial coarse sandy loam

Clay content—1 to 3 percent

Rock fragments—10 to 20 percent fine gravel, 8 to 25 percent medium and coarse gravel, 25 to 40 percent total gravel, 0 to 10 percent cobbles, 0 to 10 percent stones, 0 to 10 percent boulders, 30 to 55 percent total rock fragments

Organic matter—4 to 6.5 percent

Base saturation by ammonium acetate—43 to 58 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.20 to 2.00

P retention—75 to 90 percent

Glass content—22 to 29 percent

NaF pH—10.0 to 11.0

Soil reaction—strongly acid to slightly acid

AC horizon:

Color (dry)—10YR 5/2, 5/3

Color (moist)—10YR 3/2

Texture—very gravelly medial coarse sand, very bouldery medial coarse sand

Clay content—1 to 2 percent

Rock fragments—10 to 20 percent fine gravel, 20 to 25 percent medium and coarse gravel, 30 to 45 percent total gravel, 5 to 10 percent stones, 5 to 15 percent boulders, 40 to 55 percent total gravel

Organic matter—3.8 to 6.0 percent

Base saturation by ammonium acetate—43 to 60 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.20 to 2.50

P retention—75 to 95 percent

Glass content—22 to 35 percent

NaF pH—11.3 to 11.5

Soil reaction—slightly acid

2Ab horizon:

Color (dry)—10YR 4/3; 2.5Y 6/3
Color (moist)—10YR 3/2; 2.5Y 3/3
Texture—very stony medial sandy loam, extremely stony medial sandy loam, very bouldery medial sandy loam
Clay content—2 to 3 percent
Rock fragments—5 to 15 percent fine gravel, 5 to 15 percent medium and coarse gravel, 15 to 30 percent total gravel, 15 to 25 percent cobbles, 10 to 25 percent stones, 0 to 10 percent boulders, 45 to 70 percent total rock fragments
Organic matter—3.8 to 6.0 percent
Base saturation by ammonium acetate—50 to 65 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—2.00 to 2.50
P retention—80 to 95 percent
Glass content—28 to 35 percent
NaF pH—11.0 to 11.3
Soil reaction—slightly acid or neutral

2Bwb horizon:

Color (dry)—10YR 5/3, 6/3, 7/3
Color (moist)—10YR 4/2, 4/3
Texture—very gravelly medial sandy loam, extremely stony medial sandy loam
Clay content—3 to 4 percent
Rock fragments—5 to 20 percent fine gravel, 5 to 15 percent medium and coarse gravel, 15 to 35 percent total gravel, 5 to 25 percent cobbles, 5 to 20 percent stones, 0 to 10 percent boulders, 35 to 70 total rock fragments
Organic matter—4.3 to 8.5 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—3.35 to 5.25
P retention—90 to 100 percent
Glass content—3 to 15 percent
NaF pH—11.0 to 11.2
Soil reaction—neutral

2Bqmb horizon:

Color (dry)—10YR 7/2; 2.5Y 6/2
Color (moist)—10YR 4/2, 4/3
Texture—cemented very gravelly ashy coarse sandy loam, cemented extremely bouldery ashy loamy coarse sand
Clay content—2 to 3 percent
Rock fragments—5 to 20 percent fine gravel, 5 to 15 percent medium and coarse gravel, 15 to 30 percent total gravel, 5 to 25 percent cobbles, 5 to 20 percent stones, 0 to 10 percent boulders, 35 to 70 percent total rock fragments
Organic matter—0 to 1.2 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.10 to 1.85
P retention—48 to 78 percent
Glass content—5 to 14 percent
NaF pH—10.8 to 11.0
Rupture resistance—very weakly to strongly cemented
Soil reaction—neutral

Bearrubble Series

The Bearrubble series consists of very deep, well drained soils that formed in tephra over residuum from basalt and/or basaltic andesite. Bearrubble soils are on shield volcanoes in the Southern Cascade Mountains. Slopes range from 5 to 40

percent. The mean annual precipitation is about 45 inches (1,143 millimeters), and the mean annual air temperature is about 41 degrees F (5 degrees C).

Taxonomic Classification

Medial-skeletal, amorphic, frigid Typic Vitrixerands

Typical Pedon

Bearrubble ashy fine sand (fig. 79) on a south-facing (208 degrees) slope of 9 percent under a cover of pinemat manzanita, white fir, bush chinquapin, California red fir, and western white pine at an elevation of 7,175 feet (2,188 meters). When described on 8/22/06, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

Oi—0 to 3 inches (0 to 7 centimeters); slightly decomposed cone, needle, and twig litter; abrupt smooth boundary.

A—3 to 6 inches (7 to 14 centimeters); dark gray (10YR 4/1) ashy fine sand, black (10YR 2/1) moist; 1 percent clay; single grain; loose, nonsticky, nonplastic; common very fine and fine, many medium and coarse, and common very coarse roots; many very fine and fine interstitial pores; 2 percent subangular fine gravel; slightly acid, pH 6.4 by Hellige-Truog; NaF pH 9.3; clear smooth boundary.

C—6 to 13 inches (14 to 33 centimeters); light gray (2.5Y 7/1) extremely cobbly loamy coarse sand, very dark grayish brown (2.5Y 3/2) moist; 3 percent clay; single grain; loose, nonsticky, nonplastic; many very fine and fine, common medium, and many coarse and very coarse roots; many very fine to medium interstitial pores; 4 percent subangular fine gravel, 15 percent angular medium and coarse gravel, 55 percent angular cobbles, and 10 percent subangular stones; slightly acid, pH 6.6 by Hellige-Truog; NaF pH 9.6; clear smooth boundary.

2Bwb1—13 to 19 inches (33 to 49 centimeters); pale brown (10YR 6/3) extremely cobbly ashy sandy loam, dark yellowish brown (10YR 3/4) moist; 2 percent clay; weak very fine and fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine and fine, common medium and coarse, and few very coarse roots; many very fine and fine interstitial and common medium irregular pores; 9 percent subangular fine gravel, 15 percent subangular medium and coarse gravel, 25 percent subangular cobbles, and 15 percent subangular stones; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 10.0; clear smooth boundary.

2Bwb2—19 to 35 inches (49 to 89 centimeters); pale brown (10YR 6/3) extremely stony medial sandy loam, brown (10YR 4/3) moist; 3 percent clay; weak medium subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; common fine to very coarse roots; many very fine and fine interstitial and common medium tubular and irregular pores; 14 percent subangular fine gravel, 21 percent subangular medium and coarse gravel, 10 percent subangular cobbles, and 20 percent subangular stones; slightly acid, pH 6.2 by Hellige-Truog; NaF pH 10.4; gradual smooth boundary.

2Bwb3—35 to 49 inches (89 to 124 centimeters); pale brown (10YR 6/3) very stony medial fine sandy loam, dark yellowish brown (10YR 4/4) moist; 4 percent clay; weak very fine and fine subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; few fine and medium, many coarse, and few very coarse roots; many very fine and fine interstitial and many medium tubular pores; 11 percent subangular fine gravel, 15 percent subangular medium and coarse gravel, 5 percent subangular cobbles, and 10 percent subangular stones; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 10.3; gradual smooth boundary.

2Bwb4—49 to 60 inches (124 to 152 centimeters); light yellowish brown (2.5Y 6/3) very stony medial fine sandy loam, olive brown (2.5Y 4/4) moist; 5 percent clay; massive parting to single grain; loose, nonsticky, nonplastic; few very fine and fine and common medium and coarse roots; many very fine and fine interstitial pores; 13 percent subangular fine gravel, 13 percent subangular medium and coarse



Figure 79.—Typical profile of Bearrubble soil. Depth is marked in centimeters.

gravel, 5 percent subangular cobbles, and 10 percent subangular stones; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 10.6.

Type Location

Plumas County, California; about 0.57 mile west-southwest from the Mount Harkness fire lookout, approximately 2,400 feet north and 1,130 feet west of the southeast

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corner of sec. 28, T. 30 N., R. 6 E.; 40 degrees 25 minutes 41 seconds north latitude and 121 degrees 18 minutes 51 seconds west longitude, NAD83; USGS Quad: Mount Harkness, California.

Range in Characteristics

Depth to bedrock: More than 60 inches (152 centimeters)

Mean annual soil temperature: 43 to 47 degrees F (6 to 8 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (thickest part): 2 to 5 percent clay and 41 to 70 percent rock fragments

Surface fragments: 0 to 5 percent gravel, 0 to 10 percent cobbles, 15 to 25 percent stones, and 10 to 30 percent boulders

A horizon:

Color (dry)—10YR 4/1, 5/2; 2.5Y 3/1, 3/2, 5/2

Color (moist)—10YR 2/1, 3/1; 2.5Y 2.5/1, 3/2, 4/2

Texture—ashy fine sand, very stony ashy loamy sand, extremely stony ashy loamy sand, ashy fine sandy loam

Clay content—0 to 5 percent

Rock fragments—2 to 9 percent fine gravel, 0 to 3 percent medium and coarse gravel, 2 to 15 percent total gravel, 0 to 25 percent cobbles, 0 to 40 percent stones, 0 to 20 percent boulders, 2 to 74 percent total rock fragments

Organic matter—13 to 35 percent

Base saturation by ammonium acetate—8 to 20 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.05 to 0.10

P retention—4 to 10 percent

Glass content—35 to 48 percent

NaF pH—9.0 to 10.5

Soil reaction—slightly acid or neutral

C horizon:

Color (dry)—10YR 6/3; 2.5Y 7/1, 8/2

Color (moist)—10YR 4/3; 2.5Y 3/2, 6/2

Texture—extremely cobbly loamy coarse sand, extremely stony loamy coarse sand

Clay content—0 to 4 percent

Rock fragments—4 to 18 percent fine gravel, 4 to 15 percent medium and coarse gravel, 11 to 27 percent total gravel, 10 to 55 percent cobbles, 10 to 40 percent stones, 0 to 20 percent boulders, 76 to 87 percent total rock fragments

Organic matter—2 to 8 percent

Base saturation by ammonium acetate—3 to 15 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.10 to 0.25

P retention—2 to 10 percent

Glass content—2 to 10 percent

NaF pH—9.6 to 10.0

Soil reaction—slightly acid or neutral

Upper 2Bwb horizon:

Color (dry)—10YR 5/4, 6/3; 2.5Y 5/3, 5/4, 6/3, 6/4

Color (moist)—10YR 3/4, 4/3

Texture—very stony ashy sandy loam, extremely stony ashy sandy loam, extremely cobbly ashy very fine sandy loam, extremely cobbly ashy fine sandy loam, extremely bouldery ashy coarse sandy loam, extremely cobbly ashy sandy loam

Clay content—1 to 7 percent

Rock fragments—2 to 15 percent fine gravel, 10 to 21 percent medium and coarse

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gravel, 13 to 35 percent total gravel, 10 to 50 percent cobbles, 15 to 25 percent stones, 0 to 25 percent boulders, 50 to 88 percent total rock fragments
Organic matter—1.2 to 4 percent
Base saturation by ammonium acetate—1 to 38 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—2.0 to 2.50
P retention—70 to 80 percent
Glass content—30 to 45 percent
NaF pH—10.0 to 11.0
Soil reaction—slightly acid or neutral

Lower 2Bwb horizon:

Color (dry)—10YR 6/3; 2.5Y 5/3, 5/4, 6/3, 6/4
Color (moist)—10YR 3/4, 4/3, 4/4; 2.5Y 4/4
Texture—very stony medial fine sandy loam, extremely cobbly medial very fine sandy loam, extremely cobbly medial fine sandy loam, very stony medial sandy loam, extremely stony medial fine sandy loam, extremely bouldery medial coarse sandy loam, very stony medial fine sandy loam, extremely stony medial sandy loam
Clay content—2 to 8 percent
Rock fragments—2 to 25 percent fine gravel, 8 to 25 percent medium and coarse gravel, 10 to 45 percent total gravel, 5 to 40 percent cobbles, 10 to 40 percent stones, 0 to 25 percent boulders, 35 to 75 percent total rock fragments
Organic matter—1.0 to 2.5 percent
Base saturation by ammonium acetate—3 to 10 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—2.5 to 3.5
P retention—90 to 100 percent
Glass content—7 to 25 percent
NaF pH—10.3 to 11.2
Soil reaction—slightly acid to slightly alkaline

Brokeoff Series

The Brokeoff series consists of moderately deep, well drained soils that formed in tephra and colluvium over residuum from hydrothermally altered volcanic rock. Brokeoff soils are on convex mountain side slopes in hydrothermally altered areas. Slopes range from 10 to 80 percent. The mean annual precipitation is about 117 inches (2,972 millimeters), and the mean annual air temperature is about 39 degrees F (4 degrees C).

Taxonomic Classification

Loamy-skeletal over fragmental, isotic, frigid Typic Dystroxerepts

Typical Pedon

Brokeoff gravelly ashy loam (fig. 80) on a southwest-facing (198 degrees) slope of 35 percent under a cover of mountain monardella, lupine, and woolly mule-ears at an elevation of 7,686 feet (2,343 meters). When described on 9/20/06, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

A1—0 to 2 inches (0 to 4 centimeters); pale brown (10YR 6/3) gravelly ashy loam, dark brown (10YR 3/3) moist; 18 percent clay; weak thick platy structure parting to single grain; soft, very friable, nonsticky, nonplastic; common very fine and fine roots; many very fine and fine interstitial pores; 15 percent angular fine gravel and 15 percent angular medium and coarse gravel; very strongly acid, pH 4.8 by Hellige-Truog; NaF pH 9.2; abrupt smooth boundary.

A2—2 to 4 inches (4 to 10 centimeters); brown (10YR 5/3) gravelly ashy loam, dark



Figure 80.—Typical profile of Brokeoff soil. Depth is marked in centimeters.

grayish brown (10YR 4/2) moist; 20 percent clay; moderate very fine, fine, and medium subangular blocky structure parting to single grain; moderately hard, firm, nonsticky, nonplastic; common very fine and fine roots; many very fine and fine irregular, common fine and medium vesicular, and few medium tubular pores; 10 percent angular fine gravel and 20 percent angular medium and coarse gravel; moderately acid, pH 6.0 by Hellige-Truog; NaF pH 9.2; abrupt smooth boundary. Bw1—4 to 7 inches (10 to 19 centimeters); light olive brown (2.5Y 5/3) very gravelly clay loam, brown (10YR 4/3) moist; 29 percent clay; moderate very fine, fine, and medium subangular blocky structure parting to single grain; moderately hard, firm,

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slightly sticky, slightly plastic; many very fine to medium roots; many very fine and fine irregular and common medium vesicular pores; 15 percent angular fine gravel, 25 percent angular medium and coarse gravel, and 2 percent angular cobbles; strongly acid, pH 5.2 by Hellige-Truog; NaF pH 9.3; abrupt wavy boundary.

Bw2—7 to 15 inches (19 to 37 centimeters); brown (10YR 5/3) extremely gravelly loam, brown (10YR 4/3) moist; 26 percent clay; moderate fine and medium granular structure parting to single grain; moderately hard, firm, slightly sticky, slightly plastic; many fine and medium, few coarse, and few very fine roots; many very fine and fine irregular and few medium vesicular pores; 16 percent angular fine gravel, 24 percent angular medium and coarse gravel, and 20 percent angular cobbles; very strongly acid, pH 5.0 by Hellige-Truog; NaF pH 9.4; abrupt wavy boundary.

Cr—15 to 37 inches (37 to 94 centimeters); yellowish brown (10YR 5/4) cobbles, dark yellowish brown (10YR 4/4) moist; 25 percent clay; moderately cemented, slightly sticky, slightly plastic; few fine and medium roots; manganese coatings in cracks; 38 percent angular medium and coarse gravel, 45 percent angular cobbles, and 15 percent angular stones; very strongly acid, pH 5.0 by Hellige-Truog; NaF pH 9.4; abrupt irregular boundary.

R—37 inches (94 centimeters); indurated bedrock; few fine roots more than 10 centimeters apart.

Type Location

Shasta County, California; about 0.72 mile north-northeast from the Sulfur Works parking lot on Highway 89, approximately 1,650 feet east and 1,250 feet north of the southwest corner of sec. 15, T. 30 N., R. 4 E.; 40 degrees 27 minutes 26 seconds north latitude and 121 degrees 31 minutes 42 seconds west longitude, NAD83; USGS Quad: Lassen Peak, California.

Range in Characteristics

Depth to restrictive feature: 20 to 40 inches (51 to 102 centimeters) to lithic contact

Mean annual soil temperature: 42 to 47 degrees F (6 to 8 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section: Loamy-skeletal part—26 percent clay and 60 percent rock fragments; fragmental part—25 percent clay and 98 percent rock fragments

Surface fragments: 35 to 45 percent gravel, 5 to 15 percent cobbles, and 1 to 5 percent stones

A horizon:

Color (dry)—10YR 4/3, 5/3, 6/3

Color (moist)—10YR 2/2, 4/2, 3/3

Texture—gravelly ashy loam, very gravelly ashy clay loam

Clay content—18 to 30 percent

Rock fragments—10 to 15 percent fine gravel, 15 to 24 percent medium and coarse gravel, 0 to 5 percent cobbles, 30 to 38 percent total gravel, 30 to 43 percent total rock fragments

Organic matter—5 to 10 percent

Base saturation by ammonium acetate—35 to 45 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.55 to 0.62

P retention—48 to 55 percent

Glass content—5 to 10 percent

NaF pH—9.0 to 9.2

Soil reaction—very strongly acid to neutral

Bw horizon:

Color (dry)—10YR 5/3, 6/4; 2.5Y 5/3

Color (moist)—10YR 3/3, 4/3, 4/4

Texture—gravelly clay loam, very gravelly clay loam, extremely gravelly loam, extremely cobbly clay loam

Clay content—26 to 37 percent

Rock fragments—14 to 18 percent fine gravel, 8 to 30 percent medium and coarse gravel, 26 to 44 percent total gravel, 2 to 30 percent cobbles, 34 to 74 percent total rock fragments

Organic matter—3 to 6 percent

Base saturation by ammonium acetate—20 to 45 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.55 to 0.82

P retention—48 to 90 percent

Glass content—0 to 1 percent

NaF pH—9.0 to 9.4

Soil reaction—very strongly acid to neutral

Buttelake Series

The Buttelake series consists of deep, well drained soils that formed in recently deposited tephra over till from volcanic rocks. Buttelake soils are on ground moraines on volcanic plateaus and glacial-valley floors and walls in the Southern Cascade Mountains. Slopes range from 3 to 65 percent. The mean annual precipitation is about 25 inches (635 millimeters), and the mean annual air temperature is about 44 degrees F (7 degrees C).

Taxonomic Classification

Ashy over medial-skeletal, glassy over amorphic, frigid Humic Vitrixerands

Typical Pedon

Buttelake ashy sand on a north-facing (345 degrees) slope of 10 percent under a cover of Jeffery pine and white fir at an elevation of 5,891 feet (1,796 meters). When described on 10/3/06, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

Oi—0 to 0.4 inch (0 to 1 centimeter); slightly decomposed pine needles and twig litter; abrupt smooth boundary.

A—0.4 inch to 3 inches (1 to 8 centimeters); dark gray (2.5Y 4/1) ashy sand, black (2.5Y 2.5/1) moist; 0 percent clay; single grain; loose, nonsticky, nonplastic; common very fine and few fine roots; many very fine and fine interstitial pores; 1 percent subangular fine gravel and 1 percent subangular medium and coarse gravel; moderately acid, pH 5.9 by pH meter 1:1 water; NaF pH 8.2; abrupt smooth boundary.

C1—3 to 11 inches (8 to 27 centimeters); dark gray (2.5Y 4/1) ashy coarse sand, black (2.5Y 2.5/1) moist; 0 percent clay; single grain; loose, nonsticky, nonplastic; many very fine and few fine and medium roots; many very fine to medium interstitial pores; 2 percent subangular fine gravel; slightly acid, pH 6.5 by pH meter 1:1 water; NaF pH 9.1; abrupt smooth boundary.

C2—11 to 13 inches (27 to 33 centimeters); dark gray (2.5Y 4/1) and grayish brown (2.5Y 5/2) very gravelly ashy coarse sand, black (2.5Y 2.5/1) and very dark grayish brown (2.5Y 3/2) moist; 0 percent clay; single grain; loose, nonsticky, nonplastic; few fine and common very fine roots; many very fine to coarse interstitial pores; 20 percent subangular fine gravel and 20 percent subangular medium and coarse

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- gravel; neutral, pH 6.7 by pH meter 1:1 water; NaF pH 9.3; abrupt smooth boundary.
- 2Ab—13 to 19 inches (33 to 49 centimeters); light olive brown (2.5Y 5/3) very gravelly medial loamy coarse sand, very dark grayish brown (10YR 3/2) moist; 3 percent clay; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine to medium and few coarse roots; many very fine and fine interstitial pores; 15 percent subangular fine gravel and 25 percent subangular medium and coarse gravel; neutral, pH 6.7 by pH meter 1:1 water; NaF pH 10.8; abrupt wavy boundary.
- 2Bwb1—19 to 31 inches (49 to 79 centimeters); brown (10YR 5/3) very gravelly medial coarse sandy loam, very dark grayish brown (10YR 3/2) moist; 3 percent clay; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine to coarse roots; common very fine and fine tubular and interstitial pores; 15 percent subangular fine gravel and 20 percent subangular medium and coarse gravel; neutral, pH 6.7 by pH meter 1:1 water; NaF pH 11.0; clear smooth boundary.
- 2Bwb2—31 to 40 inches (79 to 102 centimeters); pale brown (10YR 6/3) extremely cobbly medial sandy loam, brown (10YR 4/3) moist; 2 percent clay; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; few very fine to medium roots; common very fine and fine tubular and interstitial pores; 7 percent subangular fine gravel, 28 percent subangular medium and coarse gravel, 20 percent subangular cobbles, and 10 percent subangular stones; neutral, pH 7.0 by pH meter 1:1 water; NaF pH 10.9; abrupt irregular boundary.
- 2Cdqb1—40 to 53 inches (102 to 135 centimeters); light brownish gray (10YR 6/2) extremely gravelly loamy coarse sand, dark grayish brown (10YR 4/2) moist; 1 percent clay; massive; hard, firm, noncemented, nonsticky, nonplastic; few very fine and fine roots; common very fine vesicular and few fine vesicular pores; 10 percent prominent yellow (10YR 7/6), dry, and dark yellowish brown (10YR 4/6), moist, masses of oxidized iron on faces of peds and around rock fragments; 5 percent threadlike silica masses; 25 percent subangular fine gravel, 40 percent subangular medium and coarse gravel, and 5 percent subangular cobbles; neutral, pH 6.9 by pH meter 1:1 water; NaF pH 10.4; clear smooth boundary.
- 2Cdqb2—53 to 63 inches (135 to 160 centimeters); light gray (10YR 7/1) gravel, dark grayish brown (10YR 4/2) moist; 2 percent clay; massive; hard, firm, noncemented, nonsticky, nonplastic; few very fine and fine roots; common very fine to medium vesicular pores; 10 percent threadlike silica masses around rock fragments and in cracks; 9 percent subangular fine gravel, 72 percent subangular medium and coarse gravel, and 10 percent subangular cobbles; neutral, pH 6.7 by pH meter 1:1 water; NaF pH 10.4.

Type Location

Lassen County, California; about 0.75 mile north of Bathtub Lake, approximately 1,250 feet south and 1,530 feet east of the northwest corner of sec. 3, T. 31 N., R. 6 E.; 40 degrees 34 minutes 54 seconds north latitude and 121 degrees 17 minutes 54 seconds west longitude; NAD83; USGS Quad: Prospect Peak, California.

Range in Characteristics

Depth to restrictive feature: 40 to 60 inches (102 to 152 centimeters) to densic contact

Mean annual soil temperature: 45 to 47 degrees F (7 to 8 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (weighted average): Ashy part—0 to 1 percent clay and 5 to 22 percent rock fragments; medial-skeletal part—0 to 8 percent clay and 30 to 66 percent rock fragments

Surface fragments: 0 to 5 percent gravel and 0 to 3 percent cobbles

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A horizon:

Color (dry)—10YR 3/1, 4/1; 2.5Y 2.5/1, 3/1, 4/1, 4/2; 5Y 2/1, 2.5/1, 3/2
Color (moist)—10YR 2/1, 3/1; 2.5Y 2.5/1, 3/1; 5Y 2/1, 2.5/1
Texture—ashy sand, gravelly ashy sand, ashy loamy sand, ashy sandy loam, ashy coarse sand
Clay content—0 to 2 percent
Rock fragments—1 to 10 percent fine gravel, 0 to 5 percent medium and coarse gravel, 1 to 15 percent total gravel, 1 to 15 percent total rock fragments
Organic matter—0.5 to 3.5 percent
Base saturation by ammonium acetate—55 to 70 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.05 to 0.15
P retention—2 to 6 percent
Glass content—9 to 18 percent
NaF pH—8.2 to 10.4
Soil reaction—moderately acid to neutral

C horizon:

Color (dry)—N 3/0, 4/0, 5/0; 10YR 3/1, 3/2, 4/1, 4/2, 4/4, 6/6, 7/2, 7/4; 2.5Y 3/1, 4/1, 4/2, 5/1, 5/2, 5/3; 5Y 2/1, 2.5/1, 3/1, 4/1, 5/2
Color (moist)—N 2.5/0, 3/0; 5B 4/1, 5/1, 6/1; 7.5YR 2.5/1; 10YR 2/1, 3/1, 3/4, 4/1, 4/2, 4/3, 5/6; 2.5Y 2.5/1, 3/1, 3/2, 4/2; 5Y 2/1, 2.5/1, 2.5/2, 4/3
Texture—ashy sand, gravelly ashy sand, extremely gravelly ashy sand, ashy coarse sand, gravelly ashy coarse sand, very gravelly ashy coarse sand, ashy loamy fine sand
Clay content—0 to 1 percent
Rock fragments—2 to 30 percent fine gravel, 0 to 20 percent medium and coarse gravel, 2 to 50 percent total gravel, 0 to 15 percent cobbles, 2 to 65 percent total rock fragments
Organic matter—0 to 0.8 percent
Base saturation by ammonium acetate—58 to 75 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.05 to 0.25 percent
P retention—2 to 10 percent
Glass content—7 to 65 percent
NaF pH—9.1 to 11.0
Soil reaction—slightly acid or neutral

2Ab horizon:

Color (dry)—10YR 4/3, 5/3, 6/3; 2.5Y 5/3
Color (moist)—10YR 2/2, 3/2, 4/2, 4/3; 2.5Y 3/2
Texture—gravelly medial loamy sand, gravelly medial loamy coarse sand, gravelly medial sandy loam, very gravelly medial sandy loam, very gravelly medial loamy coarse sand, stony medial sandy loam
Clay content—0 to 10 percent
Rock fragments—8 to 15 percent fine gravel, 7 to 25 percent medium and coarse gravel, 15 to 40 percent total gravel, 0 to 8 percent cobbles, 0 to 10 percent stones, 20 to 40 percent total rock fragments
Organic matter—4.0 to 6.5 percent
Base saturation by ammonium acetate—43 to 58 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.2 to 2.0 percent
P retention—75 to 90 percent
Glass content—22 to 29 percent
NaF pH—10 to 11.7
Soil reaction—slightly acid to slightly alkaline

2Bwb horizon:

Color (dry)—10YR 5/3, 6/3, 6/4; 2.5Y 5/3, 5/4, 6/4

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Color (moist)—10YR 3/2, 3/3, 4/3, 3/4, 4/4; 2.5Y 4/2
Texture—cobbley medial fine sandy loam, very gravelly medial sandy loam, very gravelly medial coarse sandy loam, very cobbley medial sandy loam, extremely cobbley medial sandy loam, extremely cobbley medial coarse sandy loam, bouldery medial sandy loam, very cobbley medial loam
Clay content—0 to 12 percent
Rock fragments—7 to 15 percent fine gravel, 6 to 40 percent medium and coarse gravel, 10 to 35 percent total gravel, 0 to 45 percent cobbles, 0 to 10 percent stones, 32 to 70 percent total rock fragments
Organic matter—3.0 to 5.5 percent
Base saturation by ammonium acetate—23 to 38 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—2.25 to 3.75 percent
P retention—85 to 100 percent
Glass content—4 to 14 percent
NaF pH—10.5 to 11.8
Soil reaction—slightly acid to moderately alkaline

2Cdq_b horizon:

Color (dry)—10YR 6/1, 7/1, 6/2, 6/3, 6/6, 7/6
Color (moist)—10YR 3/2, 4/2
Texture—very gravelly loamy sand, extremely gravelly loamy sand, extremely gravelly loamy coarse sand, very gravelly sandy loam, extremely gravelly sandy loam, extremely stony loamy coarse sand, extremely stony sandy loam, gravel
Clay content—0 to 7 percent
Rock fragments—9 to 25 percent fine gravel, 23 to 72 percent medium and coarse gravel, 35 to 81 percent total gravel, 5 to 20 percent cobbles, 0 to 20 percent stones, 51 to 91 percent total rock fragments
Organic matter—0 to 0.7 percent
Base saturation by ammonium acetate—20 to 28 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.25 to 1.60 percent
P retention—45 to 60 percent
NaF pH—10.0 to 11.0
Rupture resistance—noncemented
Soil reaction—slightly acid to slightly alkaline

Buttewash Series

The Buttewash series consists of deep, well drained soils that formed in recently deposited tephra over outwash from volcanic rocks. Buttewash soils are on outwash plains in the Southern Cascade Mountains. Slopes range from 0 to 15 percent. The mean annual precipitation is about 29 inches (737 millimeters), and the mean annual air temperature is about 44 degrees F (7 degrees C).

Taxonomic Classification

Ashy over medial, glassy over amorphous, frigid Humic Haploxerands

Typical Pedon

Buttewash ashy coarse sand (fig. 81) on a north-facing (348 degrees) slope of 1 percent under a cover of white fir, Jeffrey pine, *Haplopappus* ssp., western needlegrass, and big squirreltail in a recent burn at an elevation of 5,873 feet (1,790 meters). When described on 10/2/06, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

Oi—0 to 1 inch (0 to 2 centimeters); pine needle and bark litter; abrupt smooth boundary.



Figure 81.—Typical profile of Buttewash soil. Depth is marked in centimeters.

- A1—1 to 2 inches (2 to 6 centimeters); dark gray (2.5Y 4/1) ashy coarse sand, black (2.5Y 2.5/1) moist; 2 percent clay; single grain; loose, nonsticky, nonplastic; many very fine and common fine roots; many very fine and fine interstitial pores; 2 percent subrounded fine gravel and 2 percent subrounded medium and coarse gravel; moderately acid, pH 5.8 by pH meter 1:1 water; NaF pH 8.4; abrupt smooth boundary.
- A2—2 to 7 inches (6 to 18 centimeters); dark grayish brown (2.5Y 4/2) ashy coarse sand, black (2.5Y 2.5/1) moist; 2 percent clay; weak medium granular structure parting to single grain; loose, nonsticky, nonplastic; many very fine and common fine roots; many very fine and fine interstitial pores; 2 percent subrounded fine gravel and 2 percent subrounded medium and coarse gravel; slightly acid, pH 6.4 by pH meter 1:1 water; NaF pH 10.3; abrupt wavy boundary.
- C—7 to 12 inches (18 to 30 centimeters); dark gray (2.5Y 4/1) ashy coarse sand, black (2.5Y 2.5/1) moist; 1 percent clay; single grain; loose, nonsticky, nonplastic;

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- common very fine and fine roots; many very fine and fine interstitial pores; 2 percent subrounded fine gravel and 2 percent subrounded medium and coarse gravel; neutral, pH 6.7 by pH meter 1:1 water; NaF pH 9.9; abrupt wavy boundary.
- 2Ab—12 to 20 inches (30 to 50 centimeters); brown (10YR 5/3) gravelly medial coarse sandy loam, dark brown (7.5YR 3/2) moist; 6 percent clay; weak fine and medium granular structure; soft, very friable, nonsticky, nonplastic; common very fine and fine and few medium roots; common very fine and fine irregular and tubular pores; 10 percent subrounded fine gravel and 5 percent subrounded medium and coarse gravel; neutral, pH 6.6 by pH meter 1:1 water; NaF pH 11.0; clear smooth boundary.
- 2Bwb1—20 to 27 inches (50 to 68 centimeters); brown (10YR 5/3) medial sandy loam, dark brown (7.5YR 3/2) moist; 9 percent clay; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine to very coarse roots; common very fine and fine irregular and tubular pores; 5 percent subrounded fine gravel and 5 percent subrounded medium and coarse gravel; neutral, pH 6.7 by pH meter 1:1 water; NaF pH 11.1; clear smooth boundary.
- 2Bwb2—27 to 45 inches (68 to 115 centimeters); light yellowish brown (10YR 6/4) cobbly medial loam, dark yellowish brown (10YR 3/4) moist; 11 percent clay; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine to coarse and few very coarse roots; common very fine and fine irregular and tubular pores; 5 percent subrounded fine gravel, 5 percent subrounded medium and coarse gravel, and 15 percent subangular cobbles; slightly acid, pH 6.3 by pH meter 1:1 water; NaF pH 11.3; abrupt smooth boundary.
- 2Bqmb—45 to 57 inches (115 to 145 centimeters); light brownish gray (10YR 6/2) cemented extremely gravelly coarse sandy loam, dark grayish brown (10YR 4/2) moist; 5 percent clay; massive; very hard, extremely firm, weakly cemented, nonsticky, nonplastic; many very fine to medium interstitial pores; 3 percent threadlike yellow (10YR 8/6) silica concretions around rock fragments and in seams; 7 percent subangular fine gravel, 45 percent subangular medium and coarse gravel, and 30 percent subangular cobbles; slightly acid, pH 6.4 by pH meter 1:1 water; NaF pH 10.7; abrupt wavy boundary.
- 2Bqb—57 to 66 inches (145 to 167 centimeters); light yellowish brown (10YR 6/4) and pinkish gray (7.5YR 6/2) extremely gravelly loamy coarse sand, brown (10YR 4/3) moist; 5 percent clay; massive; soft, very friable, 20 percent weakly cemented, nonsticky, nonplastic; few very fine to medium roots; many very fine to medium interstitial pores; 15 percent threadlike yellow (10YR 8/6 and 7/6) and brownish yellow (10YR 6/6), moist, silica concretions around rock fragments; 7 percent subrounded fine gravel, 49 percent subrounded medium and coarse gravel, and 30 percent subangular cobbles; slightly acid, pH 6.5 by pH meter 1:1 water; NaF pH 10.9; abrupt smooth boundary.
- 2B'qmb—66 to 74 inches (167 to 187 centimeters); 10 percent pale brown (10YR 6/3), 10 percent pink (5YR 7/4), and 80 percent gray (10YR 6/1) cemented extremely gravelly loamy coarse sand, 20 percent light reddish brown (5YR 6/4) and 80 percent very dark gray (5YR 3/1) moist; 3 percent clay; massive; very hard, extremely firm, weakly cemented, nonsticky, nonplastic; many very fine to medium interstitial pores; 8 percent threadlike yellow (10YR 8/6) silica concretions around rock fragments; 7 percent subangular fine gravel, 52 percent subangular medium and coarse gravel, and 30 percent subangular cobbles; neutral, pH 6.6 by pH meter 1:1 water; NaF pH 10.8.

Type Location

Lassen County, California; about 0.8 mile north of Bathtub Lake, approximately 1,800 feet east and 800 feet south of the northwest corner of sec. 3, T. 31 N., R. 6 E.; 40

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degrees 34 minutes 59 seconds north latitude and 121 degrees 17 minutes 52 seconds west longitude, NAD83; USGS Quad: Prospect Peak, California.

Range in Characteristics

Depth to restrictive feature: 40 to 60 inches (102 to 152 centimeters) to duripan

Mean annual soil temperature: 45 to 47 degrees F (7 to 8 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section: Ashy part—0 to 3 percent clay and 2 to 14 percent rock fragments; medial part—6 to 11 percent clay and 10 to 25 percent rock fragments

Surface fragments: 0 to 50 percent gravel, 0 to 5 percent cobbles, and 0 to 2 percent stones

A horizon:

Color (dry)—2.5Y 3/1, 4/1, 4/2, 5/2; 10YR 2/1, 3/1; 5Y 4/2

Color (moist)—2.5Y 2.5/1; 10YR 2/1, 4/1

Texture—ashy sand, ashy coarse sand

Clay content—0 to 3 percent

Rock fragments—2 to 10 percent fine gravel, 0 to 5 percent medium and coarse gravel, 2 to 15 percent total gravel

Organic matter—1.2 to 8.5 percent

Base saturation by ammonium acetate—50 to 75 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.19 to 0.35

P retention—10 to 18 percent

Glass content—10 to 30 percent

NaF pH—9.0 to 10.8

Soil reaction—moderately acid to neutral

C horizon:

Color (dry)—2.5Y 3/1, 4/1, 4/2, 5/2; 5Y 4/1

Color (moist)—2.5Y 2.5/1, 3/2; 10YR 2/1, 3/1; 5Y 2.5/1

Texture—ashy coarse sand, gravelly ashy coarse sand, very gravelly ashy coarse sand

Clay content—0 to 2 percent

Rock fragments—2 to 35 percent fine gravel, 0 to 15 percent medium and coarse gravel, 4 to 50 percent total gravel

Organic matter—0 to 1.1 percent

Base saturation by ammonium acetate—60 to 70 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.12 to 0.18

P retention—0 to 3 percent

Glass content—20 to 25 percent

NaF pH—9.0 to 11

Soil reaction—slightly acid to neutral

2Ab horizon:

Color (dry)—10YR 5/3, 6/3; 2.5Y 5/2, 5/3

Color (moist)—10YR 2/2, 3/2; 7.5YR 3/2

Texture—medial coarse sandy loam, gravelly medial coarse sandy loam, very gravelly medial coarse sandy loam

Clay content—3 to 12 percent

Rock fragments—7 to 20 percent fine gravel, 5 to 20 percent medium and coarse gravel, 12 to 40 percent total gravel, 0 to 10 percent cobbles, 10 to 50 percent total rock fragments

Organic matter—3.8 to 6.0 percent

Base saturation by ammonium acetate—50 to 65 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—2.0 to 2.5

P retention—80 to 95 percent

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Glass content—28 to 35 percent
NaF pH—10.4 to 11.3
Soil reaction—slightly acid to neutral

2Bwb horizon:

Color (dry)—10YR 5/3, 6/3, 6/4, 7/3; 2.5Y 5/3, 6/3; 7.5YR 6/3
Color (moist)—10YR 3/2, 3/3, 3/4, 4/3; 7.5YR 3/2, 3/3, 4/3
Texture—medial sandy loam, gravelly medial loam, gravelly medial fine sandy loam, very gravelly medial sandy loam, very cobbly medial sandy loam, cobbly medial fine sandy loam, very cobbly medial fine sandy loam, very gravelly medial fine sandy loam, cobbly medial loam
Clay content—8 to 15 percent
Rock fragments—5 to 13 percent fine gravel, 4 to 20 percent medium and coarse gravel, 10 to 25 percent total gravel, 0 to 45 percent cobbles, 0 to 10 percent stones, 10 to 59 percent total rock fragments
Organic matter—4.3 to 8.5 percent
Base saturation by ammonium acetate—10 to 55 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—3.35 to 5.25
P retention—90 to 100 percent
Glass content—3 to 15 percent
NaF pH—10.2 to 11
Soil reaction—slightly acid to slightly alkaline

2Bqmb horizon:

Color (dry)—10YR 6/2, 6/3; 7.5YR 6/2; 5YR 7/4
Color (moist)—10YR 4/2; 7.5YR 3/3; 5YR 3/1, 3/2, 6/4
Texture—cemented gravelly sandy loam, cemented very cobbly sandy loam, cemented extremely cobbly coarse sandy loam, cemented extremely cobbly loamy coarse sand, cemented extremely gravelly coarse sandy loam
Clay content—2 to 7 percent
Rock fragments—7 to 15 percent fine gravel, 11 to 52 percent medium and coarse gravel, 20 to 60 percent total gravel, 10 to 50 percent cobbles, 0 to 10 percent stones, 30 to 89 percent total rock fragments
Organic matter—0 to 0.9 percent
Base saturation by ammonium acetate—3 to 20 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.10 to 1.45
P retention—48 to 62 percent
Glass content—1 to 15 percent
NaF pH—9.6 to 10.6
Rupture resistance—extremely weakly cemented to weakly cemented
Soil reaction—slightly acid to slightly alkaline

2Bqb horizon (if it occurs):

Color (dry)—7.5YR 6/2; 10YR 6/4
Color (moist)—7.5YR 4/3; 10YR 4/3
Texture—extremely cobbly loamy coarse sand, extremely gravelly loamy coarse sand
Clay content—2 to 7 percent
Rock fragments—7 to 15 percent fine gravel, 11 to 52 percent medium and coarse gravel, 20 to 60 percent total gravel, 10 to 50 percent cobbles, 0 to 10 percent stones, 60 to 89 percent total rock fragments
Organic matter—0.7 to 1.2 percent
Base saturation by ammonium acetate—12 to 20 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.1 to 1.9
P retention—65 to 78 percent
Glass content—1 to 15 percent

NaF pH—9.6 to 10.6

Rupture resistance—noncemented with discontinuous pockets that are extremely weakly cemented to weakly cemented

Soil reaction—slightly acid to slightly alkaline

Cascadesprings Series

The Cascadesprings series consists of moderately deep, well drained soils that formed in tephra over till from volcanic rocks. Cascadesprings soils are on ground moraines in the Southern Cascade Mountains. Slopes range from 5 to 30 percent. The mean annual precipitation is about 65 inches (1,651 millimeters), and the mean annual air temperature is about 41 degrees F (5 degrees C).

Taxonomic Classification

Ashy over medial-skeletal, glassy over amorphous, frigid Typic Vitrixerands

Typical Pedon

Cascadesprings gravelly ashy loamy coarse sand on a north-facing (30 degrees) slope of 15 percent under a cover of pinemat manzanita, lodgepole pine, western white pine, California red fir, and a few mountain hemlocks at an elevation of 6,948 feet (2,118 meters). When described on 6/5/2007, the soil was slightly moist throughout. (Colors are for dry soil unless otherwise noted.)

Oi—0 to 0.4 inch; (0 to 1 centimeter); slightly decomposed needles, twigs, and leaf litter; abrupt smooth boundary.

A1—0.4 inch to 2 inches (1 to 5 centimeters); grayish brown (2.5Y 5/2) gravelly ashy loamy coarse sand, very dark grayish brown (10YR 3/2) moist; 1 percent clay; weak thick platy structure parting to weak very fine to medium subangular blocky; nonsticky, nonplastic; few very fine and fine roots throughout; few fine tubular and many very fine and fine irregular pores; 15 percent subangular fine gravel and 15 percent subangular medium and coarse gravel; very strongly acid, pH 4.8 by pH meter 1:1 water; NaF pH 9.8; abrupt wavy boundary.

A2—2 to 9 inches (5 to 22 centimeters); pale brown (10YR 6/3) gravelly ashy loamy coarse sand, very dark grayish brown (10YR 3/2) moist; 3 percent clay; weak fine and medium subangular blocky structure parting to weak very fine and fine granular; nonsticky, nonplastic; many very fine and fine and common medium roots throughout; many very fine and fine irregular and few fine tubular pores; 12 percent subangular fine gravel, 12 percent subangular medium and coarse gravel, and 5 percent subangular cobbles; moderately acid, pH 5.6 by pH meter 1:1 water; NaF pH 10.7; abrupt wavy boundary.

2Bwb1—9 to 17 inches (22 to 42 centimeters); light yellowish brown (10YR 6/4) very gravelly medial coarse sandy loam, brown (10YR 4/3) moist; 3 percent clay; weak fine and medium subangular blocky structure; nonsticky, nonplastic; many very fine to medium and common coarse and very coarse roots throughout; many very fine and fine irregular and common very fine and fine tubular pores; 10 percent subangular fine gravel, 20 percent subangular medium and coarse gravel, and 10 percent subangular cobbles; moderately acid, pH 5.8 by pH meter 1:1 water; NaF pH 11.4; abrupt wavy boundary.

2Bwb2—17 to 27 inches (42 to 68 centimeters); very pale brown (10YR 7/4) very stony medial loamy coarse sand, brown (10YR 4/3) moist; 0 percent clay; weak fine subangular blocky structure parting to single grain; nonsticky, nonplastic; many very fine to very coarse roots throughout; common very fine and fine irregular pores; 6 percent subangular fine gravel, 12 percent subangular medium and coarse gravel, 20 percent subangular cobbles, and 20 percent subangular

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stones; slightly acid, pH 6.1 by pH meter 1:1 water; NaF pH 11.3; abrupt wavy boundary.

2Cd—27 to 33 inches (68 to 83 centimeters); white (2.5Y 8/1) very cobbly ashy sandy loam, grayish brown (2.5Y 5/2) moist; 2 percent clay; massive parting to single grain; moderately hard, firm, nonsticky, nonplastic; common very fine and fine irregular and tubular pores; 14 percent subangular fine gravel, 11 percent subangular medium and coarse gravel, 25 percent subangular cobbles, and 5 percent subangular stones; slightly acid, pH 6.2 by pH meter 1:1 water; NaF pH 10.9.

Type Location

Shasta County, California; about 0.75 mile southwest of the Summit Lake Ranger Station, approximately 2,100 feet north and 800 feet east from the southwest corner of sec. 4, T. 30 N., R. 5 E.; 40 degrees 29 minutes 21 seconds north latitude and 121 degrees 26 minutes 12 seconds west longitude, NAD83; USGS Quad: Reading Peak, California.

Range in Characteristics

Depth to restrictive feature: 20 to 40 inches (51 to 102 centimeters) to densic contact

Mean annual soil temperature: 40 to 43 degrees F (4 to 6 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section: Ashy part—1 to 3 percent clay and 10 to 30 percent rock fragments; medial-skeletal part—0 to 3 percent clay and 40 to 58 percent rock fragments

Surface fragments: 3 to 35 percent gravel, 5 to 10 percent cobbles, 2 to 8 percent stones, and 0 to 3 percent boulders

Other characteristics: Some pedons have an AB, 2Cq, or 2Cdq horizon

A horizon:

Color (dry)—10YR 4/2, 4/3, 5/3, 6/2, 6/3; 2.5Y 5/2, 6/2

Color (moist)—10YR 2/2, 3/2, 3/3, 4/2, 4/3; 2.5Y 3/2

Texture—ashy sandy loam, gravelly ashy loamy sand, gravelly ashy loamy coarse sand, gravelly ashy sandy loam, gravelly ashy coarse sandy loam, very gravelly ashy sandy loam

Clay content—1 to 5 percent

Rock fragments—5 to 15 percent fine gravel, 2 to 25 percent medium and coarse gravel, 10 to 40 percent total gravel, 0 to 5 percent cobbles, 0 to 5 percent stones, 10 to 50 percent total rock fragments

Organic matter—4 to 12 percent

Base saturation by ammonium acetate—3 to 20 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.52 to 0.71

P retention—25 to 55 percent

Glass content—30 to 40 percent

NaF pH—9.0 to 11.6

Soil reaction—very strongly acid to slightly acid

2Bwb horizon:

Color (dry)—10YR 5/4, 6/3, 6/4, 7/2, 7/3, 7/4, 8/3; 2.5Y 6/3, 6/4

Color (moist)—10YR 3/3, 3/4, 4/3, 4/4, 5/2, 5/3, 5/4; 2.5Y 4/3, 4/4

Texture—gravelly medial fine sandy loam, gravelly medial sandy loam, very gravelly medial fine sandy loam, very gravelly medial sandy loam, stony medial sandy loam, very stony medial sandy loam, extremely stony medial sandy loam, very gravelly medial coarse sandy loam, very stony medial loamy coarse sand

Clay content—0 to 8 percent

Rock fragments—6 to 20 percent fine gravel, 4 to 25 percent medium and coarse

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gravel, 15 to 45 percent total gravel, 0 to 20 percent cobbles, 0 to 25 percent stones, 30 to 60 percent total rock fragments
Organic matter—3.5 to 8.5 percent
Base saturation by ammonium acetate—0 to 5 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—2.35 to 3.10
P retention—90 to 100 percent
Glass content—35 to 45 percent
NaF pH—10.7 to 11.6
Soil reaction—moderately acid to neutral

2Cd horizon:

Color (dry)—10YR 6/3, 7/1, 7/2, 8/1, 8/2, 8/3; 2.5Y 8/1
Color (moist)—10YR 4/3, 5/2, 5/3, 5/4, 6/1, 6/2, 6/3, 6/4; 2.5Y 5/2, 5/3
Texture—very gravelly ashy sandy loam, extremely gravelly ashy sandy loam, extremely gravelly ashy loamy fine sand, very cobbly ashy sandy loam, extremely cobbly ashy very fine sandy loam, extremely stony ashy sandy loam
Clay content—1 to 6 percent
Rock fragments—7 to 26 percent fine gravel, 1 to 50 percent medium and coarse gravel, 8 to 70 percent total gravel, 0 to 25 percent cobbles, 0 to 25 percent stones, 55 to 70 percent total rock fragments
Organic matter—0.5 to 1.5 percent
Base saturation by ammonium acetate—0 to 0.5 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.40 to 1.50
P retention—60 to 75 percent
Glass content—20 to 30 percent
NaF pH—10.6 to 11.6
Rupture resistance—slightly hard to very hard
Soil reaction—moderately acid to neutral

Cenplat Series

The Cenplat series consists of moderately deep, well drained soils that formed in tephra over residuum from volcanic rock. Cenplat soils are on glacially scoured lava plateaus in the Southern Cascade Mountains. Slopes range from 0 to 60 percent. The mean annual precipitation is about 53 inches (1,346 millimeters), and the mean annual air temperature is about 42 degrees F (6 degrees C).

Taxonomic Classification

Ashy over medial-skeletal, glassy over amorphous, frigid Typic Haploxerands

Typical Pedon

Cenplat ashy loamy sand (fig. 82) on a southeast-facing (186 degrees) slope of 15 percent under a cover of California red fir, western white pine, and pinemat manzanita at an elevation of 7,196 feet (2,193 meters). When described on 6/13/2007, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

Oi—0 to 0.4 inch (0 to 1 centimeter); slightly decomposed needles, twigs, and leaf litter; abrupt smooth boundary.

A—0.4 inch to 2 inches (1 to 6 centimeters); grayish brown (10YR 5/2) ashy loamy sand, very dark gray (10YR 3/1) moist; 2 percent clay; weak very thick platy structure; loose, nonsticky, nonplastic; common very fine and fine roots; few fine tubular and many very fine and fine interstitial pores; 10 percent subangular fine gravel and 3 percent subangular medium gravel; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 9.1; clear wavy boundary.

C1—2 to 5 inches (6 to 13 centimeters); white (10YR 8/1) ashy sand, grayish brown



Figure 82.—Typical profile of Cenplat soil. Depth is marked in centimeters.

(2.5Y 5/2) moist; 0 percent clay; weak fine and medium subangular blocky structure; loose, nonsticky, nonplastic; many very fine and fine and common medium roots; many very fine and fine interstitial and few fine and medium tubular pores; 3 percent subangular fine gravel and 2 percent subangular medium and coarse gravel; neutral, pH 6.8 by Hellige-Truog; NaF pH 9.3; abrupt wavy boundary.

C2—5 to 8 inches (13 to 21 centimeters); white (10YR 8/1) extremely cobbly ashy coarse sand, grayish brown (10YR 5/2) moist; 0 percent clay; single grain; loose, nonsticky, nonplastic; few very fine and fine and common medium roots; many very fine to medium interstitial pores; 16 percent subangular fine gravel, 10 percent subangular medium and coarse gravel, 25 percent subangular cobbles, and 10 percent subangular stones; neutral, pH 6.8 by Hellige-Truog; NaF pH 10.0; abrupt wavy boundary.

2Bwb1—8 to 17 inches (21 to 43 centimeters); pale brown (10YR 6/3) extremely cobbly medial sandy loam, dark yellowish brown (10YR 3/4) moist; 8 percent clay; weak very fine subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; many very fine to medium and common coarse and very coarse roots; many very fine and fine irregular and common fine tubular pores; 5 percent subangular fine gravel, 12 percent subangular medium and coarse gravel, 40 percent subangular cobbles, 20 percent subangular stones, and 5 percent subangular boulders; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 10.7; clear smooth boundary.

2Bwb2—17 to 24 inches (43 to 60 centimeters); light yellowish brown (10YR 6/4)

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extremely cobbly medial sandy loam, dark yellowish brown (10YR 4/4) moist; 5 percent clay; weak very fine subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; many very fine to medium and common coarse and very coarse roots; many very fine and fine irregular and common fine tubular pores; 5 percent subangular fine gravel, 5 percent subangular medium and coarse gravel, 40 percent subangular cobbles, 20 percent subangular stones, and 5 percent subangular boulders; slightly acid, pH 6.3 by Hellige-Truog; NaF pH 11.0; clear smooth boundary.

2Bwb3—24 to 31 inches (60 to 78 centimeters); light yellowish brown (10YR 6/4) extremely gravelly medial sandy loam, dark yellowish brown (10YR 3/4) moist; 3 percent clay; single grain; loose, nonsticky, nonplastic; common fine and few medium roots; many very fine and fine irregular pores; 15 percent angular fine gravel and 50 percent angular medium and coarse gravel; slightly acid, pH 6.3 by Hellige-Truog; NaF pH 11.3; abrupt irregular boundary.

2R—31 inches (78 centimeters); indurated andesite bedrock.

Type Location

Shasta County, California; about 0.75 mile east of the base of Hat Mountain, approximately 1,400 feet south and 1,300 feet east of the northwest corner of sec. 35, T. 31 N., R. 5 E.; 40 degrees 30 minutes 30 seconds north latitude and 121 degrees 23 minutes 41 seconds west longitude, NAD83; USGS Quad: West Prospect Peak, California.

Range in Characteristics

Depth to restrictive feature: 20 to 40 inches (51 to 102 centimeters) to lithic contact

Mean annual soil temperature: 40 to 45 degrees F (6 to 7 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section: Ashy part—0 to 2 percent clay and 5 to 13 percent rock fragments; medial-skeletal part—3 to 8 percent clay and 65 to 82 percent rock fragments

Surface fragments: 5 to 45 percent gravel, 0 to 5 percent cobbles, 3 to 10 percent stones, and 3 to 10 percent boulders

A horizon:

Color (dry)—10YR 4/1, 4/2, 5/3; 2.5Y 4/1, 4/2

Color (moist)—10YR 3/1, 3/2; 2.5Y 2.5/1, 3/1, 3/2

Texture—ashy sand, ashy loamy sand, gravelly ashy loamy sand

Clay content—1 to 3 percent

Rock fragments—5 to 13 percent fine gravel, 2 to 9 percent medium and coarse gravel, 7 to 22 percent total gravel, 0 to 10 percent cobbles, 7 to 32 percent total rock fragments

Organic matter—4 to 10 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.40 to 0.71

P retention—25 to 55 percent

Glass content—30 to 60 percent

NaF pH—9.0 to 10.2

Soil reaction—slightly acid or neutral

C horizon:

Color (dry)—10YR 7/2, 8/1

Color (moist)—10YR 5/2, 5/3

Texture—ashy sand, very cobbly ashy loamy sand, extremely cobbly ashy coarse sand

Clay content—0 to 2 percent

Rock fragments—3 to 16 percent fine gravel, 2 to 10 percent medium and coarse

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gravel, 5 to 26 percent total gravel, 0 to 30 percent cobbles, 0 to 10 percent stones, 5 to 61 percent total rock fragments
Organic matter—0.5 to 3 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.18 to 0.30
P retention—10 to 20 percent
Glass content—55 to 65 percent
NaF pH—9.3 to 11.1
Soil reaction—slightly acid or neutral

Upper 2Bwb horizon:

Color (dry)—10YR 5/4, 6/3, 6/4; 2.5Y 6/3, 6/4
Color (moist)—10YR 3/4, 4/3, 4/4; 2.5Y 4/4
Texture—very gravelly medial sandy loam, extremely gravelly medial sandy loam, very cobbly medial sandy loam, extremely cobbly medial sandy loam, very stony medial sandy loam, extremely stony medial sandy loam
Clay content—3 to 8 percent
Rock fragments—5 to 25 percent fine gravel, 5 to 50 percent medium and coarse gravel, 10 to 65 percent total gravel, 0 to 40 percent cobbles, 0 to 20 percent stones, 0 to 10 percent boulders, 41 to 85 percent total rock fragments
Organic matter—2.5 to 5.0 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—2.35 to 3.11
P retention—91 to 100 percent
Glass content—36 to 45 percent
NaF pH—10.5 to 11.5
Soil reaction—slightly acid or neutral

Lower 2Bwb horizon:

Color (dry)—10YR 5/4, 6/3, 6/4; 2.5Y 6/3, 6/4
Color (moist)—10YR 4/3, 4/4; 2.5Y 4/4
Texture—very gravelly medial sandy loam, extremely gravelly medial sandy loam, very cobbly medial sandy loam, extremely cobbly medial sandy loam
Clay content—3 to 8 percent
Rock fragments—10 to 25 percent fine gravel, 15 to 55 percent medium and coarse gravel, 30 to 75 percent total gravel, 0 to 40 percent cobbles, 0 to 10 percent stones, 0 to 12 percent boulders, 45 to 85 percent total rock fragments
Organic matter—1.2 to 2.5 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.93 to 3.11
P retention—55 to 100 percent
Glass content—36 to 45 percent
NaF pH—10.5 to 11.5
Soil reaction—slightly acid or neutral

Chaos Series

The Chaos series consists of very deep, somewhat excessively drained soils that formed in rockfall avalanche deposits from rhyodacite. Chaos soils are on rockfall avalanches from Chaos Crags. Slopes range from 2 to 30 percent. The mean annual precipitation is about 43 inches (1,092 millimeters), and the mean annual air temperature is about 43 degrees F (6.5 degrees C).

Taxonomic Classification

Loamy-skeletal, isotic, nonacid, frigid Typic Xerorthents

Typical Pedon

Chaos extremely gravelly ashy coarse sand (fig. 83) on a west-facing (250 degrees)

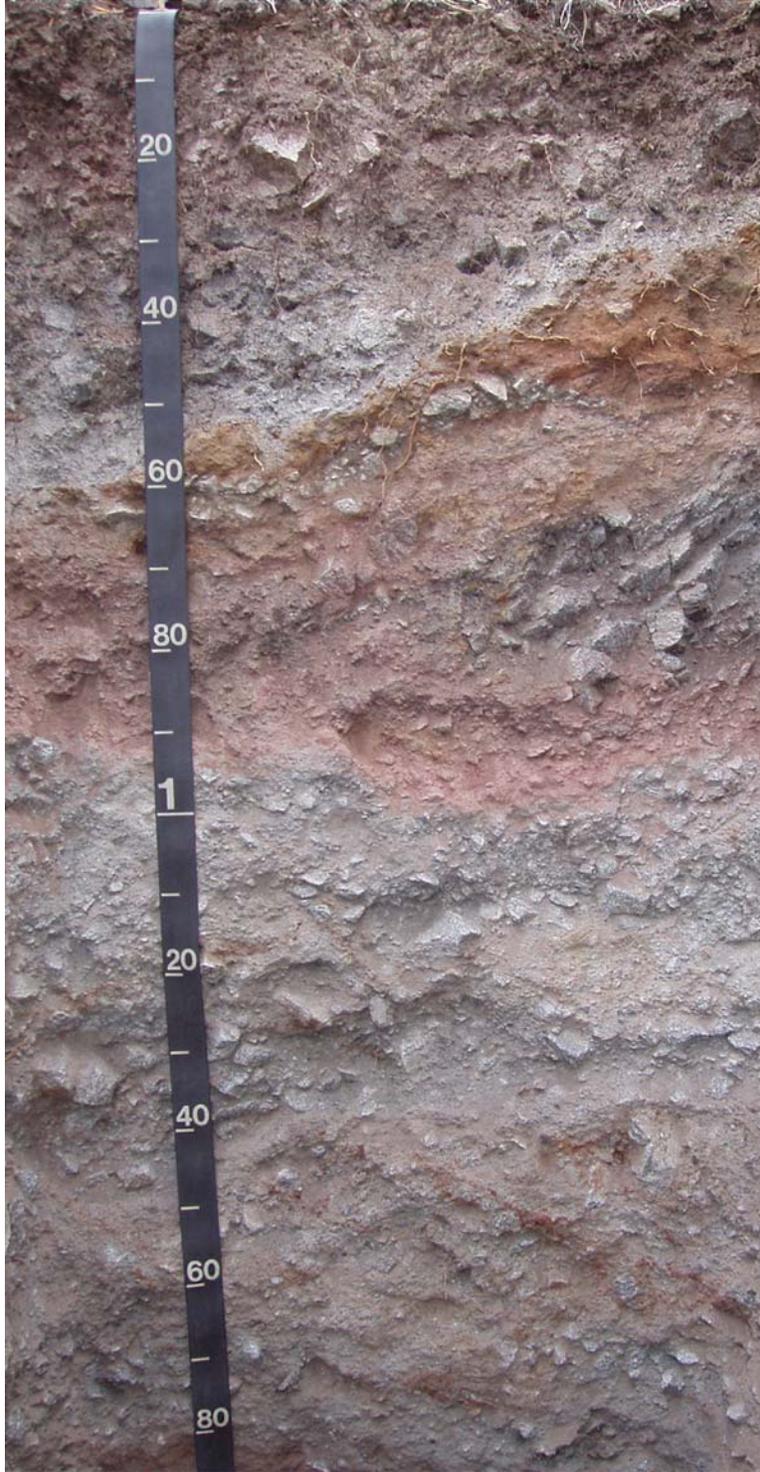


Figure 83.—Typical profile of Chaos soil. Depth is marked in centimeters.

slope of 6 percent under a cover of Jeffery pine, lodgepole pine, western white pine, and white fir at an elevation of 5,963 feet (1,809 meters). When described on 10/4/07, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

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- Oi—0 to 0.4 inch (0 to 1 centimeter); pine needles and twigs; abrupt smooth boundary.
- A—0.4 inch to 4 inches (1 to 9 centimeters); light brownish gray (10YR 6/2) extremely gravelly ashy coarse sand, dark grayish brown (10YR 4/2) moist; 1 percent clay; single grain; many very fine and fine and few medium roots; many very fine and fine interstitial pores; 22 percent angular fine gravel and 50 percent angular medium and coarse gravel; strongly acid, pH 5.3 by pH meter 1:1 water; NaF pH 7.9; clear smooth boundary.
- AC—4 to 9 inches (9 to 23 centimeters); pinkish gray (7.5YR 6/2) gravel, brown (7.5YR 4/2) moist; 1 percent clay; single grain; many very fine to medium roots; many very fine and fine and few medium interstitial pores; 10 percent angular fine gravel, 75 percent angular medium and coarse gravel, and 5 percent angular cobbles; slightly acid, pH 6.3 by pH meter 1:1 water; NaF pH 8.8; abrupt wavy boundary.
- C1—9 to 21 inches (23 to 53 centimeters); white (10YR 8/1) extremely gravelly ashy coarse sand, grayish brown (10YR 5/2) moist; 1 percent clay; single grain; common very fine to medium and many coarse and very coarse roots; common very fine and fine interstitial pores; 14 percent angular fine gravel, 50 percent angular medium and coarse gravel, and 10 percent angular cobbles; slightly acid, pH 6.1 by pH meter 1:1 water; NaF pH 9.0; abrupt wavy boundary.
- C2—21 to 23 inches (53 to 59 centimeters); pink (7.5YR 7/3) gravelly ashy sandy loam, brown (7.5YR 4/3) moist; 4 percent clay; weak fine subangular blocky structure parting to single grain; few very fine and fine, many medium and coarse, and few very coarse roots; common fine vesicular and many very fine and fine interstitial pores; 10 percent subangular fine gravel and 10 percent subangular medium and coarse gravel; moderately acid, pH 6.0 by pH meter 1:1 water; NaF pH 9.8; abrupt wavy boundary.
- C3—23 to 27 inches (59 to 68 centimeters); pinkish gray (7.5YR 6/2) very gravelly ashy loamy coarse sand, brown (7.5YR 4/2) moist; 2 percent clay; massive; few very fine to medium roots; many very fine interstitial and common fine tubular and vesicular pores; 15 percent subangular fine gravel and 30 percent subangular medium and coarse gravel; slightly acid, pH 6.4 by pH meter 1:1 water; NaF pH 8.6; abrupt wavy boundary.
- C4—27 to 36 inches (68 to 92 centimeters); light reddish brown (2.5YR 7/3) gravelly ashy loamy coarse sand, reddish brown (2.5YR 5/4) moist; 2 percent clay; massive; common very fine and few fine and medium roots; common very fine interstitial and many fine vesicular pores; 13 percent subangular fine gravel, 13 percent subangular medium and coarse gravel, and 3 percent subangular cobbles; slightly acid, pH 6.3 by pH meter 1:1 water; NaF pH 9.0; abrupt smooth boundary.
- C5—36 to 56 inches (92 to 142 centimeters); light gray (10YR 7/1) very gravelly ashy loamy coarse sand, gray (10YR 5/1) moist; 3 percent clay; massive; nonsticky, nonplastic; common very fine and few fine and medium roots; common fine vesicular, many very fine and fine, and common medium interstitial pores; 12 percent subangular fine gravel, 20 percent subangular medium and coarse gravel, and 20 percent subangular cobbles; slightly acid, pH 6.5 by pH meter 1:1 water; NaF pH 8.9; clear smooth boundary.
- C6—56 to 75 inches (142 to 191 centimeters); light gray (7.5YR 7/1) extremely gravelly ashy loamy coarse sand, dark gray (7.5YR 4/1) moist; 4 percent clay; massive; few very fine and fine and common medium roots; many very fine and fine interstitial, common fine, and few medium vesicular pores; 20 percent subangular fine gravel, 35 percent subangular medium and coarse gravel, and 7 percent subangular cobbles; neutral, pH 6.8 by pH meter 1:1 water; NaF pH 8.8; abrupt smooth boundary.
- C7—75 to 87 inches (191 to 220 centimeters); pinkish gray (5YR 6/2) gravelly ashy

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loamy sand, dark reddish gray (5YR 4/2) moist; 0 percent clay; massive; few very fine roots throughout; many very fine and fine interstitial and few fine vesicular pores; 16 percent subangular fine gravel and 16 percent subangular medium and coarse gravel; slightly acid, pH 6.5 by pH meter 1:1 water; NaF pH 8.2. (Note: Horizon has weathered porous gravel.)

Type Location

Shasta County, California; about 0.13 mile southeast of Lily Pond, approximately 800 feet west and 2,100 feet south of the northeast corner of sec. 18, T. 31 N., R. 4 E.; 40 degrees 32 minutes 16 seconds north latitude and 121 degrees 33 minutes 41 seconds west longitude, NAD83; USGS Quad: Manzanita Lake, California.

Range in Characteristics

Depth to restrictive feature: More than 60 inches (152 centimeters) to bedrock

Mean annual soil temperature: 43 to 47 degrees F (6 to 8 degrees C)

Period that soil moisture control section is dry: June to November (about 180 days)

Particle-size control section (weighted average): 0 to 2 percent clay and 27 to 83 percent rock fragments

Surface fragments: 15 to 60 percent gravel, 10 to 70 percent cobbles, 2 to 50 percent stones, and 0 to 50 percent boulders

A horizon:

Color (dry)—10YR 6/1, 6/2

Color (moist)—10YR 3/2, 4/2

Texture—gravelly ashy coarse sand, very gravelly ashy coarse sand, extremely gravelly ashy coarse sand

Clay content—0 to 1 percent

Rock fragments—8 to 22 percent fine gravel, 4 to 50 percent medium and coarse gravel, 12 to 72 percent total gravel, 0 to 5 percent cobbles, 0 to 3 percent stones, 0 to 3 percent boulders, 17 to 72 percent total rock fragments

Organic matter—1 to 4.5 percent

Base saturation by ammonium acetate—38 to 50 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.05 to 0.11

P retention—1 to 8 percent

Glass content—12 to 18 percent

NaF pH—7.9 to 9.7

Soil reaction—strongly acid to slightly acid

AC horizon:

Color (dry)—10YR 7/1, 7/2; 7.5YR 6/2

Color (moist)—10YR 3/2; 7.5YR 4/2

Texture—gravel, extremely gravelly ashy coarse sand, extremely gravelly ashy sand, extremely cobbly ashy sand, extremely cobbly ashy coarse sand, ashy gravel

Clay content—0 to 1 percent

Rock fragments—5 to 10 percent fine gravel, 30 to 75 percent medium and coarse gravel, 35 to 85 percent total gravel, 5 to 45 percent cobbles, 0 to 5 percent stones, 0 to 5 percent boulders, 70 to 92 percent total rock fragments

Organic matter—0.5 to 1.5 percent

Base saturation by ammonium acetate—50 to 65 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.02 to 0.10

P retention—1 to 8 percent

Glass content—5 to 15 percent

NaF pH—8.8 to 9.5

Soil reaction—slightly acid

C horizons:

Color (dry)—2.5YR 7/3; 5YR 6/2; 7.5YR 6/2, 7/1, 7/3, 8/1; 10YR 6/2, 7/1, 7/2, 7/3, 8/1

Color (moist)—2.5YR 5/4; 5YR 4/2; 7.5YR 4/1, 4/2, 4/3, 5/2; 10YR 4/2, 5/1, 5/2, 6/2

Texture—gravelly ashy loamy sand, gravelly ashy loamy coarse sand, gravelly ashy sandy loam, very gravelly ashy sand, very gravelly ashy loamy sand, very gravelly ashy loamy coarse sand, extremely gravelly ashy loamy coarse sand, extremely gravelly ashy coarse sand, very cobbly ashy loamy sand, very cobbly ashy loamy coarse sand, extremely cobbly ashy loamy sand

Clay content—0 to 4 percent

Rock fragments—5 to 20 percent fine gravel, 7 to 50 percent medium and coarse gravel, 14 to 64 percent total gravel, 3 to 45 percent cobbles, 0 to 30 percent stones, 0 to 5 percent boulders, 20 to 90 percent total rock fragments

Organic matter—0 to 0.5 percent

Base saturation by ammonium acetate—22 to 100 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0 to 0.20

P retention—1 to 28 percent

Glass content—8 to 20 percent

NaF pH—8.2 to 10.5

Soil reaction—moderately acid to neutral

Cragwash Series

The Cragwash series consists of deep, well drained soils that formed in alluvium redeposited from tephra over outwash from volcanic rocks. Cragwash soils are on outwash plains. Slopes range from 1 to 30 percent. The mean annual precipitation is about 41 inches (1,041 millimeters), and the mean annual air temperature is about 43 degrees F (6 degrees C).

Taxonomic Classification

Ashy-skeletal over sandy or sandy-skeletal, glassy over isotic, frigid Typic Vitrixerands

Typical Pedon

Cragwash ashy loamy coarse sand on a northwest-facing (312 degrees) slope of 5 percent under a cover of white fir and Jeffrey pine at an elevation of 5,669 feet (1,728 meters). When described on 10/2/07, the soil was slightly moist to a depth of 3 inches (7 centimeters) and dry to a depth of 82 inches (208 centimeters). (Colors are for dry soil unless otherwise noted.)

Oi—0 to 2 inches (0 to 4 centimeters); fresh and slightly decomposed needles, twigs, and branches; abrupt smooth boundary.

A1—2 to 3 inches (4 to 7 centimeters); dark grayish brown (10YR 4/2) ashy loamy coarse sand, very dark brown (10YR 2/2) moist; 4 percent clay; weak thick platy structure; soft, very friable, nonsticky, nonplastic; common very fine roots; common very fine interstitial and tubular pores; 2 percent subangular medium and coarse gravel and 10 percent subangular fine gravel; strongly acid, pH 5.5 by pH meter 1:1 water; NaF pH 8.5; abrupt smooth boundary.

A2—3 to 5 inches (7 to 13 centimeters); light brownish gray (10YR 6/2) gravelly ashy coarse sand, very dark grayish brown (10YR 3/2) moist; 3 percent clay; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine and fine roots; many very fine irregular and tubular pores; 5 percent subangular medium and coarse gravel and 20 percent subangular fine

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- gravel; moderately acid, pH 5.9 by pH meter 1:1 water; NaF pH 10.3; clear smooth boundary.
- C—5 to 11 inches (13 to 29 centimeters); light gray (10YR 7/2) very gravelly ashy coarse sandy loam, dark grayish brown (10YR 4/2) moist; 2 percent clay; massive parting to weak fine to coarse subangular blocky structure; soft, very friable, nonsticky, nonplastic; few coarse and common very fine to medium roots; few fine irregular and tubular and common very fine irregular and tubular pores; 20 percent angular medium and coarse gravel and 20 percent angular fine gravel; slightly acid, pH 6.1 by pH meter 1:1 water; NaF pH 10.6; abrupt smooth boundary.
- 2Ab—11 to 17 inches (29 to 43 centimeters); brown (10YR 5/3) very gravelly ashy loamy coarse sand, dark brown (10YR 3/3) moist; 3 percent clay; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very coarse and many very fine to coarse roots; common very fine irregular and tubular pores; 20 percent subangular fine gravel and 30 percent subangular medium and coarse gravel; slightly acid, pH 6.1 by pH meter 1:1 water; NaF pH 10.8; abrupt smooth boundary.
- 2Bwb1—17 to 27 inches (43 to 68 centimeters); pale brown (10YR 6/3) very gravelly ashy loamy coarse sand, brown (10YR 4/3) moist; 2 percent clay; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very coarse and many very fine to coarse roots; common very fine irregular and tubular pores; 5 percent subangular cobbles, 18 percent subangular fine gravel, and 35 percent subangular medium and coarse gravel; slightly acid, pH 6.2 by pH meter 1:1 water; NaF pH 10.8; clear smooth boundary.
- 2Bwb2—27 to 38 inches (68 to 97 centimeters); pale brown (10YR 6/3) extremely gravelly ashy loamy coarse sand, brown (10YR 4/3) moist; 2 percent clay; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; many very fine and fine, common medium, and few coarse roots; common very fine and fine interstitial and many very fine tubular pores; 13 percent subangular fine gravel, 15 percent subangular cobbles, and 34 percent subangular medium and coarse gravel; slightly acid, pH 6.5 by pH meter 1:1 water; NaF pH 10.6; clear smooth boundary.
- 2Bqb—38 to 57 inches (97 to 144 centimeters); light gray (10YR 7/2) extremely cobbly ashy coarse sand, brown (10YR 4/3) moist; 2 percent clay; weak fine and medium subangular blocky structure parting to single grain; soft, very friable, nonsticky, nonplastic; common very fine and fine and few medium roots; common fine interstitial and many very fine interstitial and tubular pores; 30 percent silica masses on rock fragments and in pores; 13 percent subangular fine gravel, 26 percent subangular medium and coarse gravel, and 35 percent subangular cobbles; slightly acid, pH 6.5 by pH meter 1:1 water; NaF pH 10.6; abrupt smooth boundary.
- 2Bqmb—57 to 82 inches (144 to 208 centimeters); light gray (10YR 7/1) cemented extremely gravelly ashy loamy coarse sand, dark grayish brown (10YR 4/2) moist; 2 percent clay; massive; extremely hard, slightly rigid, strongly cemented, nonsticky, nonplastic; many very fine and fine interstitial pores; 50 percent silica masses in matrix; 2 percent subangular cobbles, 33 percent subangular medium and coarse gravel, and 33 percent fine gravel; neutral, pH 6.8 by pH meter 1:1 water; NaF pH 10.5.

Type Location

Shasta County, California; about 0.38 mile southeast of Lost Creek Organizational Campground, approximately 100 feet south and 2,500 feet east of the northwest corner of sec. 10, T. 31 N., R. 4 E.; 40 degrees 33 minutes 27 seconds north latitude and 121 degrees 30 minutes 40 seconds west longitude, NAD83; USGS Quad: Manzanita Lake, California.

Range in Characteristics

Depth to restrictive feature: 40 to 60 inches (102 to 152 centimeters) to duripan

Mean annual soil temperature: 44 to 46 degrees F (7 to 8 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section: Ashy-skeletal part—2 to 3 percent clay and 50 to 58 percent rock fragments; sandy-skeletal part—1 to 2 percent clay and 62 to 74 percent rock fragments

Surface fragments: 5 to 20 percent gravel, 0 to 10 percent cobbles, 0 to 1 percent stones, and 0 to 1 percent boulders

A horizon:

Color (dry)—10YR 4/1, 4/2, 5/2, 6/2; 2.5Y 6/2, 7/2

Color (moist)—10YR 2/2, 3/1, 3/2, 4/2, 4/3

Texture—ashy loamy coarse sand, gravelly ashy coarse sand, gravelly ashy coarse sandy loam, gravelly ashy sandy loam, ashy sandy loam, gravelly ashy loamy sand

Clay content—2 to 6 percent

Rock fragments—5 to 20 percent fine gravel, 1 to 10 percent medium and coarse gravel, 5 to 25 percent total gravel

Organic matter—3 to 12 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.2 to 0.5

P retention—15 to 30 percent

Glass content—35 to 50 percent

NaF pH—8.5 to 10.5

Soil reaction—strongly acid to neutral

C horizon:

Color (dry)—10YR 6/2, 6/3, 7/2, 7/3, 8/2; 2.5Y 7/1, 7/2

Color (moist)—10YR 4/2, 4/3, 5/2, 5/3; 2.5Y 5/2, 5/3, 6/2

Texture—very gravelly ashy coarse sandy loam, gravelly ashy sandy loam, extremely gravelly ashy coarse sand, gravelly ashy coarse sandy loam, very gravelly ashy sandy loam, ashy coarse sandy loam, ashy fine sandy loam, ashy coarse sand, gravelly ashy loamy coarse sand, very gravelly ashy coarse sand, ashy loamy sand, gravelly ashy coarse sand

Clay content—1 to 8 percent

Rock fragments—1 to 25 percent fine gravel, 0 to 45 percent medium and coarse gravel, 1 to 65 percent total gravel

Organic matter—0.9 to 1.8 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.3 to 0.6

P retention—15 to 40 percent

Glass content—10 to 45 percent

NaF pH—9.3 to 11.2

Soil reaction—slightly acid or neutral

2Ab horizon:

Color (dry)—10YR 4/2, 5/3, 6/2, 6/3

Color (moist)—10YR 2/2, 3/3, 4/2

Texture—very gravelly ashy loamy coarse sand, gravelly ashy sandy loam, very stony ashy loamy sand

Clay content—2 to 7 percent

Rock fragments—5 to 20 percent fine gravel, 1 to 30 percent medium and coarse gravel, 5 to 50 percent total gravel, 0 to 15 percent cobbles, 0 to 20 percent stones, 15 to 50 percent total rock fragments

Organic matter—3 to 5 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1 to 1.5

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P retention—60 to 65 percent
Glass content—30 to 40 percent
NaF pH—10.6 to 11.4
Soil reaction—slightly acid or neutral

2Bwb horizon:

Color (dry)—10YR 5/3, 6/3, 6/4, 7/2, 7/3, 7/4
Color (moist)—10YR 3/3, 4/3, 4/4, 4/6
Texture—very gravelly ashy loamy coarse sand, extremely gravelly ashy loamy coarse sand, very gravelly ashy sandy loam, extremely cobbly ashy loamy sand, gravelly ashy sandy loam, very cobbly ashy loamy sand, gravelly ashy loamy sand
Clay content—2 to 6 percent
Rock fragments—5 to 20 percent fine gravel, 5 to 35 percent medium and coarse gravel, 15 to 55 percent total gravel, 0 to 40 percent cobbles, 0 to 20 percent stones, 25 to 80 percent total rock fragments
Organic matter—1 to 3 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.2 to 1.5
P retention—60 to 70 percent
Glass content—12 to 35 percent
NaF pH—10.2 to 11.3
Soil reaction—slightly acid or neutral

2Bqb horizon:

Color (dry)—10YR 7/2, 7/3, 8/3
Color (moist)—10YR 4/3, 5/3
Texture—extremely cobbly ashy coarse sand, extremely cobbly ashy loamy coarse sand, very gravelly ashy loamy sand, very gravelly ashy loamy coarse sand
Clay content—1 to 3 percent
Rock fragments—10 to 15 percent fine gravel, 15 to 30 percent medium and coarse gravel, 30 to 40 percent total gravel, 5 to 40 percent cobbles, 40 to 75 percent total rock fragments
Organic matter—0.3 to 0.9 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1 to 1.3
P retention—50 to 55 percent
Glass content—10 to 30 percent
NaF pH—10.0 to 11.0
Soil reaction—slightly acid or neutral

2Bqmb horizon:

Color (dry)—10YR 7/1, 7/2, 7/3, 8/1; 2.5Y 8/1
Color (moist)—10YR 4/2, 5/3; 2.5Y 5/2
Texture—cemented extremely gravelly ashy loamy coarse sand, cemented very gravelly ashy coarse sandy loam, cemented extremely cobbly ashy loamy sand, cemented very gravelly ashy loamy coarse sand
Clay content—1 to 3 percent
Rock fragments—10 to 35 percent fine gravel, 15 to 35 percent medium and coarse gravel, 30 to 70 percent total gravel, 0 to 40 percent cobbles, 40 to 75 percent total rock fragments
Organic matter—0.1 to 0.5 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.5 to 1
P retention—35 to 45 percent
Glass content—10 to 30 percent
NaF pH—10.0 to 11.0



Figure 84.—Site location of Diamondpeak soil.

Rupture resistance—weakly cemented to strongly cemented
Soil reaction—slightly acid or neutral

Diamondpeak Series

The Diamondpeak series consists of very deep, well drained soils that formed in tephra and colluvium over residuum from hydrothermally altered rocks. Diamondpeak soils are on mountain side slopes in hydrothermally altered areas in the Southern Cascade Mountains. Slopes range from 10 to 80 percent. The mean annual precipitation is about 117 inches (2,972 millimeters), and the mean annual air temperature is about 39 degrees F (4 degrees C).

Taxonomic Classification

Fine-loamy, isotic, frigid Typic Dystroxerepts

Typical Pedon

Diamondpeak ashy loam (fig. 84) on a south-facing (180 degrees) slope of 33 percent under a cover of California red fir and lupine at an elevation of 7,727 feet (2,356 meters). When described on 9/20/06, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

Oi—0 to 1 inch (0 to 3 centimeters); needle and twig litter; abrupt smooth boundary.
A—1 to 3 inches (3 to 7 centimeters); grayish brown (10YR 5/2) ashy loam, very dark grayish brown (10YR 3/2) moist; 25 percent clay; moderate very thick platy structure; slightly hard, friable, slightly sticky, slightly plastic; common very fine and fine and few medium and coarse roots; common very fine interstitial and few fine

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- and medium tubular pores; 3 percent subangular very strongly cemented fine gravel and 1 percent subangular very strongly cemented medium gravel; very strongly acid, pH 4.7 by pH meter 1:1 water; NaF pH 8.3; abrupt smooth boundary.
- 2Bwb1—3 to 10 inches (7 to 26 centimeters); very pale brown (10YR 8/4) very paragravelly clay loam, brownish yellow (10YR 6/6) moist; 39 percent clay; moderate very fine and fine subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; common very fine and few fine and medium roots; many very fine and fine irregular and common fine tubular pores; 30 percent subangular weakly cemented fine paragravel and 20 percent subangular weakly cemented medium paragravel; very strongly acid, pH 5.0 by pH meter 1:1 water; NaF pH 9.3; abrupt smooth boundary.
- 2Bwb2—10 to 31 inches (26 to 79 centimeters); 50 percent very pale brown (10YR 8/3) and 50 percent reddish yellow (7.5YR 8/6) very paragravelly sandy clay loam, reddish yellow (7.5YR 6/8) and yellow (10YR 7/6) moist; 27 percent clay; moderate fine to coarse subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; few fine to very coarse roots; many very fine and fine irregular and common fine and medium tubular pores; 25 percent subangular weakly cemented fine paragravel and 30 percent subangular weakly cemented medium paragravel; strongly acid, pH 5.1 by pH meter 1:1 water; NaF pH 9.4; abrupt irregular boundary.
- 2Bwb3—31 to 49 inches (79 to 125 centimeters); 30 percent yellow (10YR 8/6) and 70 percent yellow (10YR 7/6) extremely paragravelly loam, brownish yellow (10YR 6/6) and yellow (10YR 7/6) moist; 21 percent clay; moderate fine and medium subangular blocky structure; slightly hard, friable, moderately sticky, moderately plastic; few fine and common medium roots; common very fine and fine irregular and common fine tubular pores; 30 percent angular very weakly cemented fine paragravel and 40 percent angular very weakly cemented medium paragravel; very strongly acid, pH 5.0 by pH meter 1:1 water; NaF pH 9.6; abrupt smooth boundary.
- 2Cr/2Bwb4—49 to 60 inches (125 to 152 centimeters); reddish yellow (7.5YR 6/8) extremely paragravelly loam, strong brown (7.5YR 5/8) moist; 18 percent clay; massive and moderate fine and medium subangular blocky structure; moderately hard, firm, moderately sticky, slightly plastic; few fine to very coarse roots; few fine tubular and common very fine and fine irregular pores; 30 percent angular very weakly cemented fine paragravel and 45 percent angular very weakly cemented medium paragravel; strongly acid, pH 5.1 by pH meter 1:1 water; NaF pH 9.6.

Type Location

Shasta County, California; about 0.7 mile north-northwest of Diamond Peak, approximately 1,700 feet east and 1,600 feet north of the southwest corner of sec. 15, T. 30 N., R. 4 E.; 40 degrees 27 minutes 28 seconds north latitude and 121 degrees 31 minutes 41 seconds west longitude, NAD83; USGS Quad: Lassen Peak, California.

Range in Characteristics

Depth to restrictive feature: More than 60 inches (152 centimeters) to paralithic contact

Mean annual soil temperature: 42 to 47 degrees F (6 to 8 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (thickest part): 25 to 35 percent clay

Surface fragments: 10 to 20 percent gravel, 0 to 5 percent cobbles, and 0 to 2 percent stones

Other characteristics: Some pedons have a Bw horizon above the 2Bwb horizon

A horizon:

Color (dry)—10YR 4/2, 4/3, 5/2, 5/3

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Color (moist)—10YR 3/2, 3/3
Texture—ashy loam, gravelly ashy loam
Clay content—18 to 27 percent
Rock fragments—3 to 12 percent fine gravel, 1 to 12 percent medium and coarse gravel, 4 to 24 percent total gravel
Organic matter—14 to 18 percent
Base saturation by ammonium acetate—35 to 45 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.55 to 0.62
P retention—48 to 55 percent
Glass content—5 to 10 percent
NaF pH—8.2 to 8.5
Soil reaction—very strongly acid to moderately acid

Upper 2Bwb horizon:

Color (dry)—variegated 10YR 5/8, 6/6, 7/2, 7/6, 8/1, 8/4, 8/8; 7.5YR 6/8
Color (moist)—variegated 10YR 5/4, 6/6, 8/3; 7.5YR 6/8, 7/3, 7/8, 8/3, 8/6
Texture—very paragravelly clay loam, paragravelly clay loam, very paragravelly sandy clay loam
Clay content—25 to 40 percent
Rock fragments—9 to 30 percent fine paragravel, 10 to 30 percent medium and coarse paragravel, 25 to 55 percent total paragravel, 0 to 10 percent paracobbles
Organic matter—0.9 to 2.3 percent
Base saturation by ammonium acetate—16 to 35 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.58 to 0.82
P retention—65 to 80 percent
Glass content—0 to 1 percent
NaF pH—9.1 to 10.0
Soil reaction—very strongly acid to moderately acid

Lower 2Bwb horizon and 2Cr/2Bwb horizon:

Color (dry)—variegated 10YR 6/6, 7/6, 8/2; 7.5YR 5/8, 6/8, 7/3
Color (moist)—variegated 10YR 5/8, 7/6, 8/3, 8/6; 7.5YR 5/8, 6/8
Texture—very paragravelly loam, extremely paragravelly loam
Clay content—18 to 25 percent
Rock fragments—15 to 30 percent fine paragravel, 20 to 50 medium and coarse paragravel, 45 to 75 percent total paragravel, 0 to 5 percent paracobbles
Organic matter—0.5 to 1.2 percent
Base saturation by ammonium acetate—8 to 15 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.95 to 1.10
P retention—90 to 95 percent
Glass content—0 to 1 percent
NaF pH—9.1 to 9.6
Soil reaction—extremely acid to strongly acid

Dittmar Series

The Dittmar series consists of shallow, well drained soils that formed in tephra and mixed residuum from volcanic rock. Dittmar soils are on scoured glacial-valley walls. Slopes range from 20 to 80 percent. The mean annual precipitation is about 51 inches (1,295 millimeters), and the mean annual air temperature is about 42 degrees F (6 degrees C).

Taxonomic Classification

Medial-skeletal, amorphic, frigid Lithic Haploxerands

Typical Pedon

Dittmar very gravelly ashy sandy loam on a south-facing (180 degrees) slope of 28 percent under a cover of greenleaf manzanita, huckleberry oak, and Jeffrey pine at an elevation of 5,643 feet (1,720 meters). When described on 7/11/07, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

- Oi—0 to 1 inch (0 to 2 centimeters); slightly decomposed leaves, needles, and bark litter; abrupt smooth boundary.
- A1—1 to 2 inches (2 to 5 centimeters); grayish brown (10YR 5/2) very gravelly ashy sandy loam, very dark gray (10YR 3/1) moist; 3 percent clay; weak thin platy structure parting to single grain; loose, nonsticky, nonplastic; many very fine roots; many very fine and fine interstitial pores; 5 percent angular fine gravel, 40 percent angular medium and coarse gravel, and 3 percent angular cobbles; strongly acid, pH 5.5 by Hellige-Truog; NaF pH 9.0; abrupt smooth boundary.
- A2—2 to 5 inches (5 to 12 centimeters); grayish brown (10YR 5/2) very gravelly medial sandy loam, very dark gray (10YR 3/1) moist; 3 percent clay; weak fine to coarse granular structure parting to single grain; loose, nonsticky, nonplastic; many very fine and common fine and medium roots; many very fine and fine interstitial and common very fine tubular pores; 12 percent angular fine gravel, 30 percent angular medium and coarse gravel, and 3 percent angular cobbles; slightly acid, pH 6.4 by Hellige-Truog; NaF pH 10.6; abrupt wavy boundary.
- Bw1—5 to 7 inches (12 to 19 centimeters); pale brown (10YR 6/3) very gravelly medial fine sandy loam, dark grayish brown (10YR 4/2) moist; 4 percent clay; weak fine to coarse granular structure parting to single grain; loose, nonsticky, nonplastic; many very fine to very coarse roots; many very fine and fine interstitial and common fine and medium tubular pores; 10 percent angular fine gravel, 18 percent angular medium and coarse gravel, and 8 percent angular cobbles; slightly acid, pH 6.4 by Hellige-Truog; NaF pH 11.5; clear smooth boundary.
- Bw2—7 to 15 inches (19 to 37 centimeters); pale brown (10YR 6/3) extremely stony medial fine sandy loam, dark grayish brown (10YR 4/2) moist; 4 percent clay; weak fine to coarse granular structure parting to single grain; loose, nonsticky, nonplastic; many very fine to very coarse roots; many very fine and fine interstitial and common fine tubular pores; 4 percent angular fine gravel, 8 percent angular medium and coarse gravel, 35 percent angular cobbles, and 35 percent angular stones; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 11.6; clear wavy boundary.
- Bw3—15 to 19 inches (37 to 47 centimeters); brown (10YR 5/3) extremely stony medial fine sandy loam, dark grayish brown (10YR 4/2) moist; 4 percent clay; weak very fine and fine subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; many very fine to very coarse roots; many very fine and fine interstitial pores; 6 percent angular fine gravel, 16 percent angular medium and coarse gravel, 30 percent angular cobbles, and 30 percent angular stones; slightly acid, pH 6.3 by Hellige-Truog; NaF pH 11.6; abrupt wavy boundary.
- R—19 inches (47 centimeters); indurated dacite bedrock.

Type Location

Plumas County, California; about 0.25 mile northwest of Kelly Camp, approximately 1,200 feet east and 600 feet south of the northwest corner of sec. 30, T. 30 N., R. 6 E.; 40 degrees 26 minutes 13 seconds north latitude and 121 degrees 21 minutes 40 seconds west longitude, NAD83; USGS Quad: Mount Harkness, California.

Range in Characteristics

Depth to restrictive feature: 10 to 20 inches (25 to 51 centimeters) to lithic contact

Mean annual soil temperature: 43 to 45 degrees F (6 to 7 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (thickest part): 3 to 6 percent clay and 36 to 86 percent rock fragments

Surface fragments: 5 to 65 percent gravel, 3 to 45 percent cobbles, and 3 to 15 percent stones

A horizon:

Color (dry)—10YR 5/2, 6/2

Color (moist)—10YR 3/1, 3/2

Texture—gravelly ashy coarse sandy loam, very gravelly ashy sandy loam, very gravelly medial sandy loam

Clay content—3 to 4 percent

Rock fragments—5 to 18 percent fine gravel, 10 to 45 percent medium and coarse gravel, 25 to 55 percent total gravel, 0 to 10 percent cobbles, 25 to 59 percent total rock fragments

Organic matter—4 to 12 percent

Base saturation by ammonium acetate—25 to 55 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.20 to 2.00

P retention—65 to 90 percent

Glass content—14 to 29 percent

NaF pH—9.0 to 11.5

Soil reaction—strongly acid to slightly acid

Bw horizon:

Color (dry)—10YR 5/3, 6/2, 6/3

Color (moist)—10YR 4/2

Texture—very gravelly medial fine sandy loam, extremely stony medial fine sandy loam, extremely stony medial sandy loam, extremely cobbly medial sandy loam

Clay content—3 to 6 percent

Rock fragments—5 to 10 percent fine gravel, 5 to 20 percent medium and coarse gravel, 10 to 30 percent total gravel, 5 to 40 percent cobbles, 5 to 40 percent stones, 36 to 82 percent total rock fragments

Organic matter—3 to 8 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—2.25 to 5.00

P retention—85 to 100 percent

Glass content—4 to 15 percent

NaF pH—11.5 to 11.6

Soil reaction—slightly acid or neutral

Duric Vitraquands

Duric Vitraquands consist of deep, somewhat poorly drained soils that formed in volcanic ash over glaciolacustrine deposits over outwash from volcanic rocks. These soils are on outwash plains. Slopes range from 0 to 8 percent. The mean annual precipitation is about 61 inches (1,549 millimeters), and the mean annual air temperature is about 41 degrees F (5 degrees C).

Taxonomic Classification

Frigid Duric Vitraquands

Typical Pedon

Duric Vitraquands gravelly ashy loamy coarse sand (fig. 85) on a north-facing (0 degrees) slope of 2 percent under a cover of lodgepole pine, white fir, grasses, and wild iris at an elevation of 6,575 feet (2,042 meters). When described on 6/21/2007, the soil was very slightly moist throughout. (Colors are for dry soil unless otherwise noted.)



Figure 85.—Typical profile of Duric Vitraquands. Depth is marked in centimeters.

Oi—0 to 2 inches (0 to 5 centimeters); slightly decomposed leaves, bark, and needle litter; abrupt wavy boundary.

A—2 to 4 inches (5 to 10 centimeters); gray (10YR 5/1) gravelly ashy loamy coarse sand, black (10YR 2/1) moist; 3 percent clay; weak fine and medium granular structure parting to single grain; loose, nonsticky, nonplastic; many very fine and fine and common coarse roots; many very fine to medium interstitial pores; 12 percent subrounded fine gravel and 6 percent subrounded medium and coarse gravel; strongly acid, pH 5.2 by pH meter 1:1 water; NaF pH 9.2; abrupt wavy boundary.

2Ab1—4 to 7 inches (10 to 17 centimeters); light brownish gray (10YR 6/2) gravelly ashy loamy coarse sand, very dark grayish brown (10YR 3/2) moist; 2 percent clay; weak fine and medium subangular blocky structure parting to weak very fine and fine granular; loose, nonsticky, nonplastic; common very fine to coarse roots;

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- many very fine and fine interstitial and common fine vesicular pores; 18 percent subrounded fine gravel and 6 percent subrounded medium and coarse gravel; strongly acid, pH 5.2 by pH meter 1:1 water; NaF pH 10.7; clear smooth boundary.
- 2Ab2—7 to 13 inches (17 to 32 centimeters); light gray (10YR 7/2) gravelly ashy loamy coarse sand, dark grayish brown (10YR 4/2) moist; 3 percent clay; weak fine and medium subangular blocky structure parting to weak very fine and fine granular; loose, nonsticky, nonplastic; common very fine to coarse roots; many very fine and fine interstitial and few fine vesicular pores; 1 percent masses of oxidized iron (7.5YR 3/4) in root channels; 16 percent subrounded fine gravel and 6 percent subrounded medium and coarse gravel; very strongly acid, pH 4.8 by pH meter 1:1 water; NaF pH 10.8; clear wavy boundary.
- 3Ab3—13 to 17 inches (32 to 44 centimeters); very pale brown (10YR 7/3) gravelly ashy coarse sandy loam, dark grayish brown (10YR 4/2) moist; 4 percent clay; weak fine and medium subangular blocky structure parting to weak very fine and fine granular; loose, nonsticky, nonplastic; few very fine and common fine to coarse roots; many very fine and fine irregular and few fine tubular pores; 11 percent subrounded fine gravel and 4 percent subrounded medium and coarse gravel; strongly acid, pH 5.1 by pH meter 1:1 water; NaF pH 11.1; abrupt irregular boundary.
- 3Bwb—17 to 23 inches (44 to 59 centimeters); very pale brown (10YR 7/3) gravelly medial coarse sandy loam, brown (10YR 4/3) moist; 4 percent clay; weak fine and medium subangular blocky structure parting to weak very fine and fine granular; loose, nonsticky, nonplastic; few very fine and common fine to coarse roots; many very fine and fine irregular and few fine tubular pores; 2 percent masses of oxidized iron (7.5YR 3/4) on rock fragments and in root channels; 12 percent subrounded fine gravel, 8 percent subrounded medium and coarse gravel, and 10 percent subrounded cobbles; moderately acid, pH 5.7 by pH meter 1:1 water; NaF pH 11.1; clear wavy boundary.
- 3Bqb1—23 to 34 inches (59 to 86 centimeters); very pale brown (10YR 7/3) gravelly ashy loamy coarse sand, brown (10YR 5/3) moist; 4 percent clay; massive parting to moderate medium and coarse subangular blocky structure; slightly hard, friable, nonsticky, nonplastic; few very fine and fine and common medium and coarse roots; many very fine and fine irregular and common fine tubular pores; 5 percent masses of oxidized iron (7.5YR 4/6) on rock fragments; 3 percent threadlike silica concretions; 16 percent subrounded fine gravel, 14 percent subrounded medium and coarse gravel, and 15 percent subrounded cobbles; neutral, pH 6.6 by Hellige-Truog; NaF pH 10.9; abrupt wavy boundary.
- 3Bqb2—34 to 44 inches (86 to 112 centimeters); very pale brown (10YR 8/2) very gravelly ashy loamy coarse sand, brown (10YR 5/3) moist; 3 percent clay; massive parting to moderate medium and coarse subangular blocky structure; moderately hard, firm, nonsticky, nonplastic; few very fine and fine roots; common very fine and fine irregular and few fine tubular pores; 5 percent masses of oxidized iron (10YR 5/8) in lower part of horizon; 5 percent threadlike silica concretions; 22 percent subrounded fine gravel, 18 percent subrounded medium and coarse gravel, and 15 percent subrounded cobbles; slightly acid, pH 6.3 by pH meter 1:1 water; NaF pH 10.7; abrupt smooth boundary.
- 3Bqmb—44 to 49 inches (112 to 124 centimeters); white (10YR 8/1) cemented extremely gravelly ashy sandy loam, brown (10YR 5/3) moist; 6 percent clay; massive; moderately hard, firm, very weakly cemented, nonsticky, nonplastic; few very fine and fine roots around rock fragments; few very fine and fine irregular pores; 5 percent masses of oxidized iron (7.5YR 5/8) in upper part of horizon; 15 percent threadlike silica concretions; 30 percent subrounded fine gravel and 30 percent subrounded medium and coarse gravel; slightly acid, pH 6.1 by pH meter 1:1 water; NaF pH 10.7.

Type Location

Shasta County, California; about 0.8 mile east of Hat Lake, approximately 1,500 feet east and 1,500 south of the northwest corner of sec. 32, T. 31 N., R. 4 E.; 40 degrees 30 minutes 26 seconds north latitude and 121 degrees 27 minutes 31 seconds west longitude, NAD83; USGS Quad: West Prospect Peak, California.

Range in Characteristics

Depth to restrictive feature: 40 to 60 inches (102 to 152 centimeters) to duripan

Mean annual soil temperature: 41 to 43 degrees F (5 to 6 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (thickest part): 3 to 4 percent clay and 40 to 60 percent rock fragments

Surface fragments: 0 percent

Depth to fluctuating water table (if it occurs): From the top of the duripan to as high as 7 inches (17 centimeters)

A horizon:

Color (dry)—10YR 5/1

Color (moist)—10YR 2/1

Texture—gravelly ashy loamy coarse sand

Clay content—1 to 5 percent

Rock fragments—10 to 15 percent fine gravel, 5 to 10 percent medium and coarse gravel, 15 to 25 percent total gravel

Organic matter—5 to 7 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.25 to 0.35

P retention—20 to 40 percent

Glass content—30 to 35 percent

NaF pH—9.0 to 9.5

Soil reaction—strongly acid or moderately acid

2Ab horizon:

Color (dry)—10YR 6/2, 7/2

Color (moist)—10YR 3/2, 4/2

Texture—gravelly ashy loamy coarse sand

Clay content—1 to 5 percent

Rock fragments—10 to 20 percent fine gravel, 5 to 15 percent medium and coarse gravel, 15 to 25 percent total gravel, 0 to 5 percent cobbles, 15 to 28 percent total rock fragments

Organic matter—2 to 4 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.4 to 0.7

P retention—35 to 50 percent

Glass content—28 to 35 percent

NaF pH—10.5 to 11.5

Soil reaction—very strongly acid to slightly acid

3Ab horizon:

Color (dry)—10YR 7/3

Color (moist)—10YR 4/2

Texture—gravelly ashy coarse sandy loam

Clay content—3 to 6 percent

Rock fragments—10 to 15 percent fine gravel, 0 to 10 percent medium and coarse gravel, 10 to 25 percent total gravel

Organic matter—4.5 to 6 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.35 to 1.7

P retention—65 to 80 percent

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Glass content—35 to 45 percent
NaF pH—11.0 to 11.5
Soil reaction—strongly acid to slightly acid

3Bwb horizon:

Color (dry)—10YR 7/3
Color (moist)—10YR 4/3
Texture—gravelly medial coarse sandy loam, very gravelly medial coarse sandy loam
Clay content—2 to 6 percent
Rock fragments—10 to 15 percent fine gravel, 5 to 15 percent medium and coarse gravel, 15 to 30 percent total gravel, 5 to 15 percent cobbles, 0 to 15 percent stones, 20 to 55 percent total rock fragments
Organic matter—2 to 4 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—2.1 to 2.5
P retention—75 to 90 percent
Glass content—25 to 35 percent
NaF pH—11.0 to 11.5
Soil reaction—moderately acid or slightly acid

3Bqb horizon:

Color (dry)—10YR 7/3, 8/2
Color (moist)—10YR 5/3
Texture—gravelly ashy loamy coarse sand, very gravelly ashy loamy coarse sand, cobbly ashy loamy coarse sand
Clay content—2 to 5 percent
Rock fragments—10 to 25 percent fine gravel, 10 to 20 percent medium and coarse gravel, 20 to 40 percent total gravel, 10 to 20 percent cobbles, 30 to 55 percent total rock fragments
Organic matter—0.5 to 1.5 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.8 to 2.3
P retention—60 to 80 percent
Glass content—20 to 35 percent
NaF pH—10.5 to 11.5
Soil reaction—slightly acid or neutral

3Bqmb horizon:

Color (dry)—5Y 8/1; 10YR 8/1
Color (moist)—2.5Y 6/1; 10YR 5/3
Texture—cemented extremely gravelly ashy sandy loam
Clay content—2 to 7 percent
Rock fragments—10 to 30 percent fine gravel, 10 to 30 percent medium and coarse gravel, 20 to 60 percent total gravel, 0 to 20 percent cobbles, 0 to 15 percent stones, 60 to 70 percent total rock fragments
Organic matter—0.5 to 1.5 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.2 to 1.5
P retention—50 to 65 percent
Glass content—20 to 28 percent
NaF pH—10.5 to 11.0
Soil reaction—slightly acid

Emeraldlake Series

The Emeraldlake series consists of very deep, somewhat excessively drained soils that formed in tephra mixed with colluvium from volcanic rocks. Emeraldlake soils are

on cirque walls, volcanic domes, colluvial aprons, and mountain slopes in the Southern Cascade Mountains. Slopes range from 15 to 95 percent. The mean annual precipitation is about 117 inches (2,972 millimeters), and the mean annual air temperature is about 39 degrees F (4 degrees C).

Taxonomic Classification

Ashy-skeletal, amorphic, nonacid Vitrandic Cryorthents

Typical Pedon

Emeraldlake extremely gravelly ash fine sandy loam (fig. 86) on a southwest-facing (214 degrees) slope of 60 percent under a cover of mountain monardella, purple needlegrass, pinemat manzanita, mountain hemlock, and whitebark pine at an elevation of 8,497 feet (2,591 meters). When described on 9/19/06, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

- A1—0 to 1 inch (0 to 3 centimeters); grayish brown (2.5Y 5/2) extremely gravelly ash fine sandy loam, very dark grayish brown (2.5Y 3/2) moist; 2 percent clay; single grain; loose, nonsticky, nonplastic; 30 percent subangular fine gravel, 30 percent subangular medium and coarse gravel; strongly acid, pH 5.5 by Hellige-Truog; NaF 9.0; abrupt smooth boundary.
- A2—1 to 5 inches (3 to 12 centimeters); grayish brown (2.5Y 5/2) extremely gravelly ash loamy sand, very dark grayish brown (2.5Y 3/2) moist; 2 percent clay; single grain; loose, nonsticky, nonplastic; many very fine and fine and few medium roots; few fine interstitial and many very fine interstitial pores; 9 percent subangular fine gravel, 44 percent subangular medium gravel, 7 percent subangular cobbles; moderately acid, pH 6.0 by Hellige-Truog; NaF pH 10.0; abrupt smooth boundary.
- A3—5 to 14 inches (12 to 35 centimeters); light brownish gray (10YR 6/2) extremely gravelly ash loamy sand, dark grayish brown (10YR 4/2) moist; 3 percent clay; single grain; loose, nonsticky, nonplastic; many very fine and fine and common medium roots; common fine tubular, common medium, and many very fine interstitial pores; 5 percent subangular fine gravel, 45 percent subangular medium and coarse gravel, and 15 percent subangular cobbles; slightly acid, pH 6.5 by Hellige-Truog; NaF 10.9; abrupt wavy boundary.
- Bw1—14 to 25 inches (35 to 64 centimeters); light yellowish brown (10YR 6/4) extremely gravelly ash loamy coarse sand, brown (10YR 4/3) moist; 2 percent clay; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; few coarse and common very fine to medium roots; few fine tubular, many very fine and fine, and few medium interstitial pores; 10 percent subangular fine gravel, 55 percent subangular medium and coarse gravel, and 10 percent subangular cobbles; neutral, pH 6.7 by Hellige-Truog; NaF 11.2; abrupt smooth boundary.
- Bw2—25 to 35 inches (64 to 90 centimeters); light yellowish brown (10YR 6/4) extremely gravelly ash loamy coarse sand, dark yellowish brown (10YR 4/4) moist; 3 percent clay; weak medium subangular blocky structure parting to single grain; soft, very friable, nonsticky, nonplastic; common fine and medium, few coarse, and few very fine roots; common very fine to medium interstitial pores; 12 percent subangular fine gravel, 45 percent subangular medium gravel, 10 percent subangular cobbles, and 10 percent subangular stones; neutral, pH 6.8 by Hellige-Truog; NaF pH 11.0; clear smooth boundary.
- Bw3—35 to 51 inches (90 to 129 centimeters); very pale brown (10YR 7/4) ash boulders, dark yellowish brown (10YR 4/4) moist; 3 percent clay; single grain; loose, nonsticky, nonplastic; few very fine to coarse roots; common fine and medium interstitial pores; 3 percent subangular fine gravel, 23 percent subangular medium and coarse gravel, 5 percent subangular cobbles, 25 percent subangular

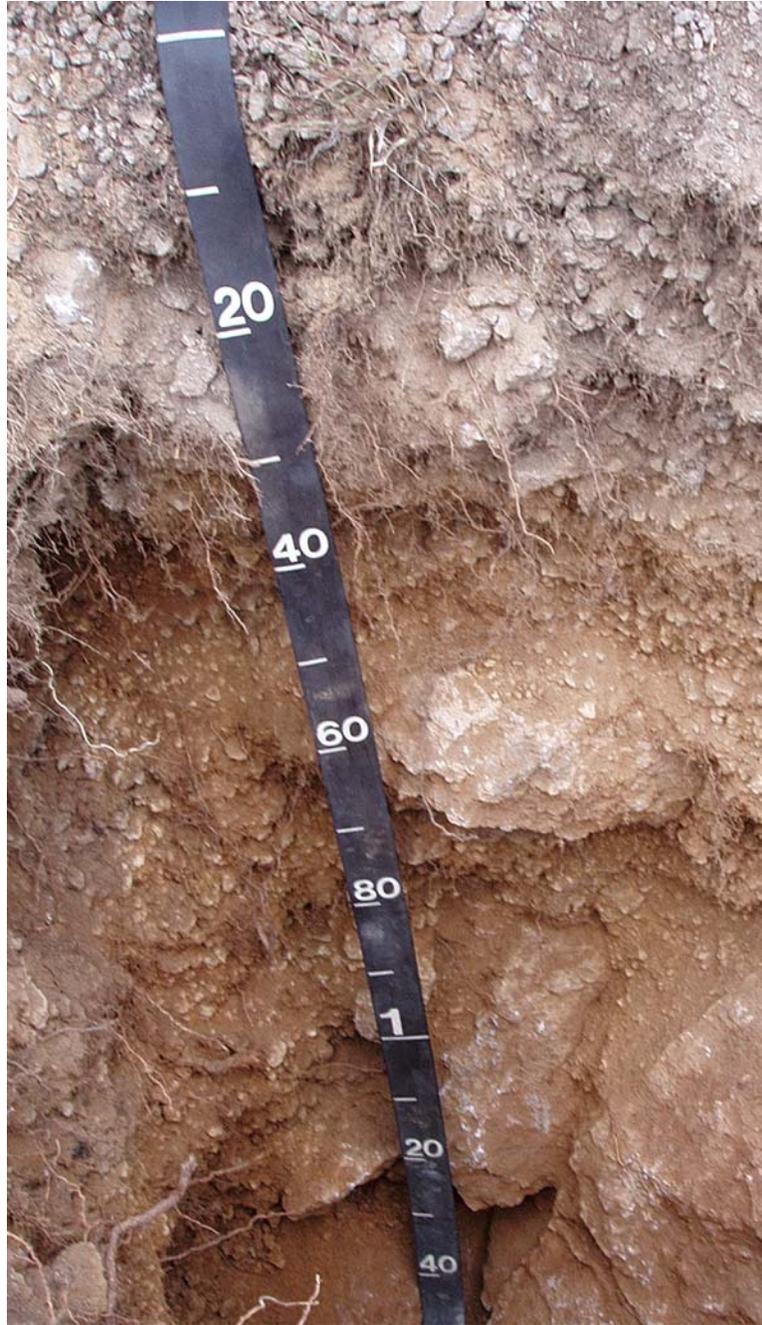


Figure 86.—Typical profile of Emeraldlake soil. Depth is marked in centimeters.

stones, and 40 percent subangular boulders; neutral, pH 6.8 by Hellige-Truog; NaF pH 11.1; abrupt smooth boundary.
Bw4—51 to 60 inches (129 to 152 centimeters); very pale brown (10YR 7/4) ashy boulders, dark yellowish brown (10YR 4/4) moist; 1 percent clay; single grain; loose, nonsticky, nonplastic; few medium and coarse roots; common fine and medium interstitial pores; 3 percent subangular fine gravel, 23 percent subangular medium and coarse gravel, 30 percent subangular stones, and 40 percent subangular boulders; neutral, pH 6.8 by Hellige-Truog; NaF pH 11.3.

Type Location

Shasta County, California; about 0.3 mile west of the southernmost corner of the Lassen Peak Trail parking lot, approximately 1,200 feet east and 2,100 feet north of the southwest corner of sec. 11, T. 30 N., R. 4 E.; 40 degrees 28 minutes 25 seconds north latitude and 121 degrees 30 minutes 39 seconds west longitude, NAD83; USGS Quad: Lassen Peak, California.

Range in Characteristics

Depth to restrictive feature: More than 60 inches (152 centimeters) to bedrock

Mean annual soil temperature: 40 to 43 degrees F (4.4 to 6.0 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (thickest part): 1 to 4 percent clay and 75 to 77 percent rock fragments

Surface fragments: 10 to 45 percent gravel, 5 to 45 percent cobbles, 5 to 20 percent stones, and 3 to 15 percent boulders

Other characteristics: Some pedons have a Bq, C, or Cq horizon

Upper A horizon:

Color (dry)—2.5Y 5/2, 6/2; 10YR 5/2, 6/2

Color (moist)—2.5Y 3/2; 10YR 3/2

Texture—extremely gravelly ashy fine sandy loam, gravelly ashy sandy loam, gravelly ashy coarse sandy loam, very gravelly ashy coarse sandy loam

Clay content—1 to 4 percent

Rock fragments—13 to 30 percent fine gravel, 14 to 38 percent medium and coarse gravel, 28 to 60 percent total gravel, 0 to 10 percent cobbles, 30 to 65 percent total rock fragments

Organic matter—4.5 to 8 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.35 to 0.5

P retention—20 to 30 percent

Glass content—15 to 20 percent

NaF pH—9.0 to 11.0

Soil reaction—slightly acid to strongly acid

Lower A horizon:

Color (dry)—2.5Y 5/2; 10YR 6/2, 6/3

Color (moist)—2.5Y 3/2; 10YR 4/2

Texture—extremely gravelly ashy loamy sand, very gravelly ashy loamy coarse sand, extremely gravelly ashy loamy coarse sand

Clay content—1 to 4 percent

Rock fragments—5 to 16 percent fine gravel, 35 to 55 percent medium and coarse gravel, 50 to 66 percent total gravel, 5 to 15 percent cobbles, 0 to 7 percent stones, 55 to 80 percent total rock fragments

Organic matter—4 to 7 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.35 to 0.5

P retention—30 to 50 percent

Glass content—18 to 30 percent

NaF pH—9.2 to 11.2

Soil reaction—slightly acid or moderately acid

Upper Bw horizon:

Color (dry)—10YR 6/3, 6/4; 2.5Y 6/2, 6/3

Color (moist)—10YR 3/3, 3/4, 4/3, 4/4; 2.5Y 3/3

Texture—extremely gravelly ashy sandy loam, extremely gravelly ashy loamy coarse sand, very cobbly ashy fine sandy loam

Clay content—2 to 4 percent

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Rock fragments—7 to 14 percent fine gravel, 17 to 55 percent medium and coarse gravel, 24 to 65 percent total gravel, 10 to 20 percent cobbles, 0 to 10 percent stones, 45 to 88 percent total rock fragments

Organic matter—3 to 5 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.4 to 1.8

P retention—60 to 85 percent

Glass content—18 to 25 percent

NaF pH—10.5 to 11.8

Soil reaction—neutral or slightly acid

Lower Bw horizon:

Color (dry)—10YR 6/3, 6/4, 7/3, 7/4; 7.5YR 7/2

Color (moist)—10YR 4/3, 4/4; 7.5YR 4/2

Texture—ashy boulders, very gravelly ashy loamy sand, extremely gravelly ashy coarse sand

Clay content—1 to 4 percent

Rock fragments—3 to 15 percent fine gravel, 8 to 55 percent medium and coarse gravel, 26 to 60 percent total gravel, 0 to 15 percent cobbles, 2 to 30 percent stones, 0 to 40 percent boulders, 55 to 96 percent total rock fragments

Organic matter—1.5 to 4 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.4 to 1.8

P retention—70 to 90 percent

Glass content—18 to 25 percent

NaF pH—10.5 to 11.8

Soil reaction—neutral or slightly acid

Endoaquepts

Endoaquepts consist of very deep, poorly drained soils that formed in slope alluvium over colluvium over till from hydrothermally altered rocks. These soils are around springs and seeps on glaciated mountain slopes in hydrothermally altered areas. Slopes range from 10 to 80 percent. The mean annual precipitation is about 109 inches (2,769 millimeters), and the mean annual air temperature is about 39 degrees F (4 degrees C).

Taxonomic Classification

Endoaquepts

Typical Pedon

Endoaquepts gravelly mucky fine sandy loam (fig. 87) on a southwest-facing (225 degrees) slope of 43 percent under a cover of alders at an elevation of 6,744 feet (2,056 meters). When described on 7/26/07, the soil was dry to a depth of 18 inches (46 centimeters), very slightly moist at a depth of 18 to 41 inches (46 to 103 centimeters), moist at a depth of 41 to 50 inches (103 to 127 centimeters), and moist with small pockets of seepage below a depth of 50 inches (127 centimeters). (Colors are for dry soil unless otherwise noted.)

Oi—0 to 2 inches (0 to 5 centimeters); slightly decomposed twigs and leaf litter; many very fine and fine roots; abrupt wavy boundary.

A1—2 to 4 inches (5 to 10 centimeters); very dark grayish brown (10YR 3/2) gravelly mucky fine sandy loam, black (10YR 2/1) moist; 8 percent clay; weak very fine granular structure parting to single grain; soft, very friable, nonsticky, nonplastic; many very fine and fine and few medium and coarse roots; many very fine and fine interstitial pores; 5 percent subangular fine gravel, 5 percent subangular



Figure 87.—Typical profile of Endoaquepts. Depth is marked in centimeters.

medium and coarse gravel, and 5 percent subangular cobbles; slightly acid, pH 6.5 by Hellige-Truog; NaF 9.0; abrupt smooth boundary.
2A2—4 to 6 inches (10 to 15 centimeters); brown (10YR 4/3) gravelly loam, very dark grayish brown (10YR 3/2) moist; 18 percent clay; moderate fine subangular blocky structure parting to moderate fine granular; slightly hard, firm, slightly sticky, slightly plastic; many very fine and fine and few medium and coarse roots; many very fine irregular, few fine tubular, and common fine interstitial pores; 5 percent subangular fine gravel, 15 percent subangular medium and coarse gravel, and 5

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- percent subangular cobbles; neutral, pH 6.7 by Hellige-Truog; NaF 9.0; abrupt wavy boundary.
- 2A3—6 to 9 inches (15 to 24 centimeters); dark grayish brown (10YR 4/2) gravelly loam, very dark gray (10YR 3/1) moist; 22 percent clay; moderate very fine and fine subangular blocky structure parting to moderate fine granular; slightly hard, firm, slightly sticky, slightly plastic; few very fine, common fine, and few medium and coarse roots; many very fine and fine irregular and few fine and medium tubular pores; 3 percent fine yellowish brown (10YR 5/6) masses of oxidized iron; 5 percent subangular fine gravel, 25 percent subangular medium and coarse gravel, and 5 percent subangular cobbles; neutral, pH 6.7 by Hellige-Truog; NaF 9.0; abrupt wavy boundary.
- 3AB—9 to 18 inches (24 to 46 centimeters); light brownish gray (10YR 6/2) silty clay loam, dark grayish brown (10YR 4/2) moist; 30 percent clay; strong medium and coarse subangular blocky structure; very hard, very firm, moderately sticky, moderately plastic; few very fine to medium roots; many very fine and fine irregular and few fine and medium tubular pores; 5 percent fine and medium irregular yellowish brown (10YR 5/6) masses of oxidized iron; 3 percent subangular fine gravel, 1 percent subangular medium and coarse gravel, and 5 percent subangular cobbles; neutral, pH 6.7 by Hellige-Truog; NaF 9.0; abrupt wavy boundary.
- 3Bw—18 to 30 inches (46 to 76 centimeters); light brownish gray (10YR 6/2) cobbly silty clay loam, dark grayish brown (10YR 4/2) moist; 32 percent clay; moderate fine to coarse subangular blocky structure; very hard, very firm, moderately sticky, moderately plastic; few very fine to coarse roots; many very fine and fine irregular and few fine tubular pores; 10 percent fine and medium irregular yellowish brown (10YR 5/6) masses of oxidized iron; 2 percent subangular fine gravel, 2 percent subangular medium and coarse gravel, and 15 percent subangular cobbles; neutral, pH 6.9 by Hellige-Truog; NaF 9.0; clear wavy boundary.
- 3Bg1—30 to 41 inches (76 to 103 centimeters); light gray (10YR 7/2) stony silty clay loam, grayish brown (10YR 5/2) moist; 34 percent clay; moderate fine and medium subangular blocky structure; very hard, very firm, moderately sticky, moderately plastic; few very fine to coarse roots; many very fine and fine irregular and few fine tubular pores; 5 percent fine and medium irregular brownish yellow (10YR 6/6) masses of oxidized iron; 3 percent subangular fine gravel, 5 percent subangular medium and coarse gravel, 10 percent subangular cobbles, and 15 percent subangular stones; neutral, pH 7.0 by Hellige-Truog; NaF 9.0; clear smooth boundary.
- 3Bg2—41 to 50 inches (103 to 127 centimeters); light gray (2.5Y 7/2) very stony clay, light brownish gray (10YR 6/2) moist; 40 percent clay; massive parting to moderate coarse subangular blocky structure; very hard, very firm, moderately sticky, very plastic; few very fine roots; many very fine and common fine irregular pores; 2 percent bluish gray (5B 6/1), moist, iron depletions and 15 percent medium and coarse irregular strong brown (7.5YR 5/6) and yellowish red (5YR 5/8), moist, and brownish yellow (10YR 6/8) masses of oxidized iron; 12 percent subangular fine gravel, 8 percent subangular medium and coarse gravel, 5 percent subangular cobbles, and 15 percent subangular stones; neutral, pH 7.2 by Hellige-Truog; NaF 9.0; clear irregular boundary.
- 3Bg3—50 to 62 inches (127 to 158 centimeters); light gray (10YR 7/2) gravelly clay loam, light brownish gray (10YR 6/2) moist; 37 percent clay; massive parting to moderate coarse subangular blocky structure; very hard, very firm, moderately sticky, moderately plastic; common very fine irregular pores; 25 percent coarse irregular yellowish red (5YR 5/8), moist, strong brown (7.5YR 5/6 and 5/8), yellowish brown (10YR 5/6), and reddish yellow masses of oxidized iron; 5 percent

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subangular fine gravel, 8 percent subangular medium and coarse gravel, and 5 percent subangular cobbles; slightly alkaline, pH 7.5 by Hellige-Truog; NaF 9.0.

Type Location

Tehama County, California; about 0.5 mile south-southwest of Sulphur Works parking lot, approximately 1,000 feet north and 960 feet east of the southwest corner of sec. 22, T. 30 N., R. 4 E.; 40 degrees 26 minutes 30 seconds north latitude and 121 degrees 31 minutes 51 seconds west longitude, NAD83; USGS Quad: Lassen Peak, California.

Range in Characteristics

Depth to restrictive feature: More than 60 inches (152 centimeters) to paralithic contact

Mean annual soil temperature: 42 to 47 degrees F (6 to 8 degrees C)

Period that soil moisture control section is dry: August to November (about 90 days)

Particle-size control section (weighted average): 28 to 35 percent clay and 14 to 23 percent rock fragments

Surface fragments: 0 to 10 percent gravel, 0 to 3 percent cobbles, 0 to 3 percent stones, and 0 to 2 percent boulders

Depth to fluctuating water table (if it occurs): 0 to more than 80 inches (203 centimeters)

Redoximorphic features: Oxidized iron in the 2A, 3AB, 3Bw, and 3Bg horizons

A horizon:

Color (dry)—7.5YR 4/3; 10YR 3/2

Color (moist)—10YR 2/1, 2/2

Texture—gravelly mucky fine sandy loam, gravelly loam, loam

Clay content—5 to 15 percent

Rock fragments—0 to 5 percent fine gravel, 0 to 5 percent medium and coarse gravel, 0 to 10 percent total gravel, 0 to 5 percent cobbles, 0 to 15 percent total rock fragments

Organic matter—14 to 22 percent

Base saturation by ammonium acetate—35 to 50 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.3 to 0.62

P retention—35 to 55 percent

Glass content—0 to 2 percent

NaF pH—9.0 to 9.1

Soil reaction—very strongly acid to slightly acid

2A horizon:

Color (dry)—10YR 4/2, 4/3

Color (moist)—10YR 3/1, 3/2

Texture—gravelly loam, loam

Clay content—15 to 25 percent

Rock fragments—3 to 5 percent fine gravel, 15 to 25 percent medium and coarse gravel, 0 to 5 percent cobbles, 4 to 35 percent total rock fragments

Organic matter—8 to 12 percent

Base saturation by ammonium acetate—35 to 50 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.3 to 0.62

P retention—35 to 55 percent

Glass content—0 to 2 percent

NaF pH—9.0 to 9.1

Soil reaction—very strongly acid to slightly acid

3AB horizon:

Color (dry)—10YR 6/2, 6/4, 7/2

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Color (moist)—10YR 3/3, 4/2
Texture—loam, silty clay loam
Clay content—19 to 30 percent
Rock fragments—3 to 5 percent fine gravel, 1 to 5 percent medium and coarse gravel, 4 to 10 percent total gravel, 0 to 5 percent cobbles, 7 to 10 percent total rock fragments
Organic matter—3 to 6 percent
Base saturation by ammonium acetate—40 to 50 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.3 to 0.5
P retention—30 to 50 percent
Glass content—0 to 2 percent
NaF pH—9.0 to 10.2
Soil reaction—neutral to very strongly acid

3Bw horizon:

Color (dry)—10YR 6/2, 7/2, 7/3; 7.5YR 6/6
Color (moist)—10YR 4/2, 5/2, 6/2, 6/6; 2.5Y 6/2
Texture—clay loam, gravelly clay loam, sandy clay loam, cobbly silty clay loam
Clay content—25 to 32 percent
Rock fragments—0 to 10 percent fine gravel, 0 to 20 percent medium and coarse gravel, 0 to 30 percent total gravel, 0 to 15 percent cobbles, 0 to 32 percent total rock fragments
Organic matter—1 to 4 percent
Base saturation by ammonium acetate—15 to 25 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.2 to 0.3
P retention—20 to 55 percent
Glass content—0 to 2 percent
NaF pH—9.0 to 10.5
Soil reaction—neutral to very strongly acid

3Bg horizon:

Color (dry)—10YR 5/1, 5/2, 6/2, 7/2, 8/2; 2.5Y 6/2, 7/2
Color (moist)—10YR 5/2, 6/2, 7/1, 8/1; 2.5Y 5/2; 5PB 4/1
Texture—clay loam, gravelly clay loam, gravelly clay, very stony clay, stony silty clay loam
Clay content—34 to 40 percent
Rock fragments—2 to 12 percent fine gravel, 1 to 8 percent medium and coarse gravel, 3 to 20 percent total gravel, 0 to 10 percent cobbles, 0 to 15 percent stones, 3 to 40 percent total rock fragments
Organic matter—0.5 to 2 percent
Base saturation by ammonium acetate—35 to 60 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.2 to 0.5
P retention—20 to 55 percent
Glass content—0 to 2 percent
NaF pH—9.0 to 9.7
Soil reaction—slightly alkaline to moderately acid

Histic Humaquepts

Histic Humaquepts consist of very deep, very poorly drained soils that formed in alluvium from volcanic rocks. These soils are in meadows on stream terraces. Slopes range from 1 to 5 percent. The mean annual precipitation is about 65 inches (1,651 millimeters), and the mean annual air temperature is about 42 degrees F (5.4 degrees C).

Taxonomic Classification

Frigid Histic Humaquepts

Typical Pedon

Histic Humaquepts ashy loam (fig. 88) on an east-northeast-facing (70 degrees) slope of 2 percent under a cover of sedges at an elevation of 5,690 feet (1,734 meters). When described on 9/6/06, the soil was dry to a depth of 30 inches (77 centimeters), moist at a depth of 30 to 51 inches (77 to 130 centimeters), wet at a depth of 51 to 57 inches (130 to 146 centimeters), and saturated at a depth of 57 to more than 62 inches (146 to 157 centimeters). A water table was at a depth of 57 inches (146 centimeters). (Colors are for dry soil unless otherwise noted.)

- Oi—0 to 2 inches (0 to 4 centimeters); herbaceous peat; sedge roots and slightly decomposed plant material; abrupt smooth boundary.
- Oe—2 to 6 inches (4 to 16 centimeters); dark grayish brown (10YR 4/2) ashy herbaceous mucky peat, very dark brown (10YR 2/2) moist; 26 percent clay; weak very fine granular structure; slightly hard, very friable, nonsticky, nonplastic; many very fine to coarse roots; many very fine and fine interstitial pores; 1 percent subrounded fine gravel; moderately acid, pH 5.7 by pH meter 1:1 water; NaF pH 7.6; abrupt smooth boundary.
- Oa—6 to 9 inches (16 to 23 centimeters); dark grayish brown (10YR 4/2) ashy muck, very dark brown (10YR 2/2) moist; 30 percent clay; weak very fine granular structure; slightly hard, very friable, nonsticky, nonplastic; few coarse and many very fine to medium roots; many very fine and fine interstitial pores; 1 percent subrounded medium gravel and 1 percent subrounded fine gravel; strongly acid, pH 5.3 by pH meter 1:1 water; NaF pH 7.6; abrupt smooth boundary.
- Ab—9 to 12 inches (23 to 30 centimeters); very dark grayish brown (10YR 3/2) ashy loam, black (10YR 2/1) moist; 24 percent clay; moderate medium subangular blocky structure parting to weak fine granular; moderately hard, friable, nonsticky, slightly plastic; common very fine to medium roots; many very fine and fine irregular pores; 1 percent subrounded medium gravel and 2 percent subrounded fine gravel; strongly acid, pH 5.4 by pH meter 1:1 water; NaF pH 8.3; abrupt smooth boundary.
- Agb—12 to 21 inches (30 to 53 centimeters); dark grayish brown (10YR 4/2) ashy loam, very dark brown (10YR 2/2) moist; 25 percent clay; moderate coarse subangular blocky structure parting to moderate medium subangular blocky; moderately hard, friable, slightly sticky, slightly plastic; common very fine to medium roots; many very fine and fine irregular and common very coarse tubular pores; 10 percent fine threadlike brownish yellow (10YR 6/8), masses of oxidized iron with sharp boundaries on surfaces along root channels; 2 percent subrounded medium gravel and 4 percent subrounded fine gravel; strongly acid, pH 5.4 by pH meter 1:1 water; NaF pH 8.3; gradual smooth boundary.
- Bgb—21 to 30 inches (53 to 77 centimeters); light gray (10YR 7/2) ashy loam, grayish brown (10YR 5/2) moist; 26 percent clay; moderate coarse subangular blocky structure; moderately hard, friable, slightly sticky, slightly plastic; common very fine and fine and many medium roots; common very fine and fine irregular and common very fine tubular pores; 10 percent fine threadlike brownish yellow (10YR 6/8) masses of oxidized iron with sharp boundaries on surfaces along root channels; 1 percent subrounded medium gravel and 2 percent subrounded fine gravel; strongly acid, pH 5.4 by pH meter 1:1 water; NaF pH 8.6; abrupt irregular boundary.
- Cg1—30 to 51 inches (77 to 130 centimeters); light brownish gray (10YR 6/2) extremely cobbly ashy sandy clay loam, dark grayish brown (10YR 4/2) moist; 21 percent clay; single grain; soft, friable, slightly sticky, slightly plastic; many very



Figure 88.—Typical profile of Histic Humaquepts. Depth is marked in centimeters.

fine to medium roots around fragments; many very fine to medium irregular pores; 10 percent subrounded stones, 10 percent subrounded fine gravel, 20 percent subrounded cobbles, and 20 percent subrounded medium and coarse gravel; very strongly acid, pH 5.0 by pH meter 1:1 water; NaF pH 8.5; clear smooth boundary.

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Cg2—51 to 62 inches (130 to 157 centimeters); light gray (10YR 7/2) very cobbly ashy coarse sandy loam, very dark grayish brown (10YR 3/2) moist; 11 percent clay; single grain; soft, friable, nonsticky, nonplastic; many very fine to medium roots; many very fine to medium interstitial pores; 10 percent subrounded stones, 15 percent subrounded medium and coarse gravel, 15 percent subrounded cobbles, and 15 percent subrounded fine gravel; very strongly acid, pH 5.0 by pH meter 1:1 water; NaF pH 7.6.

Type Location

Plumas County, California; about 0.15 mile southwest of Drakesbad, approximately 1,250 feet north and 2,900 feet west of the southeast corner of sec. 22, T. 30 N., R. 5 E.; 40 degrees 26 minutes 35 seconds north latitude and 121 degrees 24 minutes 24 seconds west longitude, NAD83; USGS Quad: Reading Peak, California.

Range in Characteristics

Depth to restrictive feature: More than 60 inches (152 centimeters) to bedrock

Mean annual soil temperature: 45 to 47 degrees F (7 to 8 degrees C)

Period that soil moisture control section is dry: August to October (about 90 days) in the upper part of the profile

Particle-size control section (weighted average): 23 percent clay and 38 percent rock fragments

Fluctuating water table (if it occurs): 0 to 60 inches (152 centimeters)

O horizon:

Color (dry)—10YR 4/2

Color (moist)—10YR 2/2

Texture—herbaceous peat, ashy herbaceous mucky peat, ashy muck

Clay content—20 to 35 percent

Rock fragments—0 to 2 percent fine gravel, 0 to 1 percent medium gravel, 0 to 2 percent total gravel

Organic matter—20 to 50 percent

Base saturation by ammonium acetate—40 to 50 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.3 to 0.45

P retention—35 to 50 percent

Glass content—15 to 25 percent

NaF pH—7.5 to 8.5

Soil reaction—strongly acid or moderately acid

Ab horizon:

Color (dry)—10YR 3/2

Color (moist)—10YR 2/1

Texture—ashy loam

Clay content—20 to 27 percent

Rock fragments—0 to 2 percent fine gravel, 0 to 1 percent medium and coarse gravel, 0 to 3 percent total gravel

Organic matter—5 to 10 percent

Base saturation by ammonium acetate—45 to 60 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.3 to 0.4

P retention—30 to 45 percent

Glass content—15 to 30 percent

NaF pH—8.0 to 9.0

Soil reaction—strongly acid or moderately acid

Agb horizon:

Color (dry)—10YR 4/2

Color (moist)—10YR 2/2

Texture—ashy loam
Clay content—20 to 27 percent
Rock fragments—0 to 5 percent fine gravel, 0 to 3 percent medium and coarse gravel, 0 to 8 percent total gravel
Organic matter—3 to 5 percent
Base saturation by ammonium acetate—15 to 25 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.2 to 0.3
P retention—15 to 25 percent
Glass content—20 to 35 percent
NaF pH—8.4 to 9.0
Soil reaction—strongly acid or moderately acid

Bgb horizon:

Color (dry)—10YR 7/2
Color (moist)—10YR 5/2
Texture—ashy loam
Clay content—20 to 27 percent
Rock fragments—0 to 5 percent fine gravel, 0 to 5 percent medium and coarse gravel, 0 to 10 percent total gravel
Organic matter—1 to 2 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.2 to 0.25
P retention—15 to 25 percent
Glass content—15 to 25 percent
NaF pH—8.0 to 9.0
Soil reaction—strongly acid

Cg horizon:

Color (dry)—10YR 6/2, 7/2
Color (moist)—10YR 3/2, 4/2
Texture—extremely cobbly ashy sandy clay loam, very cobbly ashy coarse sandy loam
Clay content—10 to 25 percent
Rock fragments—10 to 20 percent fine gravel, 15 to 25 percent medium and coarse gravel, 25 to 35 percent total gravel, 10 to 25 percent cobbles, 5 to 15 percent stones, 50 to 65 percent total rock fragments
Organic matter—1 to 3 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.10 to 0.20
Glass content—15 to 25 percent
NaF pH—7.5 to 9.0
Soil reaction—very strongly acid

Histic Humaquepts, frequently flooded

Histic Humaquepts, frequently flooded consist of very deep, very poorly drained soils that formed in stream channel alluvium over glaciolacustrine deposits from volcanic rocks. These soils are along stream channels in meadows that formed in glacial lakes. Slopes range from 0 to 3 percent. The mean annual precipitation is about 51 inches (1,295 millimeters), and the mean annual air temperature is about 42 degrees F (5.6 degrees C).

Taxonomic Classification

Frigid Histic Humaquepts

Typical Pedon

Histic Humaquepts, frequently flooded, herbaceous peat (fig. 89) on a east-facing (76



Figure 89.—Typical profile of Histic Humaquepts, frequently flooded. Depth is marked in centimeters.

degrees) slope of 0 percent under a cover of sedges at an elevation of 6,538 feet (1,993 meters). When described on 7/16/08, the soil was moist at a depth of 0 to 51 inches (130 centimeters) and saturated at a depth of 51 to more than 55 inches (130 to 140 centimeters). When the profile was excavated to a depth of 51 inches (130 centimeters), water quickly filled the pit up to a depth of 9 inches (24 centimeters). (Colors are for dry soil unless otherwise noted.)

Oi—0 to 2 inches (0 to 4 centimeters); herbaceous peat; many very fine roots; abrupt smooth boundary.

Oa1—2 to 5 inches (4 to 13 centimeters); grayish brown (10YR 5/2) herbaceous muck, black (10YR 2/1) moist; 12 percent clay; single grain; soft, very friable, nonsticky, nonplastic; many very fine to medium roots; many very fine and fine tubular and many very fine and fine irregular pores; moderately acid, pH 5.8 by Hellige-Truog; NaF pH 9.0; abrupt smooth boundary.

Oa2—5 to 9 inches (13 to 22 centimeters); light brownish gray (10YR 6/2) herbaceous muck, very dark grayish brown (10YR 3/2) moist; 20 percent clay; massive; moderately hard, firm, nonsticky, nonplastic; many very fine to medium roots; many very fine and fine irregular and many very fine and fine tubular pores; slightly acid, pH 6.3 by Hellige-Truog; NaF pH 9.0; abrupt wavy boundary.

Cg1—9 to 13 inches (22 to 33 centimeters); light gray (10YR 7/2) ashy coarse sand, grayish brown (10YR 5/2) moist; 1 percent clay; single grain; loose, nonsticky, nonplastic; many very fine to medium roots; many very fine and fine interstitial pores; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 9.0; abrupt wavy boundary.

2Agb—13 to 17 inches (33 to 43 centimeters); light gray (10YR 7/1) mucky ashy silty clay loam, very dark brown (10YR 2/2) moist; 30 percent clay; massive; hard, very

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- firm, nonsticky, nonplastic; many very fine to medium roots; many very fine and fine tubular and many very fine and fine interstitial pores; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 9.0; abrupt smooth boundary.
- 2Cg2—17 to 28 inches (43 to 70 centimeters); white (10YR 8/1) ashy silt loam, grayish brown (2.5Y 5/2) moist; 25 percent clay; massive; moderately hard, firm, nonsticky, nonplastic; many very fine to medium roots; many very fine and fine tubular and common very fine and fine irregular pores; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 9.0; abrupt smooth boundary.
- 2Bwb—28 to 47 inches (70 to 120 centimeters); pale brown (10YR 6/3) gravelly ashy sandy clay loam, brown (10YR 4/3) moist; 33 percent clay; massive; hard, very firm, slightly sticky, nonplastic; many very fine to medium roots; common very fine and fine irregular and common very fine and fine tubular pores; 15 percent subangular fine gravel; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 10.8; abrupt smooth boundary.
- 2Cg3—47 to 51 inches (120 to 130 centimeters); light gray (10YR 7/1) ashy coarse sandy loam, grayish brown (2.5Y 5/2) moist; 7 percent clay; massive; slightly hard, friable, nonsticky, nonplastic; common very fine to medium roots; common very fine and fine tubular and common very fine and fine irregular pores; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 9.9; abrupt smooth boundary.
- 2Cg4—51 to 55 inches (130 to 140 centimeters); light gray (10YR 7/1) very gravelly ashy coarse sand, grayish brown (2.5Y 5/2) moist; 1 percent clay; single grain; loose, nonsticky, nonplastic; few very fine roots; many very fine to medium interstitial pores; 40 percent subangular fine gravel; neutral, pH 6.8 by Hellige-Truog; NaF pH 9.1.

Type Location

Shasta County, California; about 0.76 mile west-southwest from the Horseshoe Lake Ranger Station, approximately 250 feet north and 100 feet east of the southwest corner of sec. 8, T. 30 N., R. 6 E.; 40 degrees 28 minutes 8 seconds north latitude and 121 degrees 20 minutes 44 seconds west longitude, NAD83; USGS Quad: Mount Harkness, California.

Range in Characteristics

Depth to restrictive feature: More than 60 inches (152 centimeters) to bedrock

Mean annual soil temperature: 42 to 45 degrees F (5.5 to 7 degrees C)

Soil moisture control section: Moist all year

Particle-size control section (weighted average): 30 percent clay and 10 percent rock fragments

Depth to fluctuating water table (if it occurs): 0 to 60 inches (152 centimeters)

Oi horizon:

Color (dry)—10YR 5/2

Color (moist)—10YR 2/1

Texture—herbaceous peat

Clay content—0 percent

Organic matter—21 to 30 percent

Soil reaction—moderately acid to neutral

Oa horizon:

Color (dry)—10YR 5/2, 6/2

Color (moist)—10YR 2/1, 3/2

Texture—herbaceous muck

Clay content—10 to 20 percent

Organic matter—21 to 30 percent

Soil reaction—moderately acid to neutral

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Cg horizon:

Color (dry)—10YR 7/2
Color (moist)—10YR 5/2
Texture—ashy coarse sand
Clay content—0 to 1 percent
Organic matter—0.5 to 2 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.15 to 0.6
P retention—0 to 5 percent
Glass content—10 to 30 percent
NaF pH—8.8 to 9.2
Soil reaction—slightly acid or neutral

2Abg horizon:

Color (dry)—10YR 7/1
Color (moist)—10YR 2/2
Texture—mucky ashy silty clay loam
Clay content—27 to 35 percent
Organic matter—10 to 30 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.3 to 0.6
P retention—25 to 55 percent
Glass content—10 to 20 percent
NaF pH—8.8 to 9.2
Soil reaction—slightly acid or neutral

Upper 2Cg horizon:

Color (dry)—10YR 8/1
Color (moist)—2.5Y 5/2
Texture—ashy silt loam
Clay content—18 to 27 percent
Organic matter—2 to 10 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.3 to 0.6
P retention—15 to 40 percent
Glass content—15 to 30 percent
NaF pH—8.8 to 9.2
Soil reaction—slightly acid or neutral

2Bwb horizon:

Color (dry)—10YR 6/3
Color (moist)—10YR 4/3
Texture—gravelly ashy sandy clay loam, ashy sandy clay loam
Clay content—20 to 35 percent
Rock fragments—0 to 15 percent fine gravel, 0 to 5 percent medium and coarse gravel, 0 to 20 percent total gravel
Organic matter—2 to 10 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.3 to 0.8
P retention—15 to 40 percent
Glass content—15 to 30 percent
NaF pH—9.5 to 11.0
Soil reaction—slightly acid or neutral

Lower 2Cg horizon:

Color (dry)—10YR 7/1
Color (moist)—2.5Y 5/2
Texture—ashy coarse sandy loam, very gravelly ashy coarse sand
Clay content—0 to 8 percent

Rock fragments—0 to 40 percent fine gravel, 0 to 20 percent medium and coarse gravel, 0 to 45 percent total gravel
Organic matter—0.2 to 0.5 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.05 to 0.1
P retention—0 to 5 percent
Glass content—20 to 30 percent
NaF pH—8.8 to 10.0
Soil reaction—slightly acid or neutral

Histic Humaquepts, lake sediments

Histic Humaquepts, lake sediments consist of very deep, poorly drained soils that formed in volcanic ash over glaciolacustrine deposits from volcanic rocks. These soils are in meadows that formed in glacial lakes. Slopes range from 0 to 3 percent. The mean annual precipitation is about 43 inches (1,092 millimeters), and the mean annual air temperature is about 41 degrees F (5 degrees C).

Taxonomic Classification

Frigid Histic Humaquepts

Typical Pedon

Histic Humaquepts, lake sediments, herbaceous peat on a northwest-facing (330 degrees) slope of 0 percent under a cover of sedges at an elevation of 6,402 feet (1,951 meters). When described on 7/17/07, the soil was saturated at a depth of 0 to 6 inches (16 centimeters), moist at a depth of 6 to 26 inches (16 to 67 centimeters), slightly moist at a depth of 26 to 39 inches (67 to 98 centimeters), and moist at a depth of 39 to more than 60 inches (67 to 152 centimeters). Water seeped out of an isolated fist-sized area at a depth of 14 to 16 inches (35 to 40 centimeters) and filled the pit to a depth of 26 inches (66 centimeters) after 1 hour. (Colors are for dry soil unless otherwise noted.)

- Oi—0 to 6 inches (0 to 16 centimeters); brown (10YR 4/3) herbaceous peat, dark brown (7.5YR 3/2) moist; massive; hard, very firm, nonsticky, nonplastic; common fine and medium and many very fine roots; many very fine irregular pores; slightly acid, pH 6.6 by Hellige-Truog; NaF pH 9.0; abrupt smooth boundary.
- Oa1—6 to 10 inches (16 to 25 centimeters); grayish brown (10YR 5/2) herbaceous muck, black (2.5Y 2.5/1) and dark grayish brown (2.5Y 4/2) moist; 0 percent clay; massive; moderately hard, firm, nonsticky, nonplastic; few fine and medium and many very fine roots; many very fine irregular pores; slightly acid, pH 6.6 by Hellige-Truog; NaF pH 9.2; abrupt smooth boundary. (The mineral part of this horizon is thought to be volcanic ash.)
- Oa2—10 to 14 inches (25 to 35 centimeters); light brownish gray (10YR 6/2) herbaceous muck, dark grayish brown (10YR 4/2) and black (10YR 2/1) moist; 15 percent clay; massive; moderately hard, firm, nonsticky, nonplastic; few fine and medium and many very fine roots; many very fine irregular pores; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 9.0; abrupt smooth boundary.
- Cg1—14 to 16 inches (35 to 40 centimeters); light gray (10YR 7/1) ashy coarse sand, grayish brown (2.5Y 5/2) and light gray (2.5Y 7/2) moist; 0 percent clay; single grain; loose, nonsticky, nonplastic; common very fine to medium roots; many very fine and fine interstitial pores; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 9.0; abrupt smooth boundary.
- Cg2—16 to 25.6 inches (40 to 65 centimeters); white (10YR 8/1) ashy silt loam, grayish brown (10YR 5/2) moist; 26 percent clay; massive; hard, very firm, slightly sticky, moderately plastic; common very fine to medium roots; common very fine

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- tubular and common very fine irregular pores; moderately acid, pH 6.0 by Hellige-Truog; NaF pH 9.0; abrupt smooth boundary.
- 2O_a—25.6 to 26.4 inches (65 to 67 centimeters); dark gray (10YR 4/1) muck, black (10YR 2/1) moist; 10 percent clay; massive; moderately hard, firm, slightly sticky, slightly plastic; common very fine to medium roots; common very fine irregular and common very fine tubular pores; moderately acid, pH 6.0 by Hellige-Truog; NaF pH 9.0; abrupt smooth boundary.
- 2Bg—26.4 to 35 inches (67 to 89 centimeters); light gray (10YR 7/1) ashy silt loam, grayish brown (10YR 5/2) moist; 12 percent clay; massive; very hard, extremely firm, slightly sticky, slightly plastic; common very fine to medium roots; few very fine irregular and few very fine tubular pores; slightly acid, pH 6.2 by Hellige-Truog; NaF pH 9.0; abrupt smooth boundary.
- 2Cg3—35 to 39 inches (89 to 98 centimeters); white (10YR 8/1) ashy silt, light brownish gray (10YR 6/2) moist; 10 percent clay; massive; extremely hard, slightly rigid, slightly sticky, slightly plastic; common very fine to medium roots; few very fine irregular and few very fine tubular pores; 15 percent fine and medium prominent grayish green (5G 4/2), moist, iron depletions; 5 percent subangular medium and coarse gravel and 5 percent subangular fine gravel; neutral, pH 7.0 by Hellige-Truog; NaF pH 9.0; abrupt smooth boundary.
- 2Cg4—39 to 44 inches (98 to 112 centimeters); light gray (10YR 7/1) very gravelly ashy loamy coarse sand, grayish brown (10YR 5/2) moist; 6 percent clay; massive; moderately hard, firm, nonsticky, nonplastic; common very fine and fine roots; common very fine irregular and common very fine tubular pores; 20 percent subangular medium and coarse gravel and 20 percent subangular fine gravel; slightly acid, pH 6.6 by Hellige-Truog; NaF pH 9.0; abrupt smooth boundary.
- 2Cg5—44 to 49 inches (112 to 125 centimeters); light gray (10YR 7/1) gravelly ashy loamy coarse sand, dark gray (10YR 4/1) moist; 1 percent clay; single grain; soft, very friable, nonsticky, nonplastic; common very fine and fine and few medium roots; common very fine and fine interstitial pores; 8 percent subangular medium and coarse gravel and 16 percent subangular fine gravel; slightly acid, pH 6.6 by Hellige-Truog; NaF pH 9.0; abrupt smooth boundary.
- 2Cg6—49 to 59 inches (125 to 150 centimeters); light gray (10YR 7/1) ashy loamy sand, dark gray (2.5Y 4/1) moist; 1 percent clay; single grain; soft, very friable, nonsticky, nonplastic; common very fine and fine and few medium roots; common very fine interstitial pores; neutral, pH 6.8 by Hellige-Truog; NaF pH 9.0.

Type Location

Lassen County, California; about 1.1 miles north of Inspiration Point, approximately 2,200 feet north and 1,450 feet east of the southwest corner of sec. 3, T. 30 N., R. 6 E.; 40 degrees 29 minutes 19 seconds north latitude and 121 degrees 18 minutes 8 seconds west longitude, NAD83; USGS Quad: Mount Harkness, California.

Range in Characteristics

Depth to restrictive feature: More than 60 inches (152 centimeters) to bedrock

Mean annual soil temperature: 42 to 45 degrees F (5.5 to 7 degrees C)

Soil moisture control section: Moist all year

Particle-size control section (weighted average): Coarse-silty part—13 percent clay and 0 percent rock fragments; sandy-skeletal part—3 percent clay and 24 percent rock fragments

Depth to fluctuating water table (if it occurs): 0 to 60 inches (152 centimeters)

Oi horizon:

Color (dry)—10YR 4/2, 4/3

Color (moist)—7.5YR 3/2; 10YR 2/1

Texture—herbaceous peat

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Clay content—0 percent
Organic matter—21 to 30 percent
Soil reaction—moderately acid to neutral

Oa horizon:

Color (dry)—10YR 5/2
Color (moist)—2.5Y 2.5/1
Texture—herbaceous muck
Clay content—0 percent
Organic matter—21 to 30 percent
Soil reaction—moderately acid to neutral

2Oa and 2O'a horizons:

Color (dry)—10YR 4/1, 6/2
Color (moist)—10YR 2/1, 4/2
Texture—herbaceous muck, muck
Clay content—5 to 20 percent
Organic matter—21 to 30 percent
Soil reaction—slightly acid or neutral

Upper 2Cg horizon:

Color (dry)—10YR 7/1, 8/1
Color (moist)—2.5Y 5/2; 10YR 5/2
Texture—ashy coarse sand, ashy silt loam
Clay content—0 to 27 percent
Organic matter—0.5 to 17 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.15 to 0.6
P retention—10 to 55 percent
Glass content—10 to 30 percent
NaF pH—8.8 to 9.2
Soil reaction—moderately acid or slightly acid

2Bg horizon:

Color (dry)—10YR 4/1
Color (moist)—10YR 5/2
Texture—ashy silt loam
Clay content—10 to 20 percent
Organic matter—0.5 to 2 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.3 to 0.6
P retention—15 to 40 percent
Glass content—20 to 30 percent
NaF pH—8.8 to 9.2
Soil reaction—slightly acid

Lower 2Cg horizon:

Color (dry)—10YR 7/1, 8/1
Color (moist)—10YR 4/1, 5/2, 6/2; 2.5Y 4/1
Texture—ashy silt, very gravelly ashy loamy coarse sand, gravelly ashy loamy coarse sand, ashy loamy sand
Clay content—0 to 12 percent
Rock fragments—0 to 25 percent fine gravel, 0 to 25 percent medium and coarse gravel, 0 to 50 percent total gravel
Organic matter—0.2 to 0.5 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.05 to 0.1
P retention—0 to 5 percent
Glass content—20 to 30 percent

NaF pH—8.8 to 9.2
Soil reaction—neutral

Humic Haploxerands

Humic Haploxerands consist of very deep, well drained soils that formed in ash over colluvium from volcanic rocks. These soils are on unglaciated shield volcanoes. Slopes range from 5 to 40 percent. The mean annual precipitation is about 39 inches (991 millimeters), and the mean annual air temperature is about 44 degrees F (7 degrees C).

Taxonomic Classification

Frigid Humic Haploxerands

Typical Pedon

Humic Haploxerands medial fine sandy loam on a north-facing (0 degrees) slope of 22 percent under a cover of white fir, bitter cherry, bush chinquapin, and snowbrush ceanothus at an elevation of 5,849 feet (1,783 meters). When described on 7/24/2006, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

- Oi—0 to 2 inches (0 to 4 centimeters); slightly decomposed twigs, needles, and cone litter; abrupt smooth boundary.
- Oa—2 to 3 inches (4 to 7 centimeters); highly decomposed needle and cone litter; common very fine roots; abrupt smooth boundary.
- A1—3 to 4 inches (7 to 11 centimeters); dark grayish brown (10YR 4/2) medial fine sandy loam, black (10YR 2/1) moist; 5 percent clay; weak fine and medium subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; common very fine and many fine roots; many very fine interstitial pores; 2 percent subangular fine gravel and 2 percent subangular medium and coarse gravel; neutral, pH 6.7 by Hellige-Truog; NaF pH 9.0; abrupt smooth boundary.
- A2—4 to 6 inches (11 to 15 centimeters); grayish brown (10YR 5/2) medial sandy loam, very dark grayish brown (10YR 3/2) moist; 5 percent clay; weak fine and medium subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; common very fine and many fine and medium roots; many very fine and fine interstitial pores; 4 percent subangular fine gravel and 6 percent subangular medium and coarse gravel; neutral, pH 6.7 by Hellige-Truog; NaF pH 10.2; abrupt wavy boundary.
- 2Ab—6 to 15 inches (15 to 37 centimeters); brown (10YR 5/3) extremely stony medial sandy loam, very dark grayish brown (10YR 3/2) moist; 4 percent clay; weak very fine and fine subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; many very fine and common fine to coarse roots; many very fine and fine interstitial pores; 2 percent subangular fine gravel, 3 percent subangular medium and coarse gravel, 5 percent subangular cobbles, and 50 percent subangular stones; slightly acid, pH 6.6 by Hellige-Truog; NaF pH 11.0; clear smooth boundary.
- 2Bwb1—15 to 24 inches (37 to 60 centimeters); dark yellowish brown (10YR 4/4) very stony medial sandy loam, very dark brown (10YR 2/2) moist; 9 percent clay; weak very fine to medium subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; common very fine, many fine to coarse, and few very coarse roots; many very fine and fine interstitial and common medium tubular pores; 4 percent subangular fine gravel, 8 percent subangular medium and coarse gravel, 10 percent subangular cobbles, and 15 percent subangular stones; slightly acid, pH 6.6 by Hellige-Truog; NaF pH 11.0; abrupt smooth boundary.
- 2Bwb2—24 to 29 inches (60 to 73 centimeters); yellowish brown (10YR 5/4) cobbly

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medial sandy loam, dark brown (7.5YR 3/3) moist; 12 percent clay; single grain; loose, nonsticky, nonplastic; common very fine and many fine to coarse roots; many very fine and fine interstitial pores; 6 percent subangular fine gravel, 9 percent subangular medium and coarse gravel, and 15 percent subangular cobbles; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 10.5; clear smooth boundary.

2Bwb3—29 to 42 inches (73 to 107 centimeters); brownish yellow (10YR 6/6) cobbly medial sandy loam, dark yellowish brown (10YR 4/4) moist; 18 percent clay; weak very fine subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; few very fine and common fine and medium roots; common very fine irregular and few fine tubular pores; 5 percent subangular fine gravel, 13 percent subangular medium and coarse gravel, and 15 percent subangular cobbles; slightly acid, pH 6.2 by Hellige-Truog; NaF pH 10.0; abrupt smooth boundary.

2Bwb4—42 to 60 inches (107 to 152 centimeters); yellow (10YR 7/6) very stony medial loam, dark yellowish brown (10YR 4/6) moist; 17 percent clay; weak very fine and fine subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; common fine and medium roots; common very fine irregular and few medium tubular pores; 7 percent subangular fine gravel, 16 percent subangular medium and coarse gravel, 15 percent subangular cobbles, and 20 percent subangular stones; moderately acid, pH 6.0 by Hellige-Truog; NaF pH 10.0.

Type Location

Shasta County, California; about 0.52 mile west-northwest of the Crags campground, approximately 2,600 feet east and 2,400 feet south of the northwest corner of sec. 4, T. 31 N., R. 4 E.; 40 degrees 33 minutes 58 seconds north latitude and 121 degrees 31 minutes 50 seconds west longitude, NAD83; USGS Quad: Manzanita Lake, California.

Range in Characteristics

Depth to restrictive feature: More than 60 inches (152 centimeters) to bedrock

Mean annual soil temperature: 45 to 47 degrees F (7 to 8 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (thickest part): 9 to 18 percent clay and 37 to 58 percent rock fragments

Surface fragments: 0 to 20 percent gravel and 0 to 1 percent cobbles

A horizon:

Color (dry)—10YR 3/2, 4/1, 4/2

Color (moist)—10YR 2/1, 2/2

Texture—medial fine sandy loam, medial sandy loam

Clay content—4 to 6 percent

Rock fragments—1 to 3 percent fine gravel, 1 to 3 percent medium and coarse gravel, 2 to 6 percent total gravel

Organic matter—12 to 17.5 percent

Base saturation by ammonium acetate—12 to 25 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—2.10 to 2.75

P retention—85 to 95 percent

Glass content—8 to 14 percent

NaF pH—9.0 to 9.5

Soil reaction—slightly acid or neutral

2Ab horizon:

Color (dry)—10YR 4/2, 5/2, 5/3

Color (moist)—10YR 2/2, 3/2

Texture—medial sandy loam, extremely stony medial sandy loam

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Clay content—4 to 7 percent
Rock fragments—2 to 5 percent fine gravel, 3 to 6 percent medium and coarse gravel, 5 to 6 percent total gravel, 0 to 5 percent cobbles, 0 to 50 percent stones, 7 to 60 percent total rock fragments
Organic matter—9.7 to 17.5 percent
Base saturation by ammonium acetate—8 to 25 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—2.10 to 3.75
P retention—85 to 100 percent
Glass content—9 to 13 percent
NaF pH—10.0 to 11.0
Soil reaction—slightly acid or neutral

Upper 2Bwb horizon:

Color (dry)—7.5YR 5/4; 10YR 4/4, 5/4
Color (moist)—7.5YR 3/3, 4/3; 10YR 2/2
Texture—medial sandy loam, gravelly medial sandy loam, cobbly medial sandy loam, very stony medial sandy loam
Clay content—9 to 12 percent
Rock fragments—4 to 6 percent fine gravel, 5 to 9 percent medium and coarse gravel, 9 to 15 percent total gravel, 0 to 15 percent cobbles, 0 to 15 percent stones, 11 to 37 percent total rock fragments
Organic matter—4.5 to 10.0 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—3.00 to 5.50
P retention—90 to 100 percent
Glass content—9 to 21 percent
NaF pH—10.2 to 11.0
Soil reaction—slightly acid or neutral

Lower 2Bwb horizon:

Color (dry)—7.5YR 6/6; 10YR 6/6, 7/6
Color (moist)—7.5YR 4/4; 10YR 4/4, 4/6, 5/6
Texture—gravelly medial sandy loam, very gravelly medial loam, cobbly medial sandy loam, very cobbly medial sandy loam, very stony medial loam
Clay content—15 to 23 percent
Rock fragments—5 to 13 percent fine gravel, 6 to 18 percent medium and coarse gravel, 11 to 31 percent total gravel, 5 to 15 percent cobbles, 0 to 20 percent stones, 16 to 58 percent total rock fragments
Organic matter—4.5 to 7.5 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—4.10 to 5.50
P retention—92 to 100 percent
Glass content—9 to 21 percent
NaF pH—9.9 to 10.0
Soil reaction—strongly acid to slightly acid

Humic Haploxerands, colluvium

Humic Haploxerands, colluvium consist of moderately deep to very deep, well drained soils that formed in ash mixed with colluvium over colluvium from volcanic rock. These soils are on colluvial aprons and landslides. Slopes range from 10 to 40 percent. The mean annual precipitation is about 53 inches (1,346 millimeters), and the mean annual air temperature is about 42 degrees F (5.6 degrees C).

Taxonomic Classification

Frigid Humic Haploxerands



Figure 90.—Typical profile of Humic Haploxerands, colluvium. Depth is marked in centimeters.

Typical Pedon

Humic Haploxerands, colluvium, gravelly medial sandy loam (fig. 90) on a southwest-facing (220 degrees) slope of 24 percent under a cover of white fir at an elevation of 5,608 feet (1,709 meters). When described on 9/13/2007, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

Oi—0 to 1.6 inches (0 to 4 centimeters); slightly decomposed plant material; abrupt wavy boundary.

Oe—1.6 to 2.4 inches (4 to 6 centimeters); moderately decomposed plant material; common very fine roots; abrupt wavy boundary.

A1—2.4 to 4 inches (6 to 10 centimeters); grayish brown (10YR 5/2) gravelly medial sandy loam, very dark grayish brown (10YR 3/2) moist; 5 percent clay; moderate

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- thick platy structure parting to weak fine and medium subangular blocky; soft, very friable, nonsticky, nonplastic; many very fine roots; few fine tubular and many very fine and fine interstitial pores; 12 percent angular fine gravel and 18 percent angular medium and coarse gravel; neutral, pH 6.8 by Hellige-Truog; NaF pH 10.8; abrupt smooth boundary.
- A2—4 to 8 inches (10 to 21 centimeters); dark grayish brown (10YR 4/2) gravelly medial sandy loam, very dark grayish brown (10YR 3/2) moist; 5 percent clay; weak medium and coarse subangular blocky structure; soft, very friable, nonsticky, nonplastic; many very fine, common fine and medium, and few coarse roots; many very fine irregular and tubular pores; 15 percent angular fine gravel, 12 percent angular medium and coarse gravel, and 5 percent angular cobbles; neutral, pH 6.7 by Hellige-Truog; NaF pH 11.2; abrupt wavy boundary.
- Bw1—8 to 15 inches (21 to 37 centimeters); brown (10YR 4/3) very gravelly medial sandy loam, very dark grayish brown (10YR 3/2) moist; 6 percent clay; weak medium and coarse subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine to coarse roots; common very fine and fine tubular and many very fine irregular pores; 17 percent angular fine gravel, 17 percent angular medium and coarse gravel, 10 percent angular cobbles, and 3 percent angular stones; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 11.2; abrupt wavy boundary.
- Bw2—15 to 22 inches (37 to 55 centimeters); brown (10YR 5/3) very gravelly medial sandy loam, dark brown (10YR 3/3) moist; 7 percent clay; weak very fine and fine subangular blocky structure; soft, very friable, slightly sticky, nonplastic; many very fine to coarse and few very coarse roots; common very fine and fine tubular and many very fine interstitial pores; 13 percent angular fine gravel, 17 percent angular medium and coarse gravel, 10 percent angular cobbles, and 5 percent angular stones; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 11.2; clear smooth boundary.
- 2Bw3—22 to 34 inches (55 to 87 centimeters); pale brown (10YR 6/3) extremely gravelly medial sandy loam, dark yellowish brown (10YR 3/4) moist; 8 percent clay; weak very fine and fine subangular blocky structure; soft, very friable, slightly sticky, nonplastic; common very fine to medium and few coarse and very coarse roots; many very fine and fine interstitial pores; 12 percent angular fine gravel, 36 percent angular medium and coarse gravel, 15 percent angular cobbles, and 5 percent angular stones; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 10.8; clear smooth boundary.
- 2BC1—34 to 50 inches (87 to 128 centimeters); pale brown (10YR 6/3) extremely gravelly medial fine sandy loam, brown (10YR 4/3) moist; 9 percent clay; massive parting to weak fine and medium subangular blocky structure; moderately hard, friable, slightly sticky, nonplastic; common very fine to medium roots; many very fine and fine interstitial and few very fine and fine tubular pores; 18 percent angular fine gravel, 26 percent angular medium and coarse gravel, 12 percent angular cobbles, and 4 percent angular stones; slightly acid, pH 6.2 by Hellige-Truog; NaF pH 10.0; clear smooth boundary.
- 2BC2—50 to 61 inches (128 to 154 centimeters); pale brown (10YR 6/3) extremely gravelly medial sandy loam, brown (10YR 4/3) moist; 7 percent clay; massive; moderately hard, friable, nonsticky, nonplastic; few fine and medium roots; common very fine and fine tubular and common very fine interstitial pores; 19 percent angular fine gravel, 27 percent angular medium and coarse gravel, 20 percent angular cobbles, and 3 percent angular stones; moderately acid, pH 6.0 by Hellige-Truog; NaF pH 9.7.

Type Location

Shasta County, California; about 1.1 miles north-northwest of Kelly Camp,

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approximately 400 feet east and 1,850 feet south of the northwest corner of sec. 19, T. 30 N., R. 6 E.; 40 degrees 26 minutes 54 seconds north latitude and 121 degrees 21 minutes 48 seconds west longitude, NAD83; USGS Quad: Mount Harkness, California.

Range in Characteristics

Depth to restrictive feature: 20 to more than 60 inches (51 to more than 152 centimeters) to bedrock

Mean annual soil temperature: 43 to 45 degrees F (6 to 7 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (thickest part): 4 to 9 percent clay and 40 to 68 percent rock fragments

Surface fragments: 5 to 50 percent gravel, 2 to 15 percent cobbles, 5 to 15 percent stones, and 1 to 8 percent boulders

A horizon:

Color (dry)—10YR 4/2, 5/3, 5/4

Color (moist)—10YR 2/1, 2/2, 3/2

Texture—gravelly medial fine sandy loam, gravelly medial sandy loam, very gravelly medial fine sandy loam

Clay content—3 to 6 percent

Rock fragments—10 to 15 percent fine gravel, 8 to 25 percent medium and coarse gravel, 20 to 40 percent total gravel, 0 to 8 percent cobbles, 20 to 45 percent total rock fragments

Organic matter—12.0 to 17.5 percent

Base saturation by ammonium acetate—12 to 25 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—2.10 to 2.75

P retention—80 to 95 percent

Glass content—8 to 14 percent

NaF pH—9.7 to 11.2

Soil reaction—slightly acid or neutral

Bw horizon:

Color (dry)—10YR 4/3, 5/3, 5/4, 6/3, 6/4

Color (moist)—10YR 3/2, 3/3, 4/3, 4/4

Texture—gravelly medial sandy loam, very gravelly medial sandy loam, extremely cobbly medial sandy loam

Clay content—3 to 8 percent

Rock fragments—10 to 18 percent fine gravel, 15 to 25 percent medium and coarse gravel, 25 to 40 percent total gravel, 5 to 20 percent cobbles, 0 to 8 percent stones, 30 to 65 percent total rock fragments

Organic matter—9.7 to 13.5 percent

Base saturation by ammonium acetate—4 to 8 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—3 to 4

P retention—90 to 100 percent

Glass content—9 to 13 percent

NaF pH—11.0 to 11.4

Soil reaction—slightly acid or neutral

2Bw horizon:

Color (dry)—10YR 6/3, 6/4

Color (moist)—10YR 3/4, 4/4

Texture—extremely gravelly medial sandy loam, extremely cobbly medial sandy loam

Clay content—4 to 9 percent

Rock fragments—8 to 15 percent fine gravel, 20 to 38 percent medium and coarse

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gravel, 30 to 50 percent total gravel, 15 to 20 percent cobbles, 2 to 8 percent stones, 60 to 70 percent total rock fragments
Organic matter—4.5 to 10.0 percent
Base saturation by ammonium acetate—3 to 8 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—3.00 to 4.50
P retention—90 to 100 percent
Glass content—9 to 18 percent
NaF pH—10.8 to 11.4
Soil reaction—slightly acid or neutral

2BC horizon:

Color (dry)—10YR 6/3, 6/4
Color (moist)—10YR 4/3, 4/4
Texture—extremely gravelly medial fine sandy loam, extremely gravelly medial sandy loam, extremely cobbly medial sandy loam, very cobbly medial sandy loam, very gravelly medial sandy loam
Clay content—4 to 10 percent
Rock fragments—8 to 20 percent fine gravel, 20 to 30 percent medium and coarse gravel, 28 to 50 percent total gravel, 10 to 30 percent cobbles, 45 to 75 percent total rock fragments
Organic matter—4.5 to 7.5 percent
Base saturation by ammonium acetate—2 to 5 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—4.10 to 5.50
P retention—92 to 100 percent
Glass content—9 to 21 percent
NaF pH—9.7 to 11.4
Soil reaction—moderately acid to neutral

Humic Haploxerands, lake terrace

Humic Haploxerands, lake terrace consist of moderately deep to very deep, well drained soils that formed in lacustrine deposits from volcanic rocks. These soils are on lake terraces. Slopes range from 1 to 30 percent. The mean annual precipitation is about 49 inches (1,245 millimeters), and the mean annual air temperature is about 41 degrees F (5 degrees C).

Taxonomic Classification

Frigid Humic Haploxerands

Typical Pedon

Humic Haploxerands, lake terrace, medial sandy loam (fig. 91) on a north-facing (0 degrees) slope of 2 percent under a cover of pinemat manzanita, lupine, California red fir, western white pine, and lodgepole pine at an elevation of 6,793 feet (2,070 meters). When described on 9/10/2007, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

Oi—0 to 0.4 inch (0 to 1 centimeter); slightly decomposed plant material; abrupt smooth boundary.

A1—0.4 inch to 3 inches (1 to 8 centimeters); dark grayish brown (10YR 4/2) medial sandy loam, very dark grayish brown (10YR 3/2) moist; 3 percent clay; weak very fine and fine subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; many very fine and few fine roots; many very fine interstitial and tubular pores; 5 percent subangular fine gravel and 7 percent subangular medium and coarse gravel; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 10.5; abrupt smooth boundary.



Figure 91.—Typical profile of Humic Haploxerands, lake terrace. Depth is marked in centimeters.

- A2—3 to 11 inches (8 to 27 centimeters); dark grayish brown (10YR 4/2) very bouldery medial fine sandy loam, very dark grayish brown (10YR 3/2) moist; 4 percent clay; weak very fine to coarse subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; many very fine, common fine and medium, and few coarse roots; common very fine interstitial and tubular pores; 7 percent subangular fine gravel, 7 percent subangular medium and coarse gravel, 5 percent subangular cobbles, 5 percent subangular stones, and 30 percent subangular boulders; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 10.3; clear smooth boundary.
- A3—11 to 18 inches (27 to 45 centimeters); brown (10YR 5/3) extremely bouldery medial fine sandy loam, very dark grayish brown (10YR 3/2) moist; 4 percent clay; weak very fine and fine subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; common very fine to medium and few coarse roots; common very fine interstitial pores; 5 percent subangular fine gravel, 10 percent subangular medium and coarse gravel, 10 percent subangular cobbles, 10 percent subangular stones, and 30 percent subangular boulders; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 10.5; abrupt smooth boundary.
- Bw—18 to 26 inches (45 to 67 centimeters); yellowish brown (10YR 5/4) very cobbly medial fine sandy loam, dark brown (10YR 3/3) moist; 5 percent clay; weak very fine to medium subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; common very fine and fine and few medium and coarse roots; common very fine interstitial and irregular pores; 12 percent subangular fine

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gravel, 18 percent subangular medium and coarse gravel, 15 percent subangular cobbles, and 5 percent subangular stones; slightly acid, pH 6.6 by Hellige-Truog; NaF pH 10.8; abrupt smooth boundary.

Bqm—26 to 35 inches (67 to 90 centimeters); pinkish gray (7.5YR 7/2) cemented very gravelly medial sandy loam, brown (7.5YR 4/3) moist; 7 percent clay; massive; very hard, extremely firm, moderately cemented, nonsticky, nonplastic; common very fine irregular and vesicular pores; 20 percent threadlike silica masses around rock fragments; 10 percent subangular fine gravel, 30 percent subangular medium and coarse gravel, and 5 percent subangular cobbles; neutral, pH 6.8 by Hellige-Truog; NaF pH 10.7.

Type Location

Lassen County, California; about 0.28 mile west of the Juniper Lake campground, approximately 1,000 feet east and 2,000 feet south of the northwest corner of sec. 22, T. 30 N., R. 6 E.; 40 degrees 26 minutes 53 seconds north latitude and 121 degrees 18 minutes 15 seconds west longitude, NAD83; USGS Quad: Mount Harkness, California.

Range in Characteristics

Depth to restrictive feature: 20 to more than 60 inches (51 to more than 152 centimeters) to duripan

Mean annual soil temperature: 43 to 45 degrees F (6 to 7 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (thickest part): 3 to 10 percent clay and 39 to 70 percent rock fragments

Surface fragments: 15 to 70 percent gravel, 0 to 2 percent cobbles, 0 to 10 percent stones, and 0 to 5 percent boulders

A horizon:

Color (dry)—10YR 3/2, 3/3, 4/2, 4/3, 5/3

Color (moist)—7.5YR 3/2; 10YR 2/2, 3/2

Texture—medial sandy loam, gravelly medial very fine sandy loam, gravelly medial fine sandy loam, very bouldery medial fine sandy loam, extremely bouldery medial fine sandy loam

Clay content—3 to 12 percent

Rock fragments—2 to 15 percent fine gravel, 4 to 25 percent medium and coarse gravel, 10 to 32 percent total gravel, 0 to 10 percent cobbles, 0 to 10 percent stones, 0 to 30 percent boulders, 12 to 70 percent total rock fragments

Organic matter—12 to 17.5 percent

Base saturation by ammonium acetate—12 to 25 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—2.10 to 2.75

P retention—80 to 95 percent

Glass content—8 to 14 percent

NaF pH—10.3 to 11.4

Soil reaction—moderately acid to neutral

Bw horizon:

Color (dry)—10YR 4/4, 5/4, 5/6, 6/6

Color (moist)—7.5YR 3/3, 3/4; 10YR 3/3, 3/4, 4/2

Texture—very gravelly medial fine sandy loam, very gravelly medial sandy loam, very cobbly medial fine sandy loam

Clay content—4 to 9 percent

Rock fragments—3 to 15 percent fine gravel, 15 to 40 percent medium and coarse gravel, 25 to 50 percent total gravel, 5 to 15 percent cobbles, 0 to 5 percent stones, 35 to 60 percent rock fragments

Organic matter—4.5 to 13.5 percent
Base saturation by ammonium acetate—2 to 8 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—3.00 to 5.50
P retention—90 to 100 percent
Glass content—9 to 21 percent
NaF pH—10.8 to 11.3
Soil reaction—slightly acid or neutral

Bqm horizon:

Color (dry)—7.5YR 7/2; 10YR 5/3, 5/4, 6/2, 6/3, 7/2
Color (moist)—7.5YR 4/3; 10YR 3/3, 3/4, 4/3
Texture—cemented very gravelly medial sandy loam, cemented very gravelly medial loamy very fine sand, cemented extremely gravelly medial loamy sand
Clay content—3 to 7 percent
Rock fragments—10 to 15 percent fine gravel, 22 to 60 percent medium and coarse gravel, 33 to 75 percent total gravel, 5 to 10 percent cobbles, 40 to 82 percent total rock fragments
Organic matter—1.0 to 2.5 percent
Base saturation by ammonium acetate—2 to 4 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—3.15 to 3.65
P retention—90 to 100 percent
Glass content—3 to 10 percent
NaF pH—10.7 to 11.5
Soil reaction—moderately acid to neutral

Humic Haploxerands, moist lake terrace

Humic Haploxerands, moist lake terrace consist of moderately deep and deep, moderately well drained soils that formed in tephra over glaciolacustrine deposits from volcanic rocks. These soils are on lake terraces. Slopes range from 0 to 15 percent. The mean annual precipitation is about 29 inches (737 millimeters), and the mean annual air temperature is about 43 degrees F (6 degrees C).

Taxonomic Classification

Frigid Humic Haploxerands

Typical Pedon

Humic Haploxerands, moist lake terrace, ashy coarse sand (fig. 92) on an east-southeast facing (119 degrees) slope of 7 percent under a cover of lodgepole pine, Jeffrey pine, woolly mule-ears, lupine, grasses, and silverleaf phacelia at an elevation of 6,116 feet (1,865 meters). When described on 6/28/2006, the soil was slightly moist throughout. (Colors are for dry soil unless otherwise noted.)

- Oi—0 to 0.4 inch (0 to 1 centimeter); slightly decomposed grasses, needles, cones, and twig litter; abrupt smooth boundary.
- A1—0.4 inch to 2 inches (1 to 4 centimeters); dark gray (2.5Y 4/1) ashy coarse sand, very dark gray (2.5Y 3/1) moist; 2 percent clay; single grain; loose, nonsticky, nonplastic; few very fine roots; common very fine and fine interstitial pores; 6 percent subangular fine gravel and 1 percent subangular medium and coarse gravel; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 9.0; abrupt smooth boundary.
- A2—2 to 5 inches (4 to 12 centimeters); dark gray (2.5Y 4/1) ashy coarse sand, black (2.5Y 2.5/1) moist; 2 percent clay; weak fine subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; common very fine and fine roots; many very fine and fine interstitial pores; 8 percent subangular fine gravel and 2 percent



Figure 92.—Typical profile of Humic Haploxerands, moist lake terrace.
Depth is marked in centimeters.

- subangular medium and coarse gravel; slightly acid, pH 6.6 by Hellige-Truog; NaF pH 10.0; abrupt wavy boundary.
- C—5 to 7 inches (12 to 17 centimeters); grayish brown (2.5Y 5/2) gravelly ashy coarse sand, very dark grayish brown (2.5Y 3/2) moist; 1 percent clay; single grain; loose, nonsticky, nonplastic; common very fine and fine roots; common very fine and fine irregular pores; 15 percent subangular fine gravel and 5 percent subangular medium and coarse gravel; neutral, pH 6.7 by Hellige-Truog; NaF pH 10.5; abrupt wavy boundary.
- 2Ab—7 to 19 inches (17 to 48 centimeters); brown (10YR 5/3) very stony medial sandy loam, very dark grayish brown (10YR 3/2) moist; 7 percent clay; weak very fine and fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine to medium and few very coarse roots; common very fine irregular and common fine tubular pores; 9 percent subangular fine gravel, 1 percent subangular medium and coarse gravel, 10 percent subangular cobbles, and 15 percent subangular stones; neutral, pH 6.7 by Hellige-Truog; NaF pH 10.5; gradual wavy boundary.
- 2Bwb—19 to 30 inches (48 to 77 centimeters); brown (10YR 5/3) very stony medial fine sandy loam, very dark grayish brown (10YR 3/2) moist; 10 percent clay; moderate fine and medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine and many fine and medium roots; many very fine and fine irregular and common medium tubular pores; 7 percent subangular fine gravel, 7 percent subangular medium and coarse gravel, 10 percent subangular cobbles, and 25 percent subangular stones; neutral, pH 7.0 by Hellige-Truog; NaF pH 10.5; abrupt smooth boundary.
- 2Bqmb—30 to 35 inches (77 to 88 centimeters); pale brown (10YR 6/3) cemented extremely gravelly medial sandy loam, dark reddish brown (5YR 3/2) moist; 8

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percent clay; massive; very hard, very firm, strongly cemented, nonsticky, nonplastic; common very fine and fine interstitial and tubular pores; 23 percent very pale brown (10YR 7/4), moist, silica masses in cracks; 6 percent subangular fine gravel, 65 percent subangular medium and coarse gravel, and 15 percent subangular cobbles; neutral, pH 7.0 by Hellige-Truog; NaF pH 10.3.

Type Location

Lassen County, California; about 0.5 mile south of Butte Lake, approximately 100 feet east and 250 feet north of the southwest corner of sec. 14, T. 31 N., R. 6 E.; 40 degrees 32 minutes 30 seconds north latitude and 121 degrees 17 minutes 4 seconds west longitude, NAD83; USGS Quad: Prospect Peak, California.

Range in Characteristics

Depth to restrictive feature: 20 to 60 inches (51 to 152 centimeters) to duripan

Mean annual soil temperature: 45 to 47 degrees F (7 to 8 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (thickest part): 7 to 10 percent clay and 35 to 50 percent rock fragments

Surface fragments: 5 to 15 percent gravel

Depth to fluctuating water table (if it occurs): From the top of the duripan to 19 inches (48 centimeters)

A horizon:

Color (dry)—10YR 6/3; 2.5Y 4/1

Color (moist)—10YR 3/2, 4/2; 2.5Y 2.5/1, 3/1

Texture—ashy coarse sand, gravelly ashy loamy sand

Clay content—1 to 2 percent

Rock fragments—5 to 15 percent fine gravel, 0 to 15 percent medium and coarse gravel, 5 to 30 percent total gravel

Organic matter—1.2 to 8.5 percent

Base saturation by ammonium acetate—50 to 75 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.19 to 0.35

P retention—10 to 18 percent

Glass content—10 to 30 percent

NaF pH—9.0 to 12.0

Soil reaction—moderately acid to neutral

C horizon:

Color (dry)—2.5Y 4/1, 5/2

Color (moist)—2.5Y 3/2

Texture—gravelly ashy coarse sand

Clay content—0 to 1 percent

Rock fragments—10 to 20 percent fine gravel, 5 to 10 percent medium and coarse gravel, 15 to 30 percent total gravel

Organic matter—0 to 1.1 percent

Base saturation by ammonium acetate—60 to 70 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.12 to 0.18

P retention—0 to 3 percent

Glass content—20 to 25 percent

NaF pH—10.3 to 10.5

Soil reaction—neutral

2Ab horizon:

Color (dry)—10YR 5/3

Color (moist)—10YR 3/2

Texture—very stony medial sandy loam

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Clay content—6 to 8 percent
Rock fragments—5 to 10 percent fine gravel, 0 to 5 percent medium and coarse gravel, 5 to 15 percent total gravel, 5 to 15 percent cobbles, 10 to 20 percent stones, 35 to 50 percent total rock fragments
Organic matter—3.8 to 6.5 percent
Base saturation by ammonium acetate—50 to 65 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—2.00 to 2.50
P retention—80 to 95 percent
Glass content—28 to 35 percent
NaF pH—10.4 to 10.6
Soil reaction—neutral

2Bwb horizon:

Color (dry)—10YR 5/3, 6/4, 7/4
Color (moist)—10YR 3/2, 4/3, 4/4
Texture—gravelly medial sandy loam, very gravelly medial sandy loam, very stony medial fine sandy loam
Clay content—10 to 12 percent
Rock fragments—5 to 25 percent fine gravel, 5 to 35 percent medium and coarse gravel, 10 to 50 percent total gravel, 0 to 15 percent cobbles, 0 to 30 percent stones, 15 to 60 percent total rock fragments
Organic matter—4.3 to 8.5 percent
Base saturation by ammonium acetate—10 to 55 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—3.35 to 5.25
P retention—90 to 100 percent
Glass content—3 to 15 percent
NaF pH—10.2 to 10.5
Soil reaction—neutral

2Bqmb horizon:

Color (dry)—10YR 6/3, 7/3
Color (moist)—5YR 3/2; 10YR 4/3
Texture—cemented extremely gravelly medial sandy loam, cemented extremely gravelly medial coarse sand
Clay content—0 to 8 percent
Rock fragments—5 to 30 percent fine gravel, 40 to 65 percent medium and coarse gravel, 45 to 75 percent total gravel, 5 to 20 percent cobbles, 65 to 88 percent total rock fragments
Organic matter—0 to 0.9 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.10 to 1.45
P retention—48 to 62 percent
NaF pH—10.2 to 10.3
Rupture resistance—very weakly cemented to strongly cemented
Soil reaction—neutral

Humic Haploxerands, outwash

Humic Haploxerands, outwash consist of very deep, well drained soils that formed in outwash from volcanic rocks. These soils are on outwash plains. Slopes range from 1 to 8 percent. The mean annual precipitation is about 53 inches (1,802 millimeters), and the mean annual air temperature is about 44 degrees F (7 degrees C).

Taxonomic Classification

Frigid Humic Haploxerands

Typical Pedon

Humic Haploxerands, outwash, medial sandy loam on a southwest-facing (215 degrees) slope of 4 percent under a cover of white fir and Jeffrey pine at an elevation of 5,911 feet (1,802 meters). When described on 8/27/2007, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

- Oi—0 to 2 inches (0 to 4 centimeters); slightly decomposed needles and twig litter; abrupt smooth boundary.
- A1—2 to 8 inches (4 to 20 centimeters); dark grayish brown (10YR 4/2) medial sandy loam, black (10YR 2/1) moist; 6 percent clay; weak fine to coarse subangular blocky structure; slightly hard, very friable, nonsticky, nonplastic; few very fine and common fine to coarse roots; many very fine irregular and interstitial pores; 5 percent subrounded fine gravel; neutral, pH 7.2 by Hellige-Truog; NaF pH 10.0; abrupt smooth boundary.
- A2—8 to 15 inches (20 to 37 centimeters); brown (10YR 5/3) very stony medial loamy sand, dark brown (10YR 3/3) moist; 5 percent clay; weak fine and medium subangular blocky structure parting to single grain; soft, very friable, nonsticky, nonplastic; many very fine to coarse roots; many very fine and fine interstitial pores; 10 percent subrounded fine gravel, 10 percent subrounded medium and coarse gravel, 10 percent subrounded cobbles, and 10 percent subrounded stones; neutral, pH 6.8 by Hellige-Truog; NaF pH 11.0; abrupt wavy boundary.
- Bw1—15 to 28 inches (37 to 72 centimeters); yellowish brown (10YR 5/4) extremely cobbly medial loamy sand, dark brown (7.5YR 3/4) moist; 4 percent clay; single grain; loose, nonsticky, nonplastic; many very fine to coarse roots; many very fine and fine interstitial pores; 20 percent subrounded fine gravel, 20 percent subrounded medium and coarse gravel, 15 percent subrounded cobbles, and 10 percent subrounded stones; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 10.5; clear wavy boundary.
- Bw2—28 to 41 inches (72 to 105 centimeters); brownish yellow (10YR 6/6) extremely stony ashy sand, dark yellowish brown (10YR 3/4) moist; 3 percent clay; single grain; loose, nonsticky, nonplastic; many very fine to coarse roots; many very fine and fine interstitial pores; 20 percent subrounded fine gravel, 20 percent subrounded medium and coarse gravel, 20 percent subrounded cobbles, and 15 percent subrounded stones; slightly acid, pH 6.3 by Hellige-Truog; NaF pH 9.8; clear wavy boundary.
- Bw3—41 to 59 inches (105 to 150 centimeters); brownish yellow (10YR 6/6) extremely stony ashy sand, dark yellowish brown (10YR 3/6) moist; 3 percent clay; single grain; loose, nonsticky, nonplastic; common very fine to coarse roots; many very fine and fine interstitial pores; 2 percent dark yellowish brown (10YR 3/6), moist, masses of oxidized iron on bottom of rock fragments; 20 percent subrounded fine gravel, 20 percent subrounded medium and coarse gravel, 20 percent subrounded cobbles, and 20 percent subrounded stones; slightly acid, pH 6.2 by Hellige-Truog; NaF pH 9.6.

Type Location

Shasta County, California; about 0.38 mile south of Manzanita Lake, approximately 1,000 feet south and 1,600 feet west of the northeast corner of sec. 19, T. 31 N., R. 4 E.; 40 degrees 31 minutes 35 seconds north latitude and 121 degrees 33 minutes 52 seconds west longitude, NAD83; USGS Quad: Manzanita Lake, California.

Range in Characteristics

Depth to restrictive feature: More than 60 inches (152 centimeters) to duripan
Mean annual soil temperature: 45 to 47 degrees F (7 to 8 degrees C)
Period that soil moisture control section is dry: July to October (about 90 days)

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Particle-size control section (thickest part): Medial-skeletal part—3 to 5 percent clay and 35 to 70 percent rock fragments; sandy-skeletal part—2 to 4 percent clay and 70 to 80 percent rock fragments

Surface fragments: 0 to 5 percent gravel, 0 to 5 percent cobbles, 0 to 5 percent stones, and 0 to 3 percent boulders

A horizon:

Color (dry)—10YR 4/2, 5/2, 5/3

Color (moist)—10YR 2/1, 3/2, 3/3

Texture—medial sandy loam, very stony medial loamy sand, very stony medial sandy loam

Clay content—2 to 6 percent

Rock fragments—5 to 15 percent fine gravel, 0 to 15 percent medium and coarse gravel, 5 to 25 percent total gravel, 0 to 15 percent cobbles, 0 to 15 percent stones, 5 to 50 percent total rock fragments

Organic matter—12 to 17.5 percent

Base saturation by ammonium acetate—12 to 25 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—2.10 to 2.75

P retention—80 to 95 percent

Glass content—8 to 14 percent

NaF pH—9.8 to 11.0

Soil reaction—slightly acid or neutral

Upper Bw horizon:

Color (dry)—10YR 5/4, 6/3, 6/4

Color (moist)—7.5YR 3/4; 10YR 3/4, 4/3, 4/4

Texture—medial sandy loam, gravelly medial sandy loam, very gravelly medial loamy sand, extremely gravelly medial loamy sand, very cobbly medial loamy sand, extremely cobbly medial loamy sand

Clay content—3 to 5 percent

Rock fragments—5 to 25 percent fine gravel, 2 to 25 percent medium and coarse gravel, 8 to 50 percent total gravel, 0 to 20 percent cobbles, 0 to 15 percent stones, 10 to 80 percent total rock fragments

Organic matter—6.5 to 11.5 percent

Base saturation by ammonium acetate—3 to 8 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—3.0 to 5.5

P retention—90 to 100 percent

Glass content—9 to 20 percent

NaF pH—10.3 to 10.8

Soil reaction—slightly acid or neutral

Lower Bw horizon:

Color (dry)—10YR 6/4, 6/6

Color (moist)—10YR 3/4, 3/6

Texture—extremely cobbly ashy sand, extremely stony ashy sand

Clay content—2 to 4 percent

Rock fragments—5 to 25 percent fine gravel, 5 to 25 percent medium and coarse gravel, 15 to 50 percent total gravel, 15 to 25 percent cobbles, 5 to 25 percent stones, 60 to 85 percent total rock fragments

Organic matter—3.0 to 7.5 percent

Base saturation by ammonium acetate—2 to 5 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.0 to 1.3

P retention—50 to 65 percent

Glass content—5 to 20 percent

NaF pH—9.6 to 10.0

Soil reaction—slightly acid



Figure 93.—Typical profile of Humic Haploxerands, outwash terrace. Depth is marked in centimeters.

Humic Haploxerands, outwash terrace

Humic Haploxerands, outwash terrace consist of moderately deep, well drained soils that formed in ash mixed with outwash from volcanic rocks. These soils are on outwash terraces. Slopes range from 2 to 30 percent. The mean annual precipitation is about 63 inches (1,600 millimeters), and the mean annual air temperature is about 42 degrees F (5 degrees C).

Taxonomic Classification

Frigid Humic Haploxerands

Typical Pedon

Humic Haploxerands, outwash terrace, gravelly medial sandy loam (fig. 93) on a north-facing (15 degrees) slope of 15 percent under a cover of white fir, incense cedar, and Jeffrey pine at an elevation of 5,897 feet (1,797 meters). When described on 9/12/2007, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

Oi—0 to 1 inch (0 to 3 centimeters); slightly decomposed needles, cones, and twig litter; abrupt smooth boundary.

Oe—1 to 2 inches (3 to 6 centimeters); moderately decomposed needles, cones, and twig litter; common very fine roots; abrupt smooth boundary.

A1—2 to 5 inches (6 to 12 centimeters); brown (10YR 4/3) gravelly medial sandy loam, very dark brown (10YR 2/2) moist; 4 percent clay; weak very fine and fine subangular blocky structure parting to single grain; soft, very friable, nonsticky, nonplastic; many very fine and fine roots; many very fine and fine irregular and

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- interstitial pores; 10 percent subangular fine gravel and 10 percent subangular medium and coarse gravel; moderately acid, pH 6.0 by Hellige-Truog; NaF pH 11.7; abrupt smooth boundary.
- A2—5 to 8 inches (12 to 20 centimeters); brown (10YR 4/3) medial fine sandy loam, very dark grayish brown (10YR 3/2) moist; 3 percent clay; weak fine and medium subangular blocky structure parting to single grain; soft, very friable, nonsticky, nonplastic; many very fine to medium and few coarse and very coarse roots; many very fine and fine interstitial and irregular pores; 7 percent subangular fine gravel and 7 percent subangular medium and coarse gravel; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 11.7; clear smooth boundary.
- A3—8 to 15 inches (20 to 39 centimeters); brown (10YR 4/3) gravelly medial fine sandy loam, very dark grayish brown (10YR 3/2) moist; 5 percent clay; weak fine and medium subangular blocky structure parting to single grain; soft, very friable, nonsticky, nonplastic; many very fine to very coarse roots; many very fine and fine interstitial and irregular pores; 10 percent subangular fine gravel, 10 percent subangular medium and coarse gravel, and 3 percent subangular cobbles; moderately acid, pH 6.0 by Hellige-Truog; NaF pH 11.7; gradual smooth boundary.
- AB—15 to 24 inches (39 to 61 centimeters); brown (10YR 5/3) gravelly medial fine sandy loam, dark brown (10YR 3/3) moist; 5 percent clay; weak fine and medium subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; many very fine to very coarse roots; many very fine and fine interstitial and irregular pores; 8 percent subangular fine gravel, 8 percent subangular medium and coarse gravel, and 5 percent subangular cobbles; slightly acid, pH 6.2 by Hellige-Truog; NaF pH 11.5; abrupt smooth boundary.
- Bw—24 to 31 inches (61 to 79 centimeters); light yellowish brown (10YR 6/4) very gravelly medial fine sandy loam, dark brown (10YR 3/3) moist; 6 percent clay; weak fine subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; few very fine and fine and common medium and coarse roots; many very fine and fine interstitial and irregular pores; 8 percent subangular fine gravel, 25 percent subangular medium and coarse gravel, and 8 percent subangular cobbles; slightly acid, pH 6.3 by Hellige-Truog; NaF pH 11.0; abrupt wavy boundary.
- Bqm—31 to 39 inches (79 to 98 centimeters); very pale brown (10YR 7/3) cemented very gravelly ashy sandy loam, pale brown (10YR 6/3) moist; 7 percent clay; massive; very hard, extremely firm, moderately cemented, nonsticky, nonplastic; few fine roots at top of horizon; few fine vesicular pores; 15 percent medium and coarse irregular strong brown (7.5YR 5/8), moist, and yellowish brown (10YR 5/8), dry, masses of oxidized iron around rock fragments; 20 percent fine threadlike silica masses around rock fragments; 10 percent subangular fine gravel, 40 percent subangular medium and coarse gravel, and 3 percent subangular cobbles; slightly acid, pH 6.3 by Hellige-Truog; NaF pH 10.5.

Type Location

Plumas County, California; about 0.38 mile southeast of Drakesbad, approximately 50 feet south and 1,000 feet west of the northeast corner of sec. 27, T. 30 N., R. 5 E.; 40 degrees 26 minutes 23 seconds north latitude and 121 degrees 23 minutes 59 seconds west longitude, NAD83; USGS Quad: Reading Peak, California.

Range in Characteristics

Depth to restrictive feature: 20 to 40 inches (51 to 102 centimeters) to duripan

Mean annual soil temperature: 42 to 44 degrees F (3 to 5 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (thickest part): 2 to 5 percent clay and 14 to 25 percent rock fragments

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Surface fragments: 15 to 25 percent gravel, 2 to 5 percent cobbles, 2 to 5 percent stones, and 0 to 3 percent boulders

A horizon:

Color (dry)—10YR 4/2, 4/3

Color (moist)—10YR 2/2, 3/2

Texture—medial fine sandy loam, gravelly medial fine sandy loam, gravelly medial sandy loam

Clay content—2 to 5 percent

Rock fragments—5 to 15 percent fine gravel, 5 to 15 percent medium and coarse gravel, 10 to 30 percent total gravel, 0 to 5 percent cobbles, 10 to 32 percent total rock fragments

Organic matter—12 to 17.5 percent

Base saturation by ammonium acetate—12 to 25 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—2.10 to 2.75

P retention—80 to 95 percent

Glass content—8 to 14 percent

NaF pH—11.5 to 11.7

Soil reaction—moderately acid or slightly acid

AB horizon:

Color (dry)—10YR 5/3, 6/3

Color (moist)—10YR 3/2, 3/3, 4/3

Texture—gravelly medial fine sandy loam, gravelly medial sandy loam

Clay content—3 to 5 percent

Rock fragments—8 to 10 percent fine gravel, 7 to 10 percent medium and coarse gravel, 15 to 20 percent total gravel, 0 to 8 percent cobbles, 15 to 28 percent total rock fragments

Organic matter—9.7 to 13.5 percent

Base saturation by ammonium acetate—4 to 8 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—3.00 to 4.00

P retention—90 to 100 percent

Glass content—9 to 13 percent

NaF pH—11.3 to 11.6

Soil reaction—moderately acid or slightly acid

Bw horizon:

Color (dry)—10YR 5/4, 6/3, 6/4

Color (moist)—10YR 3/3, 3/4, 4/3, 4/4

Texture—very gravelly medial fine sandy loam, very gravelly medial sandy loam

Clay content—4 to 6 percent

Rock fragments—5 to 10 percent fine gravel, 15 to 30 percent medium and coarse gravel, 20 to 40 percent total gravel, 5 to 10 percent cobbles, 35 to 50 percent total rock fragments

Organic matter—4.5 to 7.5 percent

Base saturation by ammonium acetate—2 to 5 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—4.10 to 5.50

P retention—92 to 100 percent

Glass content—9 to 21 percent

NaF pH—10.9 to 11.3

Soil reaction—slightly acid

Bqm horizon:

Color (dry)—10YR 7/2, 7/3, 7/4

Color (moist)—10YR 5/3, 6/3, 6/4

Texture—cemented very gravelly ashy sandy loam

Clay content—4 to 7 percent
Rock fragments—5 to 15 percent fine gravel, 35 to 45 percent medium and coarse gravel, 40 to 60 percent total gravel, 0 to 5 cobbles, 40 to 60 percent total rock fragments
Organic matter—1.0 to 2.5 percent
Base saturation by ammonium acetate—2 to 4 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—3.15 to 3.65
P retention—90 to 100 percent
Glass content—3 to 100 percent
NaF pH—10.5 to 10.8
Rupture resistance—very weakly cemented to strongly cemented
Soil reaction—slightly acid

Humic Haploxerands, strath terrace

Humic Haploxerands, strath terrace consist of moderately deep and deep, well drained soils that formed in alluvium over residuum from andesite. These soils are on strath terraces. Slopes range from 5 to 50 percent. The mean annual precipitation is about 57 inches (1,448 millimeters), and the mean annual air temperature is about 41 degrees F (5 degrees C).

Taxonomic Classification

Frigid Humic Haploxerands

Typical Pedon

Humic Haploxerands, strath terrace, gravelly ashy sandy loam (fig. 94) on a west-facing (260 degrees) slope of 12 percent under a cover of white fir, incense cedar, Jeffrey pine, and western needlegrass at an elevation of 5,632 feet (1,717 meters). When described on 7/18/2007, the soil was moist at a depth of 0 to 1 inch (2.5 centimeters) and dry below that. (Colors are for dry soil unless otherwise noted.)

- Oi—0 to 1 inch (0 to 2 centimeters); slightly decomposed needles, grass, and bark litter; abrupt smooth boundary.
- A1—1 to 4 inches (2 to 9 centimeters); grayish brown (10YR 5/2) gravelly ashy sandy loam, very dark grayish brown (10YR 3/2) moist; 8 percent clay; moderate very fine granular structure; soft, very friable, nonsticky, nonplastic; many very fine and fine roots; many very fine and fine irregular and many very fine tubular pores; 10 percent subangular fine gravel and 20 percent subangular medium and coarse gravel; moderately acid, pH 6.0 by Hellige-Truog; NaF pH 9.0; abrupt smooth boundary.
- A2—4 to 9 inches (9 to 23 centimeters); brown (10YR 4/3) gravelly medial coarse sandy loam, very dark grayish brown (10YR 3/2) moist; 12 percent clay; moderate very fine and fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; many very fine and fine and few medium and coarse roots; many very fine and fine irregular and common very fine and fine tubular pores; 14 percent subangular fine gravel and 18 percent subangular medium and coarse gravel; moderately acid, pH 6.1 by Hellige-Truog; NaF pH 10.0; clear wavy boundary.
- Bw1—9 to 16 inches (23 to 40 centimeters); brown (10YR 4/3) gravelly medial sandy loam, very dark gray (10YR 3/1) moist; 16 percent clay; weak very fine and fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine to medium and few coarse and very coarse roots; many very fine irregular and common very fine tubular pores; 10 percent subangular fine gravel and 20 percent subangular medium and coarse gravel; slightly acid, pH 6.2 by Hellige-Truog; NaF pH 10.4; clear smooth boundary.



Figure 94.—Typical profile of Humic Haploxerands, strath terrace. Depth is marked in centimeters.

- 2Bw2—16 to 20 inches (40 to 51 centimeters); brown (10YR 4/3) gravelly medial sandy loam, very dark brown (10YR 2/2) moist; 13 percent clay; weak very fine and fine subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; common very fine to medium and few coarse and very coarse roots; many very fine irregular and common very fine tubular pores; 13 percent angular fine gravel, 13 percent angular medium and coarse gravel, and 5 percent angular cobbles; moderately acid, pH 6.1 by Hellige-Truog; NaF pH 10.6; clear irregular boundary.
- 2Bw3—20 to 28 inches (51 to 71 centimeters); brown (10YR 4/3) medial cobbles, very dark grayish brown (10YR 3/2) moist; 11 percent clay; single grain; loose, nonsticky, nonplastic; few very fine and fine roots; common very fine interstitial pores; 2 percent angular fine gravel, 11 percent angular medium and coarse gravel, and 80 percent angular cobbles; moderately acid, pH 6.1 by Hellige-Truog; NaF pH 10.6; clear wavy boundary.
- 2R—28 to 32 inches (71 to 81 centimeters); extremely hard, strongly cemented andesite bedrock.

Type Location

Plumas County, California; about 1 mile east of Drakesbad, approximately 1,000 feet north and 2,400 feet west of the southeast corner of sec. 23, T. 30 N., R. 5 E.; 40 degrees 26 minutes 32 seconds north latitude and 121 degrees 23 minutes 6 seconds west longitude, NAD83; USGS Quad: Reading Peak, California.

Range in Characteristics

Depth to restrictive feature: 20 to 60 inches (51 to 152 centimeters) to lithic contact

Mean annual soil temperature: 42 to 44 degrees F (3 to 5 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (thickest part): Medial part—12 to 16 percent clay and 30 to 32 percent rock fragments; fragmental part—10 to 12 percent clay and 90 to 95 percent rock fragments

Surface fragments: 5 to 20 percent gravel

A horizon:

Color (dry)—10YR 4/2, 4/3, 5/3

Color (moist)—10YR 2/2, 3/2

Texture—gravelly medial sandy loam, very gravelly medial sandy loam, gravelly ashy sandy loam, gravelly medial coarse sandy loam

Clay content—5 to 12 percent

Rock fragments—5 to 20 percent fine gravel, 8 to 30 percent medium and coarse gravel, 15 to 45 percent total gravel

Organic matter—12 to 17.5 percent

Base saturation by ammonium acetate—12 to 25 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.30 to 2.75

P retention—80 to 95 percent

Glass content—8 to 14 percent

NaF pH—9.0 to 10.9

Soil reaction—moderately acid or slightly acid

Bw horizon:

Color (dry)—10YR 4/2, 4/3

Color (moist)—10YR 2/2, 3/1

Texture—gravelly medial sandy loam

Clay content—8 to 16 percent

Rock fragments—5 to 15 percent fine gravel, 15 to 25 percent medium and coarse gravel, 20 to 34 percent total gravel

Organic matter—9.7 to 15.5 percent

Base saturation by ammonium acetate—12 to 25 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—2.10 to 2.75

P retention—80 to 95 percent

Glass content—8 to 14 percent

NaF pH—10.3 to 10.8

Soil reaction—slightly acid or neutral

Upper 2Bw horizon:

Color (dry)—10YR 4/2, 4/3, 5/2

Color (moist)—10YR 2/2, 3/2, 3/3

Texture—gravelly medial sandy loam, very gravelly medial sandy loam

Clay content—8 to 13 percent

Rock fragments—2 to 20 percent fine gravel, 8 to 25 percent medium and coarse gravel, 10 to 45 percent total gravel, 5 to 60 percent cobbles, 25 to 60 percent total rock fragments

Organic matter—4.5 to 13.5 percent

Base saturation by ammonium acetate—2 to 8 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—3.00 to 5.50
P retention—90 to 100 percent
Glass content—9 to 21 percent
NaF pH—10.6 to 11.0
Soil reaction—slightly acid or neutral

Lower 2Bw horizon:

Color (dry)—10YR 4/2, 4/3, 5/2
Color (moist)—10YR 2/2, 3/2, 3/3
Texture—medial cobbles
Clay content—8 to 13 percent
Rock fragments—2 to 20 percent fine gravel, 8 to 25 percent medium and coarse gravel, 10 to 45 percent total gravel, 60 to 80 percent cobbles, 90 to 95 percent total rock fragments
Organic matter—4.5 to 13.5 percent
Base saturation by ammonium acetate—2 to 8 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—3.00 to 5.50
P retention—90 to 100 percent
Glass content—9 to 21 percent
NaF pH—10.6 to 11.0
Soil reaction—slightly acid or neutral

Humic Haploxerands, stream terrace

Humic Haploxerands, stream terrace consist of very deep, moderately well drained and well drained soils that formed in ash-influenced alluvium from volcanic rocks. These soils are on stream terraces along Kings Creek, Hot Springs Creek, and the North Fork of Bailey Creek where the stream gradients decrease and allow lateral deposition. Slopes range from 2 to 30 percent. The mean annual precipitation is about 53 inches (1,346 millimeters), and the mean annual air temperature is about 42 degrees F (5.6 degrees C).

Taxonomic Classification

Frigid Humic Haploxerands

Typical Pedon

Humic Haploxerands, stream terrace, gravelly medial sandy loam (fig. 95) on an east-facing (108 degrees) slope of 4 percent under a cover of white fir, incense cedar, and grasses at an elevation of 5,523 feet (1,683 meters). When described on 9/13/07, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

Oi—0 to 1 inch (0 to 3 centimeters); slightly decomposed needles and twigs; abrupt smooth boundary.

A1—1 to 4 inches (3 to 11 centimeters); dark grayish brown (10YR 4/2) gravelly medial sandy loam, very dark grayish brown (10YR 3/2) moist; 4 percent clay; weak thick platy structure parting to single grain; loose, nonsticky, nonplastic; many very fine roots; many very fine and fine irregular and interstitial pores; 12 percent subrounded fine gravel and 13 percent subrounded medium and coarse gravel; slightly acid, pH 6.4 by Hellige-Truog; NaF pH 11.0; abrupt smooth boundary.

A2—4 to 7 inches (11 to 17 centimeters); brown (10YR 4/3) gravelly medial sandy loam, very dark brown (10YR 2/2) moist; 6 percent clay; weak fine and medium subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; few fine and medium and many very fine roots; many very fine and fine interstitial



Figure 95.—Area showing typical Humic Haploxerands, stream terrace.

and very fine to medium irregular pores; 13 percent subrounded fine gravel and 17 percent subrounded medium and coarse gravel; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 11.2; clear smooth boundary.

Bw1—7 to 17 inches (17 to 43 centimeters); brown (10YR 5/3) gravelly medial coarse sandy loam, dark brown (10YR 3/3) moist; 8 percent clay; weak fine and medium subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; few coarse and many very fine to medium roots; many very fine and fine interstitial and irregular pores; 2 percent subrounded cobbles, 12 percent subrounded medium and coarse gravel, and 18 percent subrounded fine gravel; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 11.2; abrupt smooth boundary.

Bw2—17 to 28 inches (43 to 71 centimeters); brown (10YR 5/3) extremely stony medial coarse sandy loam, dark brown (10YR 3/3) moist; 12 percent clay; single grain; loose, nonsticky, nonplastic; few very coarse and many very fine to coarse roots; many very fine to medium interstitial pores; 5 percent subrounded boulders, 10 percent subrounded stones, 10 percent subrounded cobbles, 11 percent subrounded fine gravel, and 33 percent subrounded medium and coarse gravel; slightly acid, pH 6.4 by Hellige-Truog; NaF pH 11.0; clear wavy boundary.

Bw3—28 to 48 inches (71 to 123 centimeters); brown (10YR 5/3) extremely stony medial loamy coarse sand, dark brown (10YR 3/3) moist; 2 percent clay; massive parting to single grain; loose, nonsticky, nonplastic; few very fine to medium roots; many very fine to coarse interstitial pores; 5 percent subrounded boulders, 10 percent subrounded cobbles, 15 percent subrounded stones, 18 percent subrounded fine gravel, and 38 percent subrounded medium and coarse gravel; slightly acid, pH 6.2 by Hellige-Truog; NaF pH 10.8; gradual smooth boundary.

Bw4—48 to 68 inches (123 to 172 centimeters); yellowish brown (10YR 5/4) ashy

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stones, dark yellowish brown (10YR 3/4) moist; 7 percent clay; massive parting to single grain; loose, nonsticky, nonplastic; few very fine to medium roots; many very fine to coarse interstitial pores; 3 percent manganese coatings around rock fragments; 8 percent subrounded fine gravel, 10 percent subrounded boulders, 20 percent subrounded cobbles, 20 percent subrounded stones, and 33 percent subrounded medium and coarse gravel; moderately acid, pH 6.0 by Hellige-Truog; NaF pH 10.2; gradual smooth boundary.

Bw5—68 to 84 inches (172 to 214 centimeters); light yellowish brown (10YR 6/4) ashy stones, dark yellowish brown (10YR 3/4) moist; 5 percent clay; massive parting to single grain; loose, nonsticky, nonplastic; few very fine roots; many very fine to coarse interstitial pores; 10 percent manganese coatings around rock fragments; 4 percent subrounded fine gravel, 10 percent subrounded boulders, 25 percent subrounded cobbles, 25 percent subrounded stones, and 30 percent subrounded medium and coarse gravel; slightly acid, pH 6.2 by Hellige-Truog; NaF pH 9.5.

Type Location

Shasta County, California; about 1.5 miles northwest of Kelly Camp, approximately 400 feet south and 1,500 west of the northeast corner of sec. 24, T. 30 N., R. 5 E.; 40 degrees 27 minutes 7 seconds north latitude and 121 degrees 22 minutes 14 seconds west longitude, NAD83; USGS Quad: Mount Harkness, California.

Range in Characteristics

Depth to restrictive feature: More than 60 inches (152 centimeters) to bedrock

Mean annual soil temperature: 45 to 47 degrees F (7 to 8 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (thickest part): 2 to 12 percent clay and 69 to 86 percent rock fragments

Surface fragments: 3 to 35 percent gravel, 0 to 1 percent cobbles, 0 to 1 percent stones, and 0 to 1 percent boulders

Depth to fluctuating water table (if it occurs): 24 to more than 80 inches (61 to more than 203 centimeters)

Redoximorphic features: Masses of manganese and oxidized iron on rock fragments in lower horizons

Other characteristics: Some pedons have C or Cq horizons in the lower part of the profile

A horizon:

Color (dry)—10YR 4/2, 4/3

Color (moist)—10YR 2/2, 3/2

Texture—gravelly medial sandy loam, ashy fine sandy loam, gravelly ashy sandy loam, medial very fine sandy loam, gravelly medial very fine sandy loam

Clay content—4 to 8 percent

Rock fragments—2 to 15 percent fine gravel, 0 to 20 percent medium and coarse gravel, 2 to 30 percent total gravel, 0 to 5 percent cobbles, 2 to 35 percent total rock fragments

Organic matter—2 to 4 percent

Base saturation by NH_4OAc —20 to 50 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.2 to 2.5

P retention—10 to 95 percent

Glass content—20 to 50 percent

NaF pH—9.0 to 11.2

Soil reaction—very strongly acid to neutral

Upper Bw horizon:

Color (dry)—10YR 4/3, 5/3, 5/4; 2.5Y 5/3

Color (moist)—10YR 3/2, 3/3; 7.5YR 3/2
Texture—gravelly medial coarse sandy loam, very cobbly medial fine sandy loam, very gravelly medial fine sandy loam, gravelly medial fine sandy loam, gravelly medial sandy loam, gravelly medial very fine sandy loam
Clay content—5 to 10 percent
Rock fragments—5 to 20 percent fine gravel, 5 to 30 percent medium and coarse gravel, 10 to 40 percent total gravel, 0 to 20 percent cobbles, 0 to 5 percent stones, 15 to 45 percent total rock fragments
Organic matter—1 to 3 percent
Base saturation by NH_4OAc —20 to 50 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—2.0 to 2.5
P retention—85 to 95 percent
Glass content—10 to 50 percent
NaF pH—10.2 to 11.2
Soil reaction—slightly acid or neutral

Lower Bw horizon:

Color (dry)—10YR 5/3, 5/4, 6/4, 7/2; 2.5Y 5/3
Color (moist)—10YR 3/3, 3/4, 4/3; 7.5YR 3/3; 2.5Y 4/2
Texture—extremely stony medial loamy coarse sand, extremely stony medial coarse sandy loam, extremely gravelly medial loamy coarse sand, extremely gravelly medial coarse sandy loam, ashy gravel, extremely cobbly ashy loamy coarse sand, extremely gravelly ashy fine sandy loam, ashy cobbles, ashy stones
Clay content—1 to 12 percent
Rock fragments—5 to 20 percent fine gravel, 10 to 40 percent medium and coarse gravel, 20 to 55 percent total gravel, 10 to 35 percent cobbles, 2 to 25 percent stones, 0 to 10 percent boulders, 60 to 95 percent total rock fragments
Organic matter—0.5 to 1.0 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.5 to 1.5
P retention—30 to 65 percent
Glass content—5 to 20 percent
NaF pH—9.0 to 10.5
Soil reaction—slightly acid or neutral

Humic Xeric Vitricryands

Humic Xeric Vitricryands consist of moderately deep, well drained soils that formed in tephra over till from volcanic rocks. These soils are on moraines. Slopes range from 1 to 35 percent. The mean annual precipitation is about 115 inches (2,921 millimeters), and the mean annual air temperature is about 39 degrees F (4 degrees C).

Taxonomic Classification

Humic Xeric Vitricryands

Typical Pedon

Humic Xeric Vitricryands gravelly ashy sandy loam (fig. 96) on a northwest-facing (300 degrees) slope of 33 percent under a cover of mountain hemlock and lupine at an elevation of 8,111 feet (2,472 meters). When described on 8/30/2007, the soil was dry throughout.

Oi—0 to 1 inch (0 to 2 centimeters); slightly decomposed cones, twigs, and needle litter; abrupt smooth boundary.

A—1 to 4 inches (2 to 9 centimeters); very dark grayish brown (10YR 3/2) gravelly ashy sandy loam, black (10YR 2/1) moist; 3 percent clay; weak thick and very



Figure 96.—Typical profile of Humic Xeric Vitricryands. Depth is marked in centimeters.

thick platy and weak very fine and fine granular structure; loose, nonsticky, nonplastic; many very fine and fine and few medium roots; many very fine irregular and interstitial pores; 10 percent subangular fine gravel, 5 percent subangular medium and coarse gravel, and 5 percent subangular cobbles; very strongly acid, pH 5.0 by Hellige-Truog; NaF pH 9.3; clear smooth boundary.

2Ab—4 to 6 inches (9 to 16 centimeters); brown (7.5YR 4/2) gravelly ashy sandy loam, very dark brown (7.5YR 2.5/2) moist; 5 percent clay; weak fine and moderate medium subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; many very fine and fine and common medium to very coarse roots; few very fine and fine tubular and many very fine and fine irregular and interstitial pores; 10 percent subangular fine gravel, 10 percent subangular medium and coarse gravel, and 8 percent subangular cobbles; moderately acid, pH 6.0 by Hellige-Truog; NaF pH 11.7; clear smooth boundary.

2Bwb1—6 to 12 inches (16 to 30 centimeters); brown (7.5YR 4/3) very gravelly ashy sandy loam, very dark brown (7.5YR 2.5/2) moist; 6 percent clay; weak fine and moderate medium subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; many very fine and fine, common medium, and few coarse and very coarse roots; few very fine tubular and many very fine interstitial and irregular pores; 15 percent subangular fine gravel, 15 percent subangular medium and coarse gravel, 5 percent subangular cobbles, and 5 percent subangular stones; moderately acid, pH 6.1 by Hellige-Truog; NaF pH 11.5; clear wavy boundary.

2Bwb2—12 to 18 inches (30 to 45 centimeters); brown (7.5YR 4/3) very gravelly ashy

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sandy loam, very dark brown (7.5YR 2.5/2) moist; 5 percent clay; weak fine and moderate medium and coarse subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; common very fine to very coarse roots; few very fine and fine tubular and many very fine and fine irregular pores; 10 percent subangular fine gravel, 20 percent subangular medium and coarse gravel, 8 percent subangular cobbles, and 5 percent subangular stones; moderately acid, pH 6.1 by Hellige-Truog; NaF pH 11.5; abrupt wavy boundary.

2Bwb3—18 to 24 inches (45 to 62 centimeters); yellowish brown (10YR 5/4) gravelly ashy sandy loam, dark brown (10YR 3/3) moist; 6 percent clay; moderate fine and medium subangular blocky structure; loose, nonsticky, nonplastic; few very fine to medium roots; common very fine and fine tubular and vesicular and many very fine irregular pores; 12 percent subangular fine gravel and 13 percent subangular medium and coarse gravel; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 11.4; abrupt wavy boundary.

2Cdq—24 to 30 inches (62 to 77 centimeters); light brownish gray (10YR 6/2) very gravelly coarse sandy loam, dark grayish brown (10YR 4/2) moist; 5 percent clay; massive; very hard, firm, nonsticky, nonplastic; many very fine vesicular and tubular pores; 30 percent silica threads and pendants; 13 percent subangular fine gravel, 17 percent subangular medium and coarse gravel, and 5 percent subangular cobbles; neutral, pH 6.7 by Hellige-Truog; NaF pH 11.4.

Type Location

Shasta County, California; about 0.17 mile northwest of the Bumpass Hell parking lot, approximately 600 feet west and 400 feet south of northeast corner of sec. 15, T. 30 N., R. 4 E.; 40 degrees 27 minutes 60 seconds north latitude and 121 degrees 31 minutes 2 seconds west longitude, NAD83; USGS Quad: Lassen Peak, California.

Range in Characteristics

Depth to restrictive feature: 20 to 40 inches (51 to 102 centimeters) to densic contact

Mean annual soil temperature: 40 to 42 degrees F (4 to 6 degrees C)

Mean annual summer soil temperature: 43 to 46 degrees F (6 to 8 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (thickest part): 2 to 6 percent clay and 18 to 30 percent rock fragments

Surface fragments: 20 to 50 percent gravel, 15 to 20 percent cobbles, 5 to 25 percent stones, and 5 to 10 percent boulders

A horizon:

Color (dry)—10YR 3/2, 3/3, 4/2, 4/3, 5/3

Color (moist)—10YR 2/1, 2/2, 3/2

Texture—gravelly ashy sandy loam

Clay content—2 to 4 percent

Rock fragments—5 to 15 percent fine gravel, 3 to 8 percent medium and coarse gravel, 12 to 20 percent total gravel, 3 to 8 percent cobbles, 15 to 25 percent total rock fragments

Organic matter—13 to 35 percent

Base saturation by ammonium acetate—8 to 20 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.30 to 0.70

P retention—40 to 85 percent

Glass content—55 to 65 percent

NaF pH—9.0 to 9.5

Soil reaction—very strongly acid or strongly acid

2Ab horizon:

Color (dry)—7.5YR 4/2, 4/3, 5/2, 5/3; 10YR 4/2, 4/3, 5/2, 5/3

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Color (moist)—7.5YR 2.5/2, 3/2; 10YR 3/2, 3/3, 4/2
Texture—gravelly ashy sandy loam, very gravelly ashy sandy loam
Clay content—3 to 6 percent
Rock fragments—5 to 15 percent fine gravel, 5 to 15 percent medium and coarse gravel, 18 to 30 percent total gravel, 5 to 10 percent cobbles, 23 to 40 percent total rock fragments
Organic matter—2 to 3 percent
Base saturation by ammonium acetate—5 to 10 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.3 to 0.5
P retention—15 to 25 percent
Glass content—55 to 65 percent
NaF pH—11.0 to 11.7
Soil reaction—moderately acid or slightly acid

2Bwb horizon:

Color (dry)—7.5YR 4/3, 5/4; 10YR 5/4, 5/6, 7/4
Color (moist)—7.5YR 2.5/2, 2.5/3, 3/4; 10YR 3/3, 3/4, 4/3
Texture—gravelly ashy sandy loam, very gravelly ashy sandy loam
Clay content—3 to 7 percent
Rock fragments—8 to 18 percent fine gravel, 8 to 22 percent medium and coarse gravel, 20 to 40 percent total gravel, 0 to 10 percent cobbles, 0 to 8 percent stones, 25 to 50 percent total rock fragments
Organic matter—1 to 5 percent
Base saturation by ammonium acetate—2 to 15 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.75 to 1.10
P retention—45 to 64 percent
Glass content—55 to 75 percent
NaF pH—11.0 to 11.5
Soil reaction—moderately acid to neutral

2Cdq horizon:

Color (dry)—10YR 6/2, 7/2, 7/3
Color (moist)—10YR 4/2, 4/3, 5/2, 5/3
Texture—gravelly sandy loam, gravelly coarse sandy loam, very gravelly sandy loam, very gravelly coarse sandy loam, very gravelly loamy sand
Clay content—2 to 6 percent
Rock fragments—8 to 15 percent fine gravel, 15 to 25 percent medium and coarse gravel, 25 to 40 percent total gravel, 3 to 10 percent cobbles, 30 to 50 percent total rock fragments
Organic matter—1 to 2 percent
Base saturation by ammonium acetate—2 to 8 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.35 to 0.45
P retention—50 to 60 percent
Glass content—62 to 73 percent
NaF pH—11.0 to 11.5
Rupture resistance—slightly hard to hard
Soil reaction—slightly acid or neutral

Juniperlake Series

The Juniperlake series consists of deep, well drained soils that formed in tephra and till from andesite and basalt. Juniperlake soils are on ground moraines in the Southern Cascade Mountains. Slopes range from 2 to 40 percent. The mean annual precipitation is about 49 inches (1,245 millimeters), and the mean annual air temperature is about 41 degrees F, (5 degrees C).

Taxonomic Classification

Medial-skeletal, amorphic, frigid Humic Haploxerands

Typical Pedon

Juniperlake gravelly medial sandy loam on a north-northeast-facing (20 degrees) slope of 34 percent under a cover of California red fir and western white pine at an elevation of 6,936 feet (2,115 meters). When described on 8/14/06, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

Oi—0 to 1 inch (0 to 2 centimeters); needles, twigs, and bark litter; abrupt smooth boundary.

A1—1 to 4 inches (2 to 9 centimeters); dark grayish brown (10YR 4/2) gravelly medial sandy loam, very dark brown (10YR 2/2) moist; 3 percent clay; weak fine and medium subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; common very fine roots; many very fine and fine interstitial and tubular pores; 8 percent subangular fine gravel and 8 percent subangular medium and coarse gravel; moderately acid, pH 5.9 by pH meter 1:1 water; NaF pH 11.1; abrupt wavy boundary.

A2—4 to 10 inches (9 to 25 centimeters); brown (10YR 4/3) gravelly medial sandy loam, very dark grayish brown (10YR 3/2) moist; 3 percent clay; weak medium and coarse subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; common fine and medium and many very fine roots; common very fine and fine tubular and many very fine and fine interstitial pores; 12 percent subangular fine gravel, 12 percent subangular medium and coarse gravel, and 5 percent subangular cobbles; slightly acid, pH 6.3 by pH meter 1:1 water; NaF pH 11.3; clear wavy boundary.

AB—10 to 21 inches (25 to 54 centimeters); brown (10YR 5/3) very cobbly medial coarse sandy loam, dark brown (7.5YR 3/2) moist; 3 percent clay; weak fine and medium subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; many very fine and fine, common coarse, and few very coarse roots; common very fine and fine tubular and many very fine and fine interstitial pores; 6 percent subangular fine gravel, 10 percent subangular medium and coarse gravel, and 20 percent subangular cobbles; slightly acid, pH 6.4 by pH meter 1:1 water; NaF pH 11.3; clear smooth boundary.

Bw1—21 to 30 inches (54 to 76 centimeters); yellowish brown (10YR 5/4) very cobbly medial sandy loam, dark brown (7.5YR 3/3) moist; 3 percent clay; weak fine and medium subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; common very fine to coarse and few very coarse roots; many very fine and fine interstitial and common very fine and fine tubular pores; 8 percent subangular fine gravel, 20 percent subangular medium and coarse gravel, and 20 percent subangular cobbles; slightly acid, pH 6.3 by pH meter 1:1 water; NaF pH 11.3; gradual smooth boundary.

Bw2—30 to 47 inches (76 to 119 centimeters); yellowish brown (10YR 5/4) very gravelly medial sandy loam, dark brown (7.5YR 3/3) moist; 4 percent clay; weak fine and medium subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; common very fine to medium and few coarse and very coarse roots; many very fine and fine interstitial pores; 10 percent subangular fine gravel, 21 percent subangular medium and coarse gravel, and 20 percent subangular cobbles; slightly acid, pH 6.3 by pH meter 1:1 water; NaF pH 11.3; abrupt smooth boundary.

Cdq—47 to 56 inches (119 to 142 centimeters); light yellowish brown (10YR 6/4) extremely gravelly coarse sandy loam, dark brown (7.5YR 3/4) moist; 4 percent clay; massive, hard, firm, nonsticky, nonplastic; few fine and medium roots; many fine and medium interstitial pores; 15 percent threadlike silica masses around rock

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fragments; 17 percent subangular fine gravel, 40 percent subangular medium and coarse gravel, and 15 percent subangular cobbles; slightly acid, pH 6.3 by pH meter 1:1 water; NaF pH 11.1.

Type Location

Plumas County, California; about 0.5 mile south-southeast from the new Juniper Lake ranger station, approximately 2,200 feet north and 100 feet west of the southeast corner of sec. 22, T. 30 N., R. 6 E.; 40 degrees 26 minutes 40 seconds north latitude and 121 degrees 17 minutes 22 seconds west longitude, NAD83; USGS Quad: Mount Harkness, California.

Range in Characteristics

Depth to restrictive feature: 40 to 60 inches (102 to 152 centimeters) to densic contact

Mean annual soil temperature: 43 to 45 degrees F (6 to 7 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (thickest part): 3 to 4 percent clay and 36 to 51 percent rock fragments

Surface fragments: 5 to 30 percent gravel, 2 to 5 percent cobbles, 2 to 10 percent stones, and 2 to 15 percent boulders

Other characteristics: Some pedons have a Bq horizon above the Cdq horizon

A horizon:

Color (dry)—10YR 4/2, 4/3; 2.5Y 5/3

Color (moist)—10YR 2/1, 2/2, 3/1, 3/2, 4/2; 2.5Y 4/2

Texture—gravelly medial loamy fine sand, gravelly medial loamy sand, gravelly medial fine sandy loam, gravelly medial sandy loam, very gravelly medial fine sandy loam, very gravelly medial sandy loam

Clay content—2 to 6 percent

Rock fragments—5 to 15 percent fine gravel, 8 to 35 percent medium and coarse gravel, 15 to 45 percent total gravel, 0 to 20 percent cobbles, 0 to 5 percent stones, 15 to 50 percent total rock fragments

Organic matter—12.0 to 17.5 percent

Base saturation by ammonium acetate—12 to 25 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—2.10 to 2.75

P retention—85 to 95 percent

Glass content—8 to 14 percent

NaF pH—9.2 to 11.5

Soil reaction—very strongly acid to slightly acid

AB horizon:

Color (dry)—10YR 5/3, 4/3

Color (moist)—10YR 3/3, 3/2; 7.5YR 2.5/3

Texture—very gravelly medial sandy loam, very cobbly medial coarse sandy loam

Clay content—2 to 4 percent

Rock fragments—6 to 15 percent fine gravel, 10 to 35 percent medium and coarse gravel, 16 to 45 percent total gravel, 5 to 20 percent cobbles, 0 to 5 percent stones, 36 to 55 percent total rock fragments

Organic matter—9.7 to 13.5 percent

Base saturation by ammonium acetate—4 to 8 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—3.00 to 4.00

P retention—90 to 100 percent

Glass content—9 to 13 percent

NaF pH—10.8 to 11.4

Soil reaction—slightly acid

Bw horizon:

Color (dry)—7.5YR 4/4; 10YR 3/4, 4/4, 5/4, 6/4; 2.5Y 4/3, 5/3, 5/4
Color (moist)—5YR 2.5/2; 7.5YR 2.5/3, 3/3, 3/4; 10YR 3/3, 3/4, 4/4, 5/4
Texture—very gravelly medial sandy loam, extremely gravelly medial fine sandy loam, extremely gravelly medial sandy loam, very cobbly medial sandy loam, extremely cobbly medial sandy loam, extremely stony medial fine sandy loam, extremely stony medial sandy loam, extremely bouldery medial sandy loam, very bouldery medial sandy loam
Clay content—2 to 5 percent
Rock fragments—3 to 15 percent fine gravel, 15 to 35 percent medium and coarse gravel, 20 to 55 total percent gravel, 5 to 25 percent cobbles, 0 to 20 percent stones, 0 to 15 percent boulders, 48 to 80 percent total rock fragments
Organic matter—4.5 to 7.5 percent
Base saturation by ammonium acetate—2 to 5 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—4.10 to 5.50
P retention—92 to 100 percent
Glass content—9 to 21 percent
NaF pH—10.6 to 11.5
Soil reaction—strongly acid to slightly acid

Cdq horizon:

Color (dry)—10YR 5/3, 5/4, 6/2, 6/3, 6/4
Color (moist)—7.5YR 3/3, 3/4, 4/3; 10YR 4/2, 4/3
Texture—extremely gravelly loamy sand, extremely gravelly sandy loam, extremely gravelly coarse sandy loam
Clay content—3 to 8 percent
Rock fragments—15 to 20 percent fine gravel, 23 to 45 percent medium and coarse gravel, 43 to 63 percent total gravel, 5 to 22 percent cobbles, 0 to 22 percent stones, 60 to 89 percent total rock fragments
Organic matter—1.0 to 2.5 percent
Base saturation by ammonium acetate—2 to 4 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—3.15 to 3.65
P retention—90 to 100 percent
Glass content—3 to 10 percent
NaF pH—10.5 to 11.5
Rupture resistance—slightly hard to very hard
Soil reaction—slightly acid or neutral

Kingsiron Series

The Kingsiron series consists of very deep, well drained soils that formed in ash mixed with colluvium from volcanic rocks (fig. 97). Kingsiron soils are on the backslopes and base slopes of glacial-valley walls in the Southern Cascade Mountains. Slopes range from 20 to 80 percent. The mean annual precipitation is about 61 inches (1,549 millimeters), and the mean annual air temperature is about 42 degrees F (5 degrees C).

Taxonomic Classification

Medial-skeletal, amorphic, frigid Typic Haploxerands

Typical Pedon

Kingsiron extremely gravelly medial fine sandy loam on a south-facing (180 degrees) slope of 55 percent under a cover of incense cedar, white fir, sugar pine, and Jeffrey



Figure 97.—Profile of Kingsiron soil. Depth is marked in centimeters.

pine at an elevation of 5,814 feet (1,772 meters). When described on 7/11/2007, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

- Oi—0 to 1 inch (0 to 2 centimeters); slightly decomposed needles, bark, and twig litter; 10 percent angular cobbles and 5 percent angular stones; abrupt smooth boundary.
- A1—1 to 3 inches (2 to 8 centimeters); dark grayish brown (2.5Y 4/2) extremely gravelly medial fine sandy loam, very dark gray (2.5Y 3/1) moist; 4 percent clay; weak fine and medium granular structure parting to single grain; loose, nonsticky, nonplastic; common very fine and fine roots; many very fine to medium interstitial pores; 10 percent angular fine gravel, 45 percent angular medium and coarse gravel, 5 percent angular cobbles, and 5 percent angular stones; neutral, pH 6.7 by Hellige-Truog; NaF pH 10.0; abrupt smooth boundary.
- A2—3 to 9 inches (8 to 22 centimeters); grayish brown (2.5Y 5/2) extremely gravelly medial fine sandy loam, very dark grayish brown (2.5Y 3/2) moist; 5 percent clay; single grain; loose, nonsticky, nonplastic; many very fine to medium and few

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coarse and very coarse roots; many very fine to medium interstitial pores; 5 percent angular fine gravel, 74 percent angular medium and coarse gravel, 5 percent angular cobbles, and 5 percent angular stones; neutral, pH 6.7 by Hellige-Truog; NaF pH 11.0; abrupt irregular boundary.

Bw1—9 to 28 inches (22 to 70 centimeters); light yellowish brown (2.5Y 6/4) extremely gravelly medial sandy loam, olive brown (2.5Y 4/4) moist; 5 percent clay; weak very fine and fine subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; many very fine to medium and common coarse and very coarse roots; many very fine to medium interstitial pores; 14 percent angular fine gravel, 58 percent angular medium and coarse gravel, and 15 percent angular cobbles; neutral, pH 6.9 by Hellige-Truog; NaF pH 11.0; clear smooth boundary.

Bw2—28 to 41 inches (70 to 105 centimeters); light yellowish brown (2.5Y 6/4) extremely gravelly medial sandy loam, olive brown (2.5Y 4/4) moist; 6 percent clay; single grain; loose, nonsticky, nonplastic; common very fine, many fine and medium, and common coarse and very coarse roots; many very fine to medium interstitial pores; 16 percent angular fine gravel, 57 percent angular medium and coarse gravel, and 15 percent angular cobbles; neutral, pH 7.0 by Hellige-Truog; NaF pH 11.0; gradual smooth boundary.

Bw3—41 to 63 inches (105 to 160 centimeters); pale yellow (2.5Y 7/4) extremely gravelly medial sandy loam, light olive brown (2.5Y 5/4) moist; 4 percent clay; single grain; loose, nonsticky, nonplastic; many very fine and fine and common medium to very coarse roots; many very fine to medium interstitial pores; 16 percent angular fine gravel, 54 percent angular medium and coarse gravel, and 15 percent angular cobbles; slightly acid, pH 6.6 by Hellige-Truog; NaF pH 11.0.

Type Location

Plumas County, California; about 0.4 mile east of Drakesbad, approximately 1,000 feet south and 650 feet east of the northwest corner of sec. 23, T. 30 N., R. 5 E.; 40 degrees 26 minutes 40 seconds north latitude and 121 degrees 23 minutes 45 seconds west longitude, NAD83; USGS Quad: Reading Peak, California.

Range in Characteristics

Depth to restrictive feature: More than 60 inches (152 centimeters) to lithic contact

Mean annual soil temperature: 42 to 44 degrees F (6 to 7 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (thickest part): 4 to 6 percent clay and 65 to 89 percent rock fragments

Surface fragments: 3 to 20 percent gravel, 5 to 30 percent cobbles, 10 to 15 percent stones, and 0 to 10 percent boulders

A horizon:

Color (dry)—10YR 5/1, 5/2; 2.5Y 3/2, 4/2, 5/2

Color (moist)—10YR 2/1, 3/2; 2.5Y 2/1, 3/1, 3/2

Texture—extremely gravelly medial fine sandy loam, medial loamy sand, very gravelly medial loamy sand, very gravelly medial fine sandy loam

Clay content—2 to 5 percent

Rock fragments—0 to 15 percent fine gravel, 0 to 75 medium and coarse gravel, 0 to 80 percent total gravel, 5 to 10 percent cobbles, 0 to 10 percent stones, 5 to 89 percent total rock fragments

Organic matter—9 to 17.5 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—2.10 to 2.75

P retention—80 to 95 percent

Glass content—8 to 14 percent

NaF pH—9.0 to 11.0

Soil reaction—slightly acid or neutral

Upper Bw horizon:

Color (dry)—10YR 6/2, 7/2; 2.5Y 6/4

Color (moist)—10YR 4/2, 4/3, 5/2; 2.5Y 4/4

Texture—extremely gravelly medial sandy loam, extremely stony medial coarse sandy loam

Clay content—5 to 8 percent

Rock fragments—5 to 18 percent fine gravel, 15 to 60 percent medium and coarse gravel, 20 to 75 percent total gravel, 15 to 35 percent cobbles, 0 to 20 percent stones, 0 to 20 percent boulders, 65 to 88 percent total rock fragments

Organic matter—5 to 8 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—3.00 to 4.00

P retention—90 to 100 percent

Glass content—9 to 13 percent

NaF pH—10.2 to 11.0

Soil reaction—neutral

Lower Bw horizon:

Color (dry)—10YR 7/2, 8/2, 8/3; 2.5Y 7/4

Color (moist)—10YR 4/3, 5/3; 2.5Y 5/4

Texture—extremely gravelly medial sandy loam, extremely cobbly medial coarse sandy loam, extremely cobbly medial sandy loam, extremely stony medial sandy loam

Clay content—4 to 14 percent

Rock fragments—2 to 20 percent fine gravel, 15 to 55 percent medium and coarse gravel, 20 to 70 percent total gravel, 15 to 40 percent cobbles, 0 to 25 percent stones, 0 to 5 percent boulders, 65 to 85 percent total rock fragments

Organic matter—1.0 to 4.5 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—4.0 to 5.5

P retention—90 to 100 percent

Glass content—9 to 21 percent

NaF pH—9.5 to 11.0

Soil reaction—slightly acid or neutral

Prospectpeak Series

The Prospectpeak series consists of deep, well drained soils that formed in tephra over residuum from andesite. Prospectpeak soils are on shield volcanoes in the Southern Cascade Mountains. Slopes range from 10 to 30 percent. The mean annual precipitation is about 33 inches (838 millimeters), and the mean annual air temperature is about 43 degrees F (6 degrees C).

Taxonomic Classification

Fragmental, isotic, frigid Typic Vitrixerands

Typical Pedon

Prospectpeak ashy coarse sand on an east-facing (73 degrees) slope of 10 percent under a cover of California red fir, Jeffrey pine, white fir, pinemat manzanita, bush chinquapin, whiteveined wintergreen, mountain monardella, and western needlegrass at an elevation of 7,057 feet (2,152 meters). When described on 7/6/06, the soil was dry to a depth of 14 inches (35 centimeters) and slightly moist at a depth of 14 to 50 inches (35 to 127 centimeters). (Colors are for dry soil unless otherwise noted.)

Oi—0 to 1 inch (0 to 2 centimeters); slightly decomposed cones, needles, and twig litter; abrupt smooth boundary.

A—1 to 3 inches (2 to 7 centimeters); very dark gray (2.5Y 3/1) ashy coarse sand,

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- black (2.5Y 2.5/1) moist; 0 percent clay; single grain; loose, nonsticky, nonplastic; many very fine roots; common very fine and fine interstitial pores; 10 percent angular fine gravel and 3 percent angular medium and coarse gravel; slightly acid, pH 6.4 by pH meter 1:1 water; NaF pH 9.1; abrupt smooth boundary.
- C1—3 to 7 inches (7 to 17 centimeters); very dark gray (2.5Y 3/1) gravelly ashy coarse sand, black (2.5Y 2.5/1) moist; 0 percent clay; single grain; loose, nonsticky, nonplastic; common very fine and fine and few medium roots; common very fine and fine interstitial pores; 12 percent angular fine gravel and 3 percent angular medium and coarse gravel; neutral, pH 6.6 by pH meter 1:1 water; NaF pH 9.0; abrupt wavy boundary.
- C2—7 to 9 inches (17 to 22 centimeters); grayish brown (2.5Y 5/2) extremely gravelly ashy coarse sand, very dark grayish brown (2.5Y 3/2) moist; 0 percent clay; single grain; loose, nonsticky, nonplastic; many very fine and fine and few medium roots; few very fine and fine interstitial and many medium interstitial pores; 35 percent angular fine gravel, 25 percent angular medium and coarse gravel, and 5 percent subangular cobbles; neutral, pH 6.8 by pH meter 1:1 water; NaF pH 9.3; clear smooth boundary.
- 2Ab—9 to 14 inches (22 to 35 centimeters); very pale brown (10YR 7/3) extremely stony ashy coarse sand, brown (10YR 4/3) moist; 0 percent clay; single grain; loose, nonsticky, nonplastic; common very fine and medium, many fine, and few coarse roots; common very fine to medium interstitial pores; 7 percent subangular fine gravel, 5 percent subangular medium and coarse gravel, 35 percent subangular cobbles, 30 percent angular stones, and 12 percent angular boulders; neutral, pH 6.9 by pH meter 1:1 water; NaF pH 9.7; abrupt smooth boundary.
- 2Bwb1—14 to 22 inches (35 to 55 centimeters); pale brown (10YR 6/3) extremely stony ashy coarse sandy loam, dark yellowish brown (10YR 4/4) moist; 4 percent clay; single grain; loose, nonsticky, nonplastic; many very fine, common fine and medium, and few coarse roots; common very fine and fine irregular pores; 5 percent subangular fine gravel, 5 percent subangular medium and coarse gravel, 35 percent subangular cobbles, 30 percent angular stones, and 12 percent angular boulders; neutral, pH 6.6 by pH meter 1:1 water; NaF pH 10.1; abrupt smooth boundary.
- 2Bwb2—22 to 50 inches (55 to 127 centimeters); light yellowish brown (10YR 6/4) medial stones, dark yellowish brown (10YR 3/4) moist; 4 percent clay; weak very fine and fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; few very fine and common fine to coarse roots; 5 percent subangular fine gravel, 10 percent subangular medium and coarse gravel, 35 percent subangular cobbles, 30 percent angular stones, and 12 percent angular boulders; neutral, pH 6.7 by pH meter 1:1 water; NaF pH 10.6; abrupt smooth boundary.
- 2R—50 inches (127 centimeters); indurated vesicular andesite.

Type Location

Shasta County, California; about 1 mile north-northwest of Cinder Cone, approximately 2,300 feet south and 850 feet west of the northeast corner of sec. 8, T. 31 N., R. 6 E.; 40 degrees 33 minutes 51 seconds north latitude and 121 degrees 19 minutes 34 seconds west longitude, NAD83; USGS Quad: Prospect Peak, California.

Range in Characteristics

Depth to restrictive feature: 40 to 60 inches (102 to 152 centimeters) to lithic contact
Mean annual soil temperature: 45 to 47 degrees F (7 to 8 degrees C)
Period that soil moisture control section is dry: July to October (about 90 days)
Particle-size control section (thickest part): 4 percent clay and 92 percent rock fragments

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Surface fragments: 3 to 8 percent gravel, 0 to 8 percent cobbles, 3 to 15 percent stones, and 2 to 20 percent boulders

A horizon:

Color (dry)—10YR 3/1, 4/1; 2.5Y 2.5/1, 3/1, 4/1, 4/2; 5Y 2/1, 2.5/1, 3/2
Color (moist)—10YR 2/1, 3/1; 2.5Y 2.5/1, 3/1; 5Y 2/1, 2.5/1
Texture—ashy sand, gravelly ashy sand, ashy loamy sand, ashy sandy loam, ashy coarse sand
Clay content—0 to 2 percent
Rock fragments—5 to 18 percent fine gravel, 3 to 8 percent medium and coarse gravel, 8 to 22 percent total gravel, 0 to 5 percent cobbles, 0 to 5 percent stones, 8 to 30 percent total rock fragments
Organic matter—0.5 to 3.5 percent
Base saturation by ammonium acetate—70 to 95 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.05 to 0.15
P retention—2 to 6 percent
Glass content—40 to 50 percent
NaF pH—9.0 to 9.4
Soil reaction—moderately acid to neutral

C horizon:

Color (dry)—N 3/0, 4/0, 5/0; 10YR 3/1, 3/2, 4/1, 4/2, 4/4, 6/6, 7/2, 7/4; 2.5Y 3/1, 4/1, 4/2, 5/1, 5/2, 5/3; 5Y 2/1, 2.5/1, 3/1, 4/1, 5/2
Color (moist)—N 2.5/0, 3/0; 5B 4/1, 5/1, 6/1; 7.5YR 2.5/1; 10YR 2/1, 3/1, 3/4, 4/1, 4/2, 4/3, 5/6; 2.5Y 2.5/1, 3/1, 3/2, 4/2; 5Y 2/1, 2.5/1, 2.5/2, 4/3
Texture—gravelly sand, gravelly coarse sand, extremely gravelly ashy coarse sand, extremely gravelly ashy very coarse sand
Clay content—0 to 1 percent
Rock fragments—10 to 38 percent fine gravel, 2 to 28 percent medium and coarse gravel, 12 to 60 percent total gravel, 0 to 15 percent cobbles, 0 to 25 percent stones, 15 to 85 percent total rock fragments
Organic matter—0 to 0.8 percent
Base saturation by ammonium acetate—58 to 75 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.05 to 0.25
P retention—3 to 8 percent
Glass content—3 to 8 percent
NaF pH—9.7 to 10.2
Soil reaction—slightly acid or neutral

2Ab horizon:

Color (dry)—10YR 6/3, 7/2, 7/3
Color (moist)—10YR 4/2, 4/3
Texture—extremely stony ashy sand, extremely stony ashy coarse sand, extremely cobbly ashy coarse sand, extremely cobbly ashy loamy coarse sand
Clay content—0 to 2 percent
Rock fragments—3 to 10 percent fine gravel, 3 to 10 percent medium and coarse gravel, 8 to 18 percent total gravel, 10 to 35 percent cobbles, 10 to 30 percent stones, 5 to 15 percent boulders, 60 to 89 percent total rock fragments
Organic matter—0.7 to 1.5 percent
Base saturation by ammonium acetate—43 to 58 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.30 to 0.85
P retention—20 to 30 percent
Glass content—25 to 31 percent
NaF pH—9.8 to 10.1
Soil reaction—slightly acid or neutral

Upper 2Bwb horizon:

Color (dry)—10YR 5/4, 6/3, 6/4

Color (moist)—10YR 4/3, 4/4

Texture—extremely cobbly ashy loamy sand, extremely stony ashy loamy sand, extremely stony ashy sandy loam, extremely stony ashy coarse sandy loam

Clay content—1 to 5 percent

Rock fragments—5 to 15 percent fine gravel, 5 to 30 percent medium and coarse gravel, 10 to 40 percent total gravel, 18 to 40 percent cobbles, 15 to 30 percent stones, 0 to 15 percent boulders, 60 to 89 percent total rock fragments

Organic matter—1.2 to 2.0 percent

Base saturation by ammonium acetate—23 to 38 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—2.25 to 3.75

P retention—70 to 95 percent

Glass content—30 to 40 percent

NaF pH—10.0 to 10.3

Soil reaction—slightly acid or neutral

Lower 2Bwb horizon:

Color (dry)—10YR 5/3, 6/3, 6/4

Color (moist)—10YR 3/4, 4/3, 4/4

Texture—extremely gravelly medial sandy loam, extremely gravelly medial loamy sand, extremely cobbly medial loamy coarse sand, extremely cobbly medial coarse sandy loam, medial stones

Clay content—2 to 8 percent

Rock fragments—5 to 15 percent fine gravel, 8 to 50 percent medium and coarse gravel, 15 to 60 percent total gravel, 15 to 35 percent cobbles, 0 to 30 percent stones, 0 to 15 percent boulders, 60 to 95 percent total rock fragments

Organic matter—0.7 to 1.5 percent

Base saturation by ammonium acetate—23 to 38 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—2.25 to 3.75

P retention—70 to 95 percent

Glass content—5 to 18 percent

NaF pH—10.3 to 10.6

Soil reaction—slightly acid or neutral

Readingpeak Series

The Readingpeak series consists of deep, well drained soils that formed in tephra over colluvium and residuum weathered from andesite, dacite, and rhyodacite. Readingpeak soils are on glaciated mountain slopes, volcanic domes, and roche moutonnées in hanging valleys in the Southern Cascade Mountains. Slopes range from 5 to 95 percent. The mean annual precipitation is about 117 inches (2,972 millimeters), and the mean annual air temperature is about 39 degrees F (4 degrees C).

Taxonomic Classification

Ashy-skeletal, amorphic Xeric Vitricryands

Typical Pedon

Readingpeak very gravelly ashy sandy loam (fig. 98) on a south-facing (195 degrees) slope of 52 percent under a cover of mountain hemlock, western white pine, lupine, and pinemat manzanita at an elevation of 8,507 feet (2,594 meters). When described on 9/19/06, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)



Figure 98.—Typical profile of Readingpeak soil. Depth is marked in centimeters.

A1—0 to 2 inches (0 to 4 centimeters); grayish brown (10YR 5/2) very gravelly ashy sandy loam, very dark grayish brown (10YR 3/2) moist; 3 percent clay; single grain; loose, nonsticky, nonplastic; common very fine and fine roots; many very

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- fine and fine interstitial pores; 17 percent angular fine gravel, 17 percent angular medium and coarse gravel, 10 percent angular cobbles, and 5 percent angular stones; strongly acid, pH 5.6 by Hellige-Truog; NaF pH 10.5; clear smooth boundary.
- A2—2 to 7 inches (4 to 19 centimeters); light brownish gray (10YR 6/2) very gravelly ashy sandy loam, dark grayish brown (10YR 4/2) moist; 3 percent clay; weak fine and medium subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; few very coarse and many very fine to coarse roots; many very fine and fine interstitial pores; 17 percent angular fine gravel, 21 percent angular medium and coarse gravel, 10 percent angular cobbles, and 5 percent angular stones; moderately acid, pH 5.7 by Hellige-Truog; NaF pH 11.0; clear smooth boundary.
- 2Bq1—7 to 14 inches (19 to 36 centimeters); light yellowish brown (10YR 6/4) extremely gravelly ashy loamy sand, dark yellowish brown (10YR 4/4) moist; 3 percent clay; single grain; loose, partially weakly cemented by silica, nonsticky, nonplastic; few coarse and many very fine to medium roots; many very fine interstitial pores; 20 percent threadlike silica masses around rock fragments; 15 percent angular fine gravel, 38 percent angular medium and coarse gravel, 20 percent angular cobbles, and 5 percent angular stones; slightly acid, pH 6.3 by Hellige-Truog; NaF pH 11.6; clear smooth boundary.
- 2Bq2—14 to 26 inches (36 to 65 centimeters); very pale brown (10YR 7/3) extremely cobbly ashy loamy coarse sand, dark yellowish brown (10YR 4/4) moist; 3 percent clay; single grain; loose, partially very weakly cemented by silica, nonsticky, nonplastic; few very fine to medium roots; many very fine interstitial pores; 15 percent threadlike silica masses around rock fragments; 21 percent subangular fine gravel, 35 percent subangular medium and coarse gravel, 20 percent subangular cobbles, and 10 percent subangular stones; slightly acid, pH 6.3 by Hellige-Truog; NaF pH 11.5; clear smooth boundary.
- 2Bq3—26 to 35 inches (65 to 88 centimeters); very pale brown (10YR 8/2) extremely cobbly ashy loamy sand, yellowish brown (10YR 5/4) moist; 3 percent clay; moderate fine and medium subangular blocky structure; slightly hard, friable, partially extremely weakly cemented, nonsticky, nonplastic; few very fine to medium roots; many very fine to medium interstitial and many very fine to coarse irregular pores; 10 percent threadlike silica masses around rock fragments; 14 percent subangular fine gravel, 28 percent subangular medium and coarse gravel, 20 percent subangular cobbles, and 10 percent subangular stones; slightly acid, pH 6.4 by Hellige-Truog; NaF pH 11.4; gradual wavy boundary.
- 2Bq4—35 to 50 inches (88 to 127 centimeters); light gray (10YR 7/2) extremely stony ashy loamy sand, brown (10YR 4/3) moist; 2 percent clay; moderate fine and medium subangular blocky structure; slightly hard, friable, partially very weakly cemented, nonsticky, nonplastic; few fine to coarse roots; many medium and coarse irregular and many very fine to medium interstitial pores; 10 percent threadlike silica masses around rock fragments; 9 percent subangular fine gravel, 18 percent subangular medium and coarse gravel, 25 percent subangular cobbles, and 30 percent subangular stones; slightly acid, pH 6.6 by Hellige-Truog; NaF pH 11.3; clear smooth boundary.
- 2R—50 inches (127 centimeters); indurated bedrock.

Type Location

Shasta County, California; about 0.2 mile west-southwest from the southernmost corner of the Lassen Peak Trail parking lot, approximately 1,900 feet north and 1,600 feet east from the southwest corner of sec. 11, T. 30 N., R. 4 E.; 40 degrees 28 minutes 24 seconds north latitude and 121 degrees 30 minutes 34 seconds west longitude, NAD83; USGS Quad: Lassen Peak, California.

Range in Characteristics

Depth to restrictive feature: 40 to 60 inches (102 to 152 centimeters) to lithic contact

Mean annual soil temperature: 40 to 43 degrees F (4.4 to 6.0 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (thickest part): 2 to 3 percent clay and 72 to 86 percent rock fragments

Surface fragments: 20 to 30 percent gravel, 25 to 35 percent cobbles, 15 to 30 percent stones, and 0 to 15 percent boulders

A horizon:

Color (dry)—10YR 5/2, 6/2

Color (moist)—10YR 3/2, 4/2

Texture—very gravelly ashy sandy loam

Clay content—2 to 4 percent

Rock fragments—15 to 20 percent fine gravel, 15 to 25 percent medium and coarse gravel, 30 to 45 percent total gravel, 5 to 15 percent cobbles, 0 to 10 percent stones, 35 to 60 percent total rock fragments

Organic matter—4 to 5.5 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.35 to 0.50

P retention—30 to 50 percent

Glass content—20 to 30 percent

NaF pH—10.5 to 11.0

Soil reaction—moderately acid

Upper 2Bq horizon:

Color (dry)—10YR 7/3, 6/4

Color (moist)—10YR 4/4

Texture—extremely gravelly ashy loamy coarse sand, extremely gravelly ashy loamy sand, extremely cobbly ashy loamy coarse sand

Clay content—2 to 4 percent

Cementation class—extremely weakly cemented to strongly cemented in less than 10 percent of horizon

Rock fragments—15 to 25 percent fine gravel, 30 to 40 percent medium and coarse gravel, 45 to 65 total gravel, 15 to 25 percent cobbles, 0 to 15 percent stones, 60 to 85 percent total rock fragments

Organic matter—3 to 5 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.4 to 1.8

P retention—60 to 85 percent

Glass content—18 to 25 percent

NaF pH—11.5 to 11.6

Soil reaction—slightly acid

Lower 2Bq horizon:

Color (dry)—10YR 7/2, 8/2

Color (moist)—10YR 4/3, 5/4

Texture—extremely gravelly ashy loamy sand, extremely stony ashy loamy sand, extremely cobbly ashy loamy sand

Clay content—2 to 3 percent

Cementation class—extremely weakly cemented to strongly cemented in less than 10 percent of horizon

Rock fragments—5 to 15 percent fine gravel, 15 to 30 percent medium and coarse gravel, 25 to 45 percent total gravel, 15 to 30 percent cobbles, 5 to 35 percent stones, 45 to 85 percent total rock fragments

Organic matter—2 to 4 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.4 to 1.8



Figure 99.—Typical profile Scoured soil. Depth is marked in centimeters.

P retention—70 to 95 percent
Glass content—18 to 25 percent
NaF pH—11.3 to 11.4
Soil reaction—slightly acid or neutral

Scoured Series

The Scoured series consists of moderately deep, well drained soils that formed in tephra over colluvium and/or residuum from volcanic rocks. Scoured soils are on glacially scoured ridges and glacial headlands in the Southern Cascade Mountains. Slopes range from 2 to 90 percent. The mean annual precipitation is about 49 inches (1,245 millimeters), and the mean annual air temperature is about 41 degrees F (5 degrees C).

Taxonomic Classification

Medial-skeletal over fragmental or cindery, amorphic over isotic, frigid Humic Haploxerands

Typical Pedon

Scoured very bouldery medial loamy sand (fig. 99) on an east-northeast-facing (60 degrees) slope of 25 percent under a cover of pinemat manzanita, western white pine, California red fir, lodgepole pine, blue wildrye, dryland sedge, stipa, squirreltail, and

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mountain monardella at an elevation of 6,823 feet (2,080 meters). When described on 10/4/06, the soil was moist to a depth of 1.5 inches (4 centimeters) and dry below that to a depth of 30 inches (76 centimeters). (Colors are for dry soil unless otherwise noted.)

- O_i—0 to 1 inch (0 to 2 centimeters); slightly decomposed needles, leaves, twigs, and bark litter; abrupt smooth boundary.
- A—1 to 4 inches (2 to 10 centimeters); dark grayish brown (10YR 4/2) very bouldery medial loamy sand, very dark gray (7.5YR 3/1) moist; 2 percent clay; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; many very fine and common fine roots; common very fine and fine tubular and irregular pores; 7 percent subangular fine gravel, 10 percent subangular medium and coarse gravel, 10 percent subangular cobbles, 10 percent subangular stones, and 15 percent subangular boulders; moderately acid, pH 5.8 by pH meter 1:1 water; NaF pH 11.2; abrupt smooth boundary.
- AB—4 to 10 inches (10 to 25 centimeters); dark grayish brown (10YR 4/2) very bouldery medial sandy loam, very dark grayish brown (10YR 3/2) moist; 2 percent clay; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine and fine and few medium and coarse roots; common fine and medium irregular and tubular pores; 14 percent subangular fine gravel, 10 percent subangular medium and coarse gravel, 10 percent subangular cobbles, 10 percent subangular stones, and 10 percent subangular boulders; moderately acid, pH 6.0 by pH meter 1:1 water; NaF pH 11.6; clear smooth boundary.
- 2B_w—10 to 17 inches (25 to 42 centimeters); brown (10YR 4/3) very bouldery medial fine sandy loam, dark brown (7.5YR 3/2) moist; 2 percent clay; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine and fine and few medium roots; common fine and medium tubular and irregular pores; 10 percent subangular fine gravel, 13 percent subangular medium and coarse gravel, 10 percent subangular cobbles, 10 percent subangular stones, and 15 percent subangular boulders; moderately acid, pH 6.0 by pH meter 1:1 water; NaF pH 11.7; abrupt wavy boundary.
- 2C—17 to 30 inches (42 to 76 centimeters); boulders; 2 percent clay; massive; few very fine and fine roots; 20 percent subangular medium and coarse gravel, 25 percent subangular cobbles, 25 percent subangular stones, and 25 percent subangular boulders; slightly acid, pH 6.1 by pH meter 1:1 water; NaF pH 11.7; clear wavy boundary.
- 2R—30 inches (76 centimeters); lithic bedrock; massive; indurated; few very fine and fine roots.

Type Location

Plumas County, California; about 0.96 mile south-southeast of the new Juniper Lake ranger station, 700 feet north and 2,500 feet east of the southwest corner of sec. 23, T. 30 N., R. 6 E.; 40 degrees 26 minutes 23 seconds north latitude and 121 degrees 16 minutes 48 seconds west longitude, NAD83; USGS Quad: Mount Harkness, California.

Range in Characteristics

Depth to restrictive feature: 20 to 40 inches (51 to 102 centimeters) to lithic contact

Mean annual soil temperature: 43 to 45 degrees F (6 to 7 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (weighted average): 1 to 6 percent clay and 42 to 76 percent rock fragments

Surface fragments: 3 to 40 percent gravel, 3 to 10 percent cobbles, 3 to 10 percent stones, and 0 to 10 percent boulders

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Other characteristics: Some pedons have a B/R or 2BC horizon above the lithic contact

A horizon:

Color (dry)—10YR 4/2, 5/2, 5/3; 2.5Y 5/3
Color (moist)—7.5YR 3/1; 10YR 3/1, 3/2
Texture—gravelly medial loamy sand, very stony medial loamy sand, very stony medial sandy loam, very bouldery medial loamy sand
Clay content—1 to 3 percent
Rock fragments—1 to 8 percent fine gravel, 2 to 12 percent medium and coarse gravel, 3 to 20 percent total gravel, 0 to 10 percent cobbles, 0 to 45 percent stones, 0 to 15 percent boulders, 20 to 56 percent total rock fragments
Organic matter—13.5 to 18 percent
Base saturation by ammonium acetate—20 to 45 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.3 to 2.0
P retention—65 to 85 percent
Glass content—14 to 20 percent
NaF pH—10.4 to 11.2
Soil reaction—moderately acid or slightly acid

AB horizon:

Color (dry)—10YR 4/2, 5/4
Color (moist)—10YR 3/2, 4/3
Texture—very gravelly medial sandy loam, very stony medial fine sandy loam, very bouldery medial sandy loam
Clay content—1 to 5 percent
Rock fragments—6 to 14 percent fine gravel, 10 to 15 percent medium and coarse gravel, 19 to 24 percent total gravel, 5 to 10 percent cobbles, 10 to 30 percent stones, 0 to 15 percent boulders, 54 percent total rock fragments
Organic matter—12.0 to 16.0 percent
Base saturation by ammonium acetate—5 to 15 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.90 to 3.20
P retention—85 to 100 percent
Glass content—14 to 20 percent
NaF pH—11.0 to 11.6
Soil reaction—moderately acid or slightly acid

2Bw horizon:

Color (dry)—10YR 4/3, 5/3, 5/4, 6/4
Color (moist)—7.5YR 3/2; 10YR 4/2, 3/3, 4/3
Texture—very gravelly medial fine sandy loam, extremely stony medial fine sandy loam, very bouldery medial fine sandy loam, very stony medial fine sandy loam, gravelly medial very fine sandy loam
Clay content—1 to 8 percent
Rock fragments—1 to 14 percent fine gravel, 2 to 23 percent medium and coarse gravel, 3 to 34 percent total gravel, 0 to 10 percent cobbles, 0 to 80 percent stones, 0 to 15 percent boulders, 33 to 83 percent total rock fragments
Organic matter—12.0 to 16.5 percent
Base saturation by ammonium acetate—4 to 12 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—3.00 to 5.00
P retention—90 to 100 percent
Glass content—8 to 15 percent
NaF pH—11.0 to 11.7
Soil reaction—slightly acid or moderately acid

2C horizon:

Color (dry)—10YR 4/3, 5/3, 5/4, 6/4

Color (moist)—7.5YR 3/2; 10YR 4/2, 3/3, 4/3

Texture—boulders, stones, cobbles

Clay content—1 to 3 percent

Rock fragments—0 to 20 percent fine gravel, 20 to 35 percent medium and coarse gravel, 20 to 40 percent total gravel, 20 to 35 percent cobbles, 20 to 85 percent stones, 20 to 60 percent boulders, 90 to 98 percent total rock fragments

Organic matter—1 to 4 percent

Base saturation by ammonium acetate—4 to 12 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.5 to 3

P retention—90 to 100 percent

Glass content—2 to 5 percent

NaF pH—11.0 to 11.7

Soil reaction—slightly acid or moderately acid

Shadowlake Series

The Shadowlake series consists of deep, well drained soils that formed in tephra over or mixed with till from volcanic rocks (fig. 100). Shadowlake soils are on ground moraines and glacial-valley walls in the Southern Cascade Mountains. Slopes range from 2 to 80 percent. The mean annual precipitation is about 83 inches (2,108 millimeters), and the mean annual air temperature is about 41 degrees F (5 degrees C).

Taxonomic Classification

Ashy-skeletal, glassy Xeric Vitricryands

Typical Pedon

Shadowlake gravelly ashy sandy loam on a northwest-facing (315 degrees) slope of 2 percent under a cover of California red fir and lodgepole pine at an elevation of 7,486 feet (2,282 meters). When described on 8/8/2007, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

Oi—0 to 1 inch (0 to 2 centimeters); slightly decomposed cones, needles, and twig litter; abrupt smooth boundary.

A—1 to 2 inches (2 to 6 centimeters); grayish brown (10YR 5/2) gravelly ashy sandy loam, very dark grayish brown (10YR 3/2) moist; 5 percent clay; weak thin platy structure parting to weak fine granular parting to single grain; common very fine roots; common very fine irregular pores; 22 percent subangular fine gravel and 10 percent subangular medium and coarse gravel; moderately acid, pH 6.0 by Hellige-Truog; NaF pH 9.5; abrupt wavy boundary.

Bw1—2 to 6 inches (6 to 16 centimeters); light gray (10YR 7/2) gravelly ashy sandy loam, brown (10YR 5/3) moist; 5 percent clay; weak very fine and fine subangular blocky structure parting to single grain; common very fine and fine and few medium roots; many very fine tubular and interstitial pores; 18 percent subangular fine gravel and 10 percent subangular medium and coarse gravel; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 11.5; clear smooth boundary.

Bw2—6 to 13 inches (16 to 32 centimeters); very pale brown (10YR 7/3) gravelly ashy sandy loam, brown (10YR 4/3) moist; 6 percent clay; weak very fine and fine subangular blocky structure parting to single grain; common very fine and fine, many medium, and few coarse and very coarse roots; common very fine tubular and irregular pores; 23 percent subangular fine gravel and 10 percent subangular



Figure 100.—Profile of Shadowlake soil. Depth is marked in centimeters.

medium and coarse gravel; slightly acid, pH 6.3 by Hellige-Truog; NaF pH 11.5; clear wavy boundary.

Bw3—13 to 23 inches (32 to 58 centimeters); very pale brown (10YR 7/3) very gravelly ashy sandy loam, brown (10YR 5/3) moist; 5 percent clay; weak fine and medium subangular blocky structure parting to single grain; common very fine and fine, many medium, and common coarse and very coarse roots; common very fine irregular and tubular pores; 20 percent subangular fine gravel, 20 percent subangular medium and coarse gravel, and 5 percent subangular cobbles; neutral, pH 6.7 by Hellige-Truog; NaF pH 11.5; abrupt smooth boundary.

Bq—23 to 41 inches (58 to 104 centimeters); white (10YR 8/1) extremely gravelly ashy coarse sandy loam, grayish brown (2.5Y 5/2) moist; 5 percent clay; massive; very hard, extremely firm; few very fine, common fine and medium, and few coarse and very coarse roots; many very fine irregular and tubular pores; 20 percent silica masses in pores and around rock fragments; 31 percent subangular fine gravel

and 30 percent subangular medium and coarse gravel; neutral, pH 7.2 by Hellige-Truog; NaF pH 11.3; abrupt smooth boundary.
Cdq—41 inches (104 centimeters); white (2.5Y 8/1) loam, light olive brown (2.5Y 5/3) moist; 12 percent clay; massive; extremely hard, slightly rigid, slightly sticky; few very fine to very coarse roots matted at top of horizon; common very fine irregular and tubular pores; 10 percent silica masses in pores and around rock fragments; 12 percent subangular fine gravel and 2 percent subangular medium and coarse gravel; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 11.2.

Type Location

Shasta County, California; about 0.5 mile east of Shadow Lake, approximately 700 feet south and 200 feet east of the northwest corner of sec. 8, T. 30 N., R. 5 E.; 40 degrees 28 minutes 50 seconds north latitude and 121 degrees 27 minutes 30 seconds west longitude, NAD83; USGS Quad: Reading Peak, California.

Range in Characteristics

Depth to restrictive feature: 40 to 60 inches (102 to 152 centimeters) to densic contact

Mean annual soil temperature: 40 to 43 degrees F (4 to 6 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (thickest part): 5 percent clay and 45 to 61 percent rock fragments

Surface fragments: 7 to 40 percent gravel, 3 to 5 percent cobbles, 1 to 10 percent stones, and 0 to 10 percent boulders

A horizon:

Color (dry)—10YR 5/2, 5/3, 6/3

Color (moist)—10YR 2/2, 3/2, 4/2

Texture—gravelly ashy sandy loam

Clay content—1 to 6 percent

Rock fragments—10 to 22 percent fine gravel, 8 to 12 percent medium and coarse gravel, 18 to 34 percent total gravel

Organic matter—4 to 12 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.52 to 0.71

P retention—25 to 55 percent

Glass content—30 to 40 percent

NaF pH—9.5 to 12

Soil reaction—moderately acid to neutral

Bw horizon:

Color (dry)—10YR 6/3, 6/4, 7/2, 7/3, 7/4, 8/3

Color (moist)—7.5YR 4/4; 10YR 3/3, 3/4, 4/3, 4/6, 5/3, 5/4

Texture—gravelly ashy sandy loam, very gravelly ashy sandy loam, very bouldery ashy sandy loam

Clay content—3 to 8 percent

Rock fragments—5 to 23 percent fine gravel, 6 to 20 percent medium and coarse gravel, 11 to 33 percent total gravel, 0 to 15 percent cobbles, 0 to 10 percent stones, 0 to 10 percent boulders, 28 to 59 percent total rock fragments

Organic matter—3.5 to 8.6 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—2.0 to 2.5

P retention—65 to 90 percent

Glass content—36 to 45 percent

NaF pH—11.0 to 11.5

Soil reaction—moderately acid to neutral

Bq horizon:

Color (dry)—10YR 7/4, 8/1; 2.5Y 7/4, 8/1

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Color (moist)—2.5Y 5/2, 5/3, 6/2; 10YR 4/4
Texture—extremely gravelly ashy coarse sandy loam
Clay content—1 to 5 percent
Rock fragments—28 to 32 percent fine gravel, 28 to 32 percent medium and coarse gravel, 60 to 64 percent total gravel, 0 to 15 percent cobbles, 0 to 10 percent stones, 0 to 10 percent boulders, 60 to 75 percent total rock fragments
Organic matter—0.5 to 1.5 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1 to 1.5
P retention—45 to 55 percent
Glass content—15 to 30 percent
NaF pH—11.2 to 11.4
Rupture resistance—noncemented
Soil reaction—neutral

Cdq horizon:

Color (dry)—7.5YR 8/2; 2.5Y 8/1; 10YR 7/2
Color (moist)—7.5YR 4/4; 2.5Y 5/3; 10YR 4/2
Texture—loam, extremely bouldery loamy coarse sand, very gravelly sandy loam
Clay content—1 to 12 percent
Rock fragments—9 to 12 percent fine gravel, 2 to 14 percent medium and coarse gravel, 14 to 78 percent total gravel, 0 to 15 percent cobbles, 0 to 20 percent stones, 0 to 20 percent boulders, 14 to 78 percent total rock fragments
Organic matter—0 to 0.3 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.5 to 0.7
P retention—25 to 35 percent
Glass content—15 to 30 percent
NaF pH—10.0 to 11.2
Rupture resistance—slightly hard to extremely hard
Soil reaction—moderately acid or slightly acid

Sueredo Series

The Sueredo series consists of very deep, well drained soils that formed in tephra over till from volcanic rocks (fig. 101). Sueredo soils are on ground moraines in the Southern Cascade Mountains. Slopes range from 2 to 70 percent. The mean annual precipitation is about 43 inches (1,092 millimeters), and the mean annual air temperature is about 43 degrees F (6 degrees C).

Taxonomic Classification

Ashy-skeletal, mixed, frigid Typic Vitrixerands

Typical Pedon

Sueredo bouldery ashy loamy coarse sand on an east-northeast-facing (54 degrees) slope of 8 percent under a cover of white fir and Jeffrey pine at an elevation of 5,788 feet (1,764 meters). When described on 10/2/07, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

Oi—0 to 2 inches (0 to 6 centimeters); slightly decomposed needle, twig, and cone litter; abrupt smooth boundary.

Oe—2 to 5 inches (6 to 12 centimeters); moderately decomposed needle, twig, and cone litter; few very fine and fine roots; abrupt wavy boundary.

A1—5 to 9 inches (12 to 22 centimeters); grayish brown (10YR 5/2) bouldery ashy loamy coarse sand, very dark grayish brown (10YR 3/2) moist; 2 percent clay; weak fine to coarse subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine and fine and few medium and coarse roots; many



Figure 101.—Profile of Sueredo soil. Depth is marked in centimeters.

very fine irregular and tubular pores; 4 percent subangular medium and coarse gravel, 5 percent subangular stones, 5 percent subangular boulders, and 18 percent subangular fine gravel; strongly acid, pH 5.5 by pH meter 1:1 water; NaF pH 10.0; clear wavy boundary.

- A2—9 to 13 inches (22 to 32 centimeters); light brownish gray (10YR 6/2) bouldery ashy loamy coarse sand, dark grayish brown (10YR 4/2) moist; 1 percent clay; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; few coarse and common very fine to medium roots; common very fine irregular and tubular pores; 5 percent subangular boulders, 5 percent subangular stones, 7 percent subangular medium and coarse gravel, and 11 percent subangular fine gravel; moderately acid, pH 5.8 by pH meter 1:1 water; NaF pH 10.5; abrupt wavy boundary.
- C1—13 to 16 inches (32 to 41 centimeters); light gray (10YR 7/2) bouldery ashy loamy coarse sand, dark brown (10YR 3/3) moist; 2 percent clay; weak fine and medium subangular blocky structure parting to single grain; soft, very friable, nonsticky, nonplastic; few coarse and common very fine to medium roots; common very fine irregular and tubular pores; 5 percent subangular boulders, 5 percent subangular stones, 8 percent subangular fine gravel, and 16 percent subangular medium and

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- coarse gravel; moderately acid, pH 5.9 by pH meter 1:1 water; NaF pH 10.5; abrupt smooth boundary.
- C2—16 to 18 inches (41 to 46 centimeters); light brownish gray (10YR 6/2) very bouldery ashy coarse sand, dark grayish brown (10YR 4/2) moist; 1 percent clay; single grain; loose, nonsticky, nonplastic; common fine and medium, few coarse, and many very fine roots; many very fine to medium interstitial pores; 5 percent subangular boulders, 5 percent subangular stones, 10 percent subangular cobbles, 14 percent subangular medium and coarse pumice gravel, and 14 percent subangular fine pumice gravel; slightly acid, pH 6.1 by pH meter 1:1 water; NaF pH 9.7; abrupt smooth boundary.
- 2Ab—18 to 26 inches (46 to 66 centimeters); brown (10YR 5/3) very bouldery ashy loamy coarse sand, dark brown (10YR 3/3) moist; 2 percent clay; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; common fine to very coarse and many very fine roots; common very fine irregular and tubular pores; 5 percent subangular boulders, 5 percent subangular stones, 10 percent subangular cobbles, 14 percent subangular medium and coarse gravel, and 14 percent subangular fine gravel; slightly acid, pH 6.2 by pH meter 1:1 water; NaF pH 10.8; clear smooth boundary.
- 2Bwb—26 to 50 inches (66 to 127 centimeters); pale brown (10YR 6/3) extremely cobbly ashy coarse sand, dark brown (10YR 3/3) moist; 0 percent clay; single grain; loose, nonsticky, nonplastic; common coarse and very coarse and many very fine to medium roots; many very fine irregular pores; 5 percent subangular boulders, 5 percent subangular fine gravel, 15 percent subangular stones, 17 percent subangular medium and coarse gravel, and 35 percent subangular cobbles; slightly acid, pH 6.3 by pH meter 1:1 water; NaF pH 10.6; clear smooth boundary.
- 2C—50 to 76 inches (127 to 192 centimeters); very pale brown (10YR 7/3) ashy stones, brown (10YR 4/3) moist; 1 percent clay; single grain; loose, nonsticky, nonplastic; few coarse and very coarse and many very fine to medium roots; many very fine irregular pores; 5 percent subangular boulders, 7 percent subangular fine gravel, 20 percent subangular stones, 29 percent subangular medium and coarse gravel, and 30 percent subangular cobbles; slightly acid, pH 6.4 by 1:1 water; NaF pH 10.6; gradual wavy boundary.
- 2Cdq—76 to 83 inches (192 to 212 centimeters); light gray (7.5YR 7/1) extremely bouldery ashy loamy coarse sand, brown (7.5YR 5/2) moist; 1 percent clay; massive; very hard, extremely firm, noncemented, nonsticky, nonplastic; many very fine and fine tubular pores; 25 percent silica masses lining pores; 5 percent subrounded boulders, 5 percent subrounded stones, 15 percent subrounded cobbles, 19 percent subrounded fine gravel, and 23 percent subrounded medium and coarse gravel; slightly acid, pH 6.5 by pH meter 1:1 water; NaF pH 10.3.

Type Location

Shasta County, California; about 0.82 mile southeast of Lost Creek Organizational Campground, approximately 1,200 feet south and 900 feet west of the northeast corner of sec. 10, T. 31 N., R. 4 E.; 40 degrees 33 minutes 18 seconds north latitude and 121 degrees 30 minutes 18 seconds west longitude, NAD83; USGS Quad: Manzanita Lake, California.

Range in Characteristics

Depth to restrictive feature: 60 to 80 inches (152 to 203 centimeters) to densic contact

Mean annual soil temperature: 43 to 46 degrees F (6 to 8 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (thickest part): 0 to 2 percent clay and 48 to 77 percent rock fragments

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Surface fragments: 0 to 25 percent gravel, 0 to 15 percent cobbles, 0 to 5 percent stones, and 0 to 10 percent boulders

A horizon:

Color (dry)—10YR 4/1, 4/2, 5/2, 6/2; 2.5Y 5/2

Color (moist)—10YR 2/1, 3/2, 4/2; 2.5Y 2.5/1, 3/1

Texture—bouldery ashy loamy coarse sand, gravelly ashy loamy coarse sand, gravelly ashy sandy loam, ashy sandy loam, very gravelly ashy loamy coarse sand, ashy loamy sand

Clay content—1 to 6 percent

Rock fragments—5 to 25 percent fine gravel, 0 to 15 percent medium and coarse gravel, 5 to 30 percent total gravel, 0 to 5 percent cobbles, 0 to 5 percent stones, 0 to 5 percent boulders, 5 to 40 percent total rock fragments

Organic matter—2 to 4 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.3 to 0.7

P retention—15 to 40 percent

Glass content—30 to 50 percent

NaF pH—9.0 to 10.5

Soil reaction—strongly acid to neutral

C horizon:

Color (dry)—10YR 6/2, 7/1, 7/2, 8/1, 8/2; 2.5Y 4/2, 6/2, 7/1, 7/2, 8/1

Color (moist)—10YR 3/3, 4/2, 4/3, 5/2, 5/3, 7/1; 2.5Y 4/2, 5/2, 6/1, 6/2

Texture—bouldery ashy loamy coarse sand, very bouldery ashy coarse sand, gravelly ashy loamy coarse sand, very gravelly ashy coarse sand, gravelly ashy sandy loam, extremely stony ashy loamy sand, ashy very fine sandy loam, extremely gravelly ashy coarse sand, ashy coarse sand, very gravelly ashy fine sandy loam, ashy sand, ashy sandy loam, ashy loamy sand, gravelly ashy sand, ashy fine sandy loam

Clay content—0 to 7 percent

Rock fragments—1 to 35 percent fine gravel, 0 to 55 percent medium and coarse gravel, 1 to 85 percent total gravel, 0 to 20 percent cobbles, 0 to 35 percent stones, 0 to 5 percent boulders, 5 to 85 percent total rock fragments

Organic matter—0.5 to 3 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.3 to 0.5

P retention—10 to 35 percent

Glass content—35 to 45 percent

NaF pH—9.2 to 11.5

Soil reaction—moderately acid to neutral

2Ab horizon:

Color (dry)—10YR 5/3, 6/2, 6/3, 7/2; 2.5Y 6/2, 6/3

Color (moist)—10YR 3/3, 4/2, 4/3, 5/3; 2.5Y 3/2, 4/2

Texture—very bouldery ashy loamy coarse sand, very gravelly ashy loamy coarse sand, extremely stony ashy sandy loam, gravelly ashy loamy coarse sand, gravelly ashy loamy fine sand, gravelly ashy fine sandy loam, very gravelly ashy sandy loam, very cobbly ashy loamy sand

Clay content—1 to 9 percent

Rock fragments—5 to 20 percent fine gravel, 5 to 15 percent medium and coarse gravel, 15 to 35 percent total gravel, 0 to 25 percent cobbles, 0 to 30 percent stones, 0 to 5 percent boulders, 20 to 65 percent total rock fragments

Organic matter—3 to 4 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.0 to 1.5

P retention—50 to 70 percent

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Glass content—30 to 40 percent
NaF pH—10.0 to 11.3
Soil reaction—slightly acid or neutral

2Bwb horizon:

Color (dry)—10YR 6/3, 7/3; 2.5Y 6/3, 7/3
Color (moist)—10YR 3/3, 4/2, 4/3, 5/3; 2.5Y 4/3
Texture—extremely cobbly ashy coarse sand, extremely stony ashy sandy loam, extremely stony ashy fine sandy loam, very gravelly ashy loamy fine sand, extremely cobbly ashy loamy fine sand, very stony ashy sandy loam, very gravelly ashy sandy loam, very gravelly ashy loamy sand
Clay content—0 to 8 percent
Rock fragments—5 to 25 percent fine gravel, 5 to 25 percent medium and coarse gravel, 15 to 45 percent total gravel, 5 to 35 percent cobbles, 0 to 25 percent stones, 0 to 5 percent boulders, 35 to 80 percent total rock fragments
Organic matter—2 to 3 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.0 to 1.5
P retention—60 to 75 percent
Glass content—15 to 30 percent
NaF pH—10.5 to 11.2
Soil reaction—slightly acid or neutral

2C horizon:

Color (dry)—10YR 7/2, 7/3, 8/1; 2.5Y 6/3
Color (moist)—10YR 4/3, 5/2, 5/3
Texture—ashy stones, ashy cobbles, extremely gravelly ashy loamy sand, extremely cobbly ashy coarse sand
Clay content—0 to 3 percent
Rock fragments—5 to 20 percent fine gravel, 24 to 45 percent medium and coarse gravel, 35 to 50 percent total gravel, 15 to 35 percent cobbles, 0 to 25 percent stones, 0 to 5 percent boulders, 60 to 95 percent total rock fragments
Organic matter—0.5 to 1.5 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.0 to 1.5
P retention—45 to 55 percent
Glass content—15 to 30 percent
NaF pH—10.5 to 11.2
Soil reaction—slightly acid or neutral

2Cdq horizon:

Color (dry)—7.5YR 7/1; 10YR 7/2, 8/1
Color (moist)—7.5YR 5/2; 10YR 5/2, 5/3
Texture—extremely bouldery ashy loamy coarse sand, extremely gravelly ashy loamy coarse sand, very gravelly ashy loamy sand, extremely gravelly ashy loamy sand
Clay content—1 to 3 percent
Rock fragments—15 to 25 percent fine gravel, 10 to 40 percent medium and coarse gravel, 35 to 65 percent total gravel, 0 to 20 percent cobbles, 0 to 10 percent stones, 0 to 5 percent boulders, 50 to 89 percent total rock fragments
Organic matter—0 to 0.3 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.5 to 0.8
P retention—25 to 35 percent
Glass content—15 to 30 percent
NaF pH—10.0 to 11.0
Soil reaction—slightly acid or neutral



Figure 102.—Typical profile of Summertown soil. Depth is marked in centimeters.

Summertown Series

The Summertown series consists of moderately deep, well drained soils that formed in volcanic ash over and mixed with till derived from volcanic rocks. Summertown soils are on moraines. Slopes range from 5 to 35 percent. The mean annual precipitation is about 55 inches (1,397 millimeters), and the mean annual air temperature is about 40 degrees F (4.5 degrees C).

Taxonomic Classification

Ashy-skeletal, glassy, frigid Humic Vitrixerands

Typical Pedon

Summertown gravelly ashy loamy coarse sand (fig. 102) on a west-facing (292 degrees) slope of 20 percent under a cover of white fir, greenleaf manzanita, Jeffrey pine, and bush chinquapin at an elevation of 5,992 feet (1,826 meters). When described on 6/25/07, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

Oi—0 to 2 inches (0 to 5 centimeters); slightly decomposed needles, cones, and twig litter; abrupt smooth boundary.

Oa—2 to 4 inches (5 to 9 centimeters); highly decomposed needles, cones, and twig litter; common very fine and fine roots; abrupt wavy boundary.

A—4 to 6 inches (9 to 14 centimeters); dark grayish brown (10YR 4/2) gravelly ashy loamy coarse sand, very dark brown (10YR 2/2) moist; 2 percent clay; weak very

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- thick platy structure; loose, nonsticky, nonplastic; common very fine, many fine and medium, and few coarse and very coarse roots; many very fine and fine interstitial and common fine tubular pores; 10 percent subangular fine gravel, 3 percent subangular medium and coarse gravel, and 3 percent subangular stones; moderately acid, pH 5.7 by Hellige-Truog; NaF pH 10.8; abrupt wavy boundary.
- AB—6 to 15 inches (14 to 38 centimeters); brown (10YR 5/3) cobbly ashy loamy coarse sand, dark brown (10YR 3/3) moist; 2 percent clay; weak very fine to medium subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; many very fine to coarse and few very coarse roots; many very fine and fine interstitial and few fine and medium tubular pores; 11 percent subangular fine gravel, 5 percent subangular medium and coarse gravel, 5 percent subangular cobbles, and 3 percent subangular stones; neutral, pH 6.7 by Hellige-Truog; NaF pH 10.9; clear wavy boundary.
- 2Bw1—15 to 22 inches (38 to 55 centimeters); dark yellowish brown (10YR 4/4) very cobbly ashy loamy coarse sand, dark brown (10YR 3/3) moist; 2 percent clay; weak fine subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; many very fine to coarse and few very coarse roots; many very fine and fine interstitial and few fine and medium tubular pores; 6 percent subangular fine gravel, 4 percent subangular medium and coarse gravel, 25 percent subangular cobbles, and 15 percent subangular stones; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 10.9; clear wavy boundary.
- 2Bw2—22 to 31 inches (55 to 80 centimeters); yellowish brown (10YR 5/4) extremely cobbly ashy loamy sand, dark brown (10YR 3/3) moist; 4 percent clay; single grain; loose, nonsticky, nonplastic; common very fine to coarse and few very coarse roots; many very fine and fine interstitial pores; 6 percent subangular fine gravel, 8 percent subangular medium and coarse gravel, 40 percent subangular cobbles, and 20 percent subangular stones; slightly acid, pH 6.3 by Hellige-Truog; NaF pH 10.6; abrupt wavy boundary.
- 2Cdq—31 to 43 inches (80 to 108 centimeters); very pale brown (10YR 7/3) extremely stony ashy loamy coarse sand, dark yellowish brown (10YR 4/4) moist; 2 percent clay; massive; very hard, firm, nonsticky, nonplastic; few very fine interstitial pores; 20 percent silica masses around rock fragments; 5 percent subangular fine gravel, 8 percent subangular medium and coarse gravel, 40 percent subangular cobbles, and 30 percent subangular stones; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 10.7.

Type Location

Shasta County, California; about 0.66 mile southeast of Manzanita Lake, approximately 300 feet east and 1,600 feet south of the northwest corner of sec. 20, T. 21 N., R. 4 E.; 40 degrees 31 minutes 29 seconds north latitude and 121 degrees 33 minutes 28 seconds west longitude, NAD83; USGS Quad: Manzanita Lake, California.

Range in Characteristics

Depth to restrictive feature: 20 to 40 inches (51 to 102 centimeters) to densic contact

Mean annual soil temperature: 45 to 47 degrees F (7 to 8 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (thickest part): 4 percent clay and 74 percent rock fragments

Surface fragments: 2 to 20 percent gravel, 1 to 5 percent cobbles, 1 to 3 percent stones, and 1 to 3 percent boulders

A horizon:

Color (dry)—10YR 4/2; 2.5Y 4/2, 5/2

Color (moist)—10YR 2/1, 2/2, 3/1

Texture—gravelly ashy loamy coarse sand, ashy fine sandy loam, ashy sandy

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loam, gravelly ashy fine sandy loam, very gravelly ashy sandy loam, very cobbly ashy sandy loam

Clay content—2 to 4 percent

Rock fragments—5 to 15 percent fine gravel, 2 to 20 percent medium and coarse gravel, 5 to 35 percent total gravel, 0 to 20 percent cobbles, 0 to 5 percent stones, 0 to 3 percent boulders, 7 to 55 percent total rock fragments

Organic matter—4 to 5.5 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.55 to 0.70

P retention—30 to 50 percent

Glass content—30 to 35 percent

NaF pH—9.0 to 11.3

Soil reaction—moderately acid or slightly acid

AB horizon:

Color (dry)—10YR 5/3

Color (moist)—10YR 3/3

Texture—gravelly ashy loamy coarse sand, ashy fine sandy loam, cobbly ashy loamy coarse sand

Clay content—2 to 4 percent

Rock fragments—2 to 15 percent fine gravel, 1 to 5 percent medium and coarse gravel, 4 to 15 percent total gravel, 2 to 10 percent cobbles, 2 to 10 percent stones, 0 to 3 percent boulders, 10 to 30 percent total rock fragments

Organic matter—2 to 3 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.8 to 0.95

P retention—45 to 60 percent

Glass content—30 to 40 percent

NaF pH—11.0 to 11.5

Soil reaction—slightly acid or neutral

2Bw horizon:

Color (dry)—10YR 4/4, 5/4, 6/3, 6/4; 2.5Y 5/3, 6/3

Color (moist)—10YR 3/2, 3/3, 4/2, 4/4, 5/4

Texture—very stony ashy loamy coarse sand, extremely cobbly ashy loamy sand, very stony ashy fine sandy loam, very gravelly ashy loamy fine sand, very bouldery ashy fine sandy loam, very cobbly ashy loamy coarse sand

Clay content—2 to 6 percent

Rock fragments—5 to 15 percent fine gravel, 4 to 25 percent medium and coarse gravel, 10 to 35 percent total gravel, 5 to 40 percent cobbles, 0 to 20 percent stones, 0 to 20 percent boulders, 35 to 80 percent total rock fragments

Organic matter—2.5 to 4 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.2 to 1.5

P retention—55 to 70 percent

Glass content—30 to 40 percent

NaF pH—10.5 to 11.2

Soil reaction—slightly acid

2Cdq horizon:

Color (dry)—10YR 6/2, 7/3, 7/4, 8/3

Color (moist)—10YR 4/4, 5/4

Texture—extremely stony ashy loamy coarse sand, extremely gravelly ashy loamy sand, extremely stony ashy loamy sand

Clay content—2 to 5 percent

Rock fragments—5 to 15 percent fine gravel, 5 to 25 percent medium and coarse gravel, 10 to 40 percent total gravel, 15 to 40 percent cobbles, 5 to 45 percent stones, 0 to 20 percent boulders, 60 to 88 percent total rock fragments

Organic matter—0 to 1.5 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—2.0 to 2.8

P retention—70 to 85 percent

Glass content—30 to 40 percent

NaF pH—10.0 to 11.0

Soil reaction—slightly acid

Sunhoff Series

The Sunhoff series consists of moderately deep, well drained soils that formed in tephra from Cinder Cone over till from volcanic rocks. Sunhoff soils are on moraines in the Southern Cascade Mountains. Slopes range from 20 to 65 percent. The mean annual precipitation is about 27 inches (686 millimeters), and the mean annual air temperature is about 43 degrees F (6 degrees C).

Taxonomic Classification

Medial-skeletal, amorphic, frigid Typic Vitrixerands

Typical Pedon

Sunhoff ashy loamy sand on a northwest-facing (309 degrees) slope of 35 percent under a cover of California red fir, Jeffrey pine, and bush chinquapin at an elevation of 6,743 feet (2,056 meters). When described on 6/27/06, the soil was very slightly moist at a depth of 1 to 9 inches (2 to 22 centimeters) and slightly moist at a depth of 9 to 29 inches (22 to 73 centimeters). (Colors are for dry soil unless otherwise noted.)

Oi—0 to 1 inch (0 to 2 centimeters); needle and twig litter; abrupt smooth boundary.

A—1 to 6 inches (2 to 14 centimeters); grayish brown (10YR 5/2) ashy loamy sand, black (10YR 2/1) moist; 2 percent clay; single grain; loose, nonsticky, nonplastic; many very fine, common fine, and few medium roots; many very fine and fine irregular pores; slightly acid, pH 6.4 by Hellige-Truog; NaF pH 9.0; abrupt wavy boundary.

2Ab—6 to 9 inches (14 to 22 centimeters); light yellowish brown (10YR 6/4) gravelly medial loamy coarse sand, brown (7.5YR 4/3) moist; 4 percent clay; weak very fine granular structure parting to single grain; loose, nonsticky, nonplastic; many very fine and fine, common medium, and few coarse roots; many very fine and fine interstitial pores; 15 percent subangular fine gravel and 15 percent subangular medium and coarse gravel; neutral, pH 6.7 by Hellige-Truog; NaF pH 10.3; abrupt smooth boundary.

2Bwb—9 to 29 inches (22 to 73 centimeters); light brown (7.5YR 6/4) extremely cobbly medial loamy sand, brown (7.5YR 4/4) moist; 5 percent clay; weak very fine and fine subangular blocky structure; loose, nonsticky, nonplastic; common very fine to medium and few coarse roots; common very fine and fine irregular and common medium tubular pores; 8 percent subangular fine gravel and 12 percent subangular medium and coarse gravel, 30 percent subangular cobbles, and 20 percent subangular stones; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 10.3; abrupt wavy boundary.

2Cd—29 to 39 inches (73 to 99 centimeters); very pale brown (10YR 7/3) extremely gravelly ashy sandy loam, brown (7.5YR 4/3) moist; 1 percent clay; massive; very hard; nonsticky, nonplastic; 15 percent subangular fine gravel, 40 percent subangular medium and coarse gravel, and 5 percent subangular cobbles; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 10.0.

Type Location

Lassen County, California; about 0.25 mile north of Sunrise Peak, approximately 2,300 feet east and 1,500 feet north of the southwest corner of sec. 11, T. 31 N., R. 6 E.; 40

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degrees 33 minutes 38 seconds north latitude and 121 degrees 16 minutes 35 seconds west longitude, NAD83; USGS Quad: Prospect Peak, California.

Range in Characteristics

Depth to restrictive feature: 20 to 40 inches (51 to 102 centimeters) to dense till

Mean annual soil temperature: 45 to 47 degrees F (7 to 8 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (thickest part): 5 percent clay and 70 percent rock fragments

Surface fragments: 0 to 20 percent gravel, 0 to 10 percent cobbles, 0 to 10 percent stones, and 0 to 10 percent boulders

A horizon:

Color (dry)—10YR 5/2; 2.5Y 4/1, 4/2

Color (moist)—10YR 2/1; 2.5Y 2.5/1

Texture—ashy loamy sand, ashy sand

Clay content—0 to 4 percent

Rock fragments—0 to 10 percent fine gravel, 0 to 2 percent medium and coarse gravel, 0 to 15 percent total gravel

Organic matter—0.5 to 3.5 percent

Base saturation by ammonium acetate—55 to 70 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.5 to 0.25

P retention—2 to 10 percent

Glass content—3 to 18 percent

NaF pH—9.0 to 9.9

Soil reaction—slightly acid to neutral

2Ab horizon:

Color (dry)—10YR 6/4, 6/3

Color (moist)—10YR 4/3; 7.5YR 4/3

Texture—gravelly medial loamy coarse sand, gravelly medial sandy loam

Clay content—2 to 5 percent

Rock fragments—10 to 20 percent fine gravel, 10 to 20 percent medium and coarse gravel, 25 to 35 percent total gravel, 0 to 10 percent cobbles, 0 to 5 percent stones, 0 to 2 percent boulders, 20 to 34 percent total rock fragments

Organic matter—3.0 to 6.5 percent

Base saturation by ammonium acetate—43 to 58 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.20 to 2.00

P retention—75 to 90 percent

Glass content—22 to 29 percent

NaF pH—10.3 to 10.6

Soil reaction—neutral

2Bwb horizon:

Color (dry)—7.5YR 6/4; 10YR 6/4, 2.5Y 6/4

Color (moist)—7.5YR 4/4; 10YR 3/4, 4/4

Texture—extremely stony medial loamy sand, extremely bouldery medial sandy loam, extremely cobbly medial sandy loam, extremely cobbly medial loamy sand

Clay content—3 to 8 percent

Rock fragments—8 to 15 percent fine gravel, 5 to 20 percent medium and coarse gravel, 10 to 35 percent total gravel, 15 to 35 percent cobbles, 5 to 35 percent stones, 0 to 35 percent boulders, 60 to 75 percent total rock fragments

Organic matter—3.0 to 5.5 percent

Base saturation by ammonium acetate—23 to 38 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—2.25 to 3.75

P retention—85 to 100 percent
Glass content—4 to 14 percent
NaF pH—10.3 to 11.3
Soil reaction—slightly acid to neutral

2Cd horizon:

Color (dry)—10YR 7/3
Color (moist)—10YR 4/3
Texture—extremely gravelly ashy sandy loam, very gravelly ashy sandy loam
Clay content—0.5 to 1 percent
Rock fragments—5 to 25 percent fine gravel, 20 to 70 percent medium and coarse gravel, 35 to 80 percent total gravel, 5 to 20 percent cobbles, 0 to 20 percent stones, 50 to 88 percent total rock fragments
Organic matter—0 to 0.7 percent
Base saturation by ammonium acetate—20 to 38 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.25 to 1.60
P retention—45 to 60 percent
Glass content—4 to 14 percent
NaF pH—10.0 to 10.1
Rupture resistance—slightly hard to very hard
Soil reaction—slightly acid or neutral

Talved Series

The Talved series consists of very deep, excessively drained soils that formed in tephra over colluvium from volcanic rocks. Talved soils are on talus slopes on scoured glacial-valley walls in the Southern Cascade Mountains. Slopes range from 20 to 65 percent. The mean annual precipitation is about 25 inches (635 millimeters), and the mean annual air temperature is about 44 degrees F (7 degrees C).

Taxonomic Classification

Medial-skeletal, amorphic, frigid Typic Vitrixerands

Typical Pedon

Talved extremely cobbly ashy loamy coarse sand on a west-facing (290 degrees) slope of 68 percent under a cover of lichens, horse mint, and Jeffrey pine at an elevation of 6,243 feet (1,903 meters). When described on 6/26/06, the soil was dry to a depth of 13 inches (35 centimeters) and slightly moist to a depth of 60 inches (152 centimeters). (Colors are for dry soil unless otherwise noted.)

Oi—0 to 1 inch (0 to 3 centimeters); pine needle and cone litter; abrupt smooth boundary.

A—1 to 5 inches (3 to 13 centimeters); dark gray (10YR 4/1) extremely cobbly ashy loamy coarse sand, very dark brown (10YR 2/2) moist; 1 percent clay; single grain; loose, nonsticky, nonplastic; many very fine and few fine roots; many very fine and fine irregular pores; 10 percent angular fine gravel, 5 percent angular medium and coarse gravel, 40 percent angular cobbles, 10 percent angular stones, and 10 percent angular boulders; neutral, pH 6.8 by Hellige-Truog; NaF pH 9.9; gradual wavy boundary.

2Ab—5 to 13 inches (13 to 33 centimeters); dark grayish brown (10YR 4/2) extremely bouldery medial coarse sand, black (10YR 2/1) moist; 0 percent clay; weak very fine subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; many very fine, common fine, and few medium coarse and very coarse roots; many very fine and fine irregular pores; 5 percent angular fine gravel, 15 percent angular medium and coarse gravel, 20 percent angular cobbles, 20

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- percent angular stones, and 20 percent angular boulders; neutral, pH 6.9 by Hellige-Truog; NaF pH 10.4; gradual wavy boundary.
- 2Bwb1—13 to 26 inches (33 to 65 centimeters); brown (10YR 5/3) extremely bouldery medial coarse sandy loam, dark grayish brown (10YR 4/2) moist; 4 percent clay; weak very fine subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; many very fine, common fine, and few medium roots; many very fine and fine irregular pores; 10 percent angular fine gravel, 15 percent angular medium and coarse gravel, 20 percent angular cobbles, 20 percent angular stones, and 20 percent angular boulders; neutral, pH 7.0 by Hellige-Truog; NaF pH 11.0; gradual wavy boundary.
- 2Bwb2—26 to 39 inches (65 to 100 centimeters); pale brown (10YR 6/3) medial stones, brown (10YR 4/3) moist; 5 percent clay; weak very fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine to medium roots; many very fine and fine irregular pores; 5 percent subangular fine gravel, 15 percent angular medium and coarse gravel, 30 percent angular cobbles, 30 percent angular stones, and 10 percent angular boulders; neutral, pH 7.2 by Hellige-Truog; NaF pH 11.5; gradual wavy boundary.
- 2Bwb3—39 to 60 inches (100 to 152 centimeters); pale brown (10YR 6/3) extremely bouldery medial sandy loam, brown (10YR 4/3) moist; 7 percent clay; weak very fine to medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; few very fine to medium roots; many very fine to medium irregular pores; 5 percent angular fine gravel, 15 percent angular medium and coarse gravel, 10 percent angular cobbles, 20 percent angular stones, and 30 percent angular boulders; slightly alkaline, pH 7.4 by Hellige-Truog; NaF pH 10.6.

Type Location

Lassen County, California; about 0.25 mile east of Bathtub Lake, approximately 2,400 feet west and 300 feet north of the southeast corner of sec. 3, T. 31 N., R. 6 E.; 40 degrees 34 minutes 18 seconds north latitude and 121 degrees 17 minutes 36 seconds west longitude, NAD83; USGS Quad: Prospect Peak, California.

Range in Characteristics

- Depth to restrictive feature:* More than 60 inches (152 centimeters) to bedrock
- Mean annual soil temperature:* 45 to 47 degrees F (7 to 8 degrees C)
- Period that soil moisture control section is dry:* July to October (about 90 days)
- Particle-size control section (thickest part):* 3 to 8 percent clay and 80 to 88 percent rock fragments
- Surface fragments:* 10 to 30 percent gravel, 15 to 30 percent cobbles, 25 to 60 percent stones, and 20 to 40 percent boulders
- A horizon:*
- Color (dry)—10YR 4/1, 4/2, 5/2; 2.5Y 4/1, 4/2
 - Color (moist)—10YR 2/2, 3/2; 2.5Y 2.5/1, 3/1, 3/2
 - Texture—extremely cobbly ashy loamy sand, extremely cobbly ashy loamy coarse sand, extremely cobbly ashy coarse sand
 - Clay content—0 to 2 percent
 - Rock fragments—5 to 20 percent fine gravel, 0 to 20 percent medium and coarse gravel, 5 to 30 percent total gravel, 20 to 45 percent cobbles, 5 to 15 percent stones, 5 to 15 percent boulders, 60 to 85 percent total rock fragments
 - Organic matter—2 to 5 percent
 - Base saturation by ammonium acetate—55 to 70 percent
 - Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.05 to 0.25
 - P retention—2 to 10 percent
 - Glass content—3 to 8 percent

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NaF pH—9.1 to 9.9
Soil reaction—slightly acid or neutral

2Ab horizon:

Color (dry)—10YR 4/2, 5/2; 2.5Y 4/1, 4/2, 5/2
Color (moist)—10YR 2/1, 2/2, 3/2; 2.5Y 3/1, 3/2
Texture—extremely bouldery medial coarse sand, extremely stony medial coarse sand, extremely cobbly medial coarse sand, extremely stony medial coarse sand
Clay content—0 to 2 percent
Rock fragments—0 to 10 percent fine gravel, 5 to 15 percent medium and coarse gravel, 5 to 25 percent total gravel, 15 to 30 percent cobbles, 15 to 30 percent stones, 15 to 30 percent boulders, 60 to 89 percent total rock fragments
Organic matter—2 to 5 percent
Base saturation by ammonium acetate—58 to 75 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.05 to 0.20
P retention—2 to 10 percent
Glass content—3 to 10 percent
NaF pH—9.1 to 10.4
Soil reaction—slightly acid or neutral

Upper 2Bwb horizon:

Color (dry)—10YR 5/3, 6/3, 6/4; 2.5Y 5/3, 5/4, 6/4
Color (moist)—10YR 4/2, 4/3, 3/4, 4/4; 2.5Y 4/2
Texture—extremely bouldery medial coarse sandy loam, extremely bouldery medial sandy loam, extremely stony medial sandy loam, extremely stony medial coarse sandy loam, medial stones, medial boulders
Clay content—2 to 6 percent
Rock fragments—5 to 15 percent fine gravel, 10 to 20 percent medium and coarse gravel, 15 to 35 percent total gravel, 15 to 35 percent cobbles, 15 to 35 percent stones, 5 to 25 percent boulders, 60 to 95 percent total rock fragments
Organic matter—1 to 3 percent
Base saturation by ammonium acetate—25 to 45 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—2.2 to 3.5
P retention—90 to 100 percent
Glass content—4 to 14 percent
NaF pH—10.5 to 11.5
Soil reaction—slightly acid or neutral

Lower 2Bwb horizon:

Color (dry)—10YR 5/3, 6/3, 6/4, 7/3; 2.5Y 5/3, 5/4, 6/4, 7/3
Color (moist)—10YR 4/2, 4/3, 3/4, 4/4; 2.5Y 4/2
Texture—extremely stony medial sandy loam, extremely bouldery medial sandy loam
Clay content—3 to 8 percent
Rock fragments—0 to 10 percent fine gravel, 10 to 20 percent medium and coarse gravel, 15 to 25 percent total gravel, 5 to 15 percent cobbles, 15 to 25 percent stones, 10 to 40 percent boulders, 60 to 88 percent total rock fragments
Organic matter—0.5 to 2 percent
Base saturation by ammonium acetate—25 to 35 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—2.2 to 3.5
P retention—90 to 100 percent
Glass content—4 to 14 percent
NaF pH—10.6 to 10.9
Soil reaction—slightly acid to slightly alkaline



Figure 103.—Typical profile of Terracelake soil. Depth is marked in centimeters.

Terracelake Series

The Terracelake series consists of moderately deep, well drained soils that formed in tephra over or mixed with colluvium and residuum from volcanic rock. Terracelake soils are on glaciated volcanic domes, glaciated mountain slopes, glaciated lava flows, scoured glacial-valley walls and floors, and roche moutonnées in the Southern Cascade Mountains. Slopes range from 1 to 95 percent. The mean annual precipitation is about 99 inches (2,515 millimeters), and the mean annual air temperature is about 41 degrees F (5 degrees C).

Taxonomic Classification

Ashy-skeletal, amorphic Xeric Vitricryands

Typical Pedon

Terracelake gravelly ashy sandy loam (fig. 103) on a south-facing (195 degrees) slope of 34 percent under a cover of pinemat manzanita at an elevation of 7,590 feet (2,313 meters). When described on 8/1/2007, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

Oi—0 to 1 inch (0 to 3 centimeters); leaf and twig litter; abrupt smooth boundary.

A—1 to 3 inches (3 to 7 centimeters); dark grayish brown (10YR 4/2) gravelly ashy sandy loam, very dark brown (10YR 2/2) moist; 3 percent clay; moderate thick and very thick platy structure parting to moderate coarse granular; many very fine and fine roots; common very fine and fine tubular and many very fine and fine irregular

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- pores; 12 percent subangular fine gravel and 5 percent subangular medium and coarse gravel; strongly acid, pH 5.5 by Hellige-Truog; NaF pH 9.2; abrupt smooth boundary.
- 2Ab—3 to 7 inches (7 to 18 centimeters); brown (10YR 5/3) gravelly ashy sandy loam, brown (10YR 4/3) moist; 4 percent clay; weak very fine to medium subangular blocky structure parting to single grain; many very fine to coarse roots; many very fine and fine irregular, many very fine tubular, and few medium tubular pores; 15 percent subangular fine gravel and 18 percent subangular medium and coarse gravel; moderately acid, pH 6.0 by Hellige-Truog; NaF pH 11.5; abrupt smooth boundary.
- 2Bwb1—7 to 19 inches (18 to 49 centimeters); pale brown (10YR 6/3) very gravelly ashy fine sandy loam, brown (10YR 4/3) moist; 5 percent clay; weak very fine and fine subangular blocky structure parting to single grain; many very fine and fine, common medium, and many coarse and very coarse roots; many very fine and fine irregular and common very fine tubular pores; 13 percent subangular fine gravel, 27 percent subangular medium and coarse gravel, and 15 percent subangular cobbles; slightly acid, pH 6.3 by Hellige-Truog; NaF pH 11.7; abrupt irregular boundary.
- 2Bwb2—19 to 24 inches (49 to 62 centimeters); very pale brown (10YR 7/3) extremely gravelly ashy fine sandy loam, dark yellowish brown (10YR 4/4) moist; 6 percent clay; weak very fine to medium subangular blocky structure parting to single grain; many very fine and fine, common medium, and many coarse and very coarse roots; many very fine and fine interstitial and irregular and common fine tubular pores; 15 percent subangular fine gravel, 25 percent subangular medium and coarse gravel, 20 percent subangular cobbles, and 2 percent subangular stones; slightly acid, pH 6.3 by Hellige-Truog; NaF pH 11.4; abrupt wavy boundary.
- 2Bqb—24 to 37 inches (62 to 95 centimeters); pale brown (10YR 6/3) extremely stony ashy sandy loam, brown (10YR 4/3) moist; 3 percent clay; massive; common very fine and fine roots between rock fragments; common very fine to medium irregular pores; 10 percent threadlike silica masses around rock fragments; 7 percent subangular fine gravel, 27 percent subangular medium and coarse gravel, 15 percent subangular cobbles, and 40 percent subangular stones; slightly acid, pH 6.3 by Hellige-Truog; NaF pH 11.4; abrupt wavy boundary.
- 2R—37 inches (95 centimeters); dacite bedrock.

Type Location

Shasta County, California; about 1 mile east-northeast of the Kings Creek Picnic Area, approximately 1,450 feet south and 500 feet east of the northwest corner of sec. 17, T. 30 N., R. 5 E.; 40 degrees 27 minutes 51 seconds north latitude and 121 degrees 27 minutes 26 seconds west longitude, NAD83; USGS Quad: Reading Peak, California.

Range in Characteristics

Depth to restrictive feature: 20 to 40 inches (51 to 102 centimeters) to lithic contact

Mean annual soil temperature: 40 to 43 degrees F (4 to 6 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (thickest part): 3 to 6 percent clay and 60 to 89 percent rock fragments

Surface fragments: 0 to 75 percent gravel, 3 to 30 percent cobbles, 0 to 25 percent stones, and 0 to 20 percent boulders

A horizon:

Color (dry)—10YR 3/2, 4/2, 5/2, 6/2, 6/3; 2.5Y 4/2

Color (moist)—10YR 3/1, 2/2, 3/2, 4/2, 4/3

Texture—ashy loamy very fine sand, ashy loamy coarse sand, gravelly ashy loamy coarse sand, ashy very fine sandy loam, gravelly ashy fine sandy loam, gravelly

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ashy sandy loam, very gravelly ashy fine sandy loam, very gravelly ashy sandy loam, very bouldery ashy sandy loam
Clay content—2 to 6 percent
Rock fragments—0 to 27 percent fine gravel, 0 to 23 percent medium and coarse gravel, 0 to 50 percent total gravel, 0 to 35 percent cobbles, 0 to 10 percent stones, 0 to 10 percent boulders, 8 to 60 percent total rock fragments
Organic matter—5.5 to 10 percent
Base saturation by ammonium acetate—3 to 20 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.35 to 0.5
P retention—20 to 30 percent
Glass content—15 to 20 percent
NaF pH—9.0 to 11.7
Soil reaction—strongly acid to slightly acid

2Ab horizon:

Color (dry)—10YR 5/2, 6/2, 5/3; 2.5Y 6/3
Color (moist)—10YR 3/2, 4/2, 4/3
Texture—gravelly ashy sandy loam, very gravelly ashy sandy loam, extremely gravelly ashy coarse sandy loam
Clay content—3 to 5 percent
Rock fragments—10 to 20 percent fine gravel, 16 to 40 percent medium and coarse gravel, 33 to 58 percent total gravel, 0 to 12 percent cobbles, 0 to 5 percent stones, 0 to 10 percent boulders, 33 to 68 percent total rock fragments
Organic matter—3 to 5 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.4 to 1.8
P retention—60 to 85 percent
Glass content—18 to 25 percent
NaF pH—10.4 to 11.5
Soil reaction—strongly acid to slightly acid

2Bwb horizon:

Color (dry)—10YR 5/4, 5/6, 6/3, 6/4, 6/6, 7/3, 7/4; 2.5Y 6/4
Color (moist)—7.5YR 4/3, 4/4; 10YR 3/3, 3/4, 3/6, 4/3, 4/4; 2.5Y 4/3
Texture—very gravelly ashy fine sandy loam, very gravelly ashy sandy loam, extremely gravelly ashy fine sandy loam, extremely gravelly ashy sandy loam, extremely gravelly ashy coarse sandy loam, very cobbly ashy fine sandy loam, extremely cobbly ashy fine sandy loam, extremely stony ashy sandy loam, ashy stones
Clay content—2 to 10 percent
Rock fragments—1 to 26 percent fine gravel, 6 to 45 percent medium and coarse gravel, 18 to 61 percent total gravel, 5 to 50 percent cobbles, 0 to 25 percent stones, 0 to 10 percent boulders, 44 to 90 percent total rock fragments
Organic matter—2 to 4 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.4 to 1.8
P retention—70 to 95 percent
Glass content—18 to 25 percent
NaF pH—10.6 to 12.0
Soil reaction—slightly acid or neutral

2Bqb horizon:

Color (dry)—10YR 6/3, 7/2; 7.5YR 8/3
Color (moist)—10YR 4/3, 5/3; 7.5YR 5/4
Texture—very gravelly ashy loamy sand, extremely gravelly ashy coarse sandy loam, extremely stony ashy fine sandy loam, extremely stony ashy sandy loam
Clay content—2 to 9 percent

Rock fragments—5 to 35 percent fine gravel, 26 to 45 percent medium and coarse gravel, 34 to 61 percent total gravel, 0 to 20 percent cobbles, 0 to 40 percent stones, 0 to 10 percent boulders, 55 to 89 percent total rock fragments

Organic matter—0.5 to 1.5 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.4 to 1.8

P retention—70 to 95 percent

Glass content—18 to 25 percent

NaF pH—11.0 to 11.4

Soil reaction—slightly acid or neutral

Terric Haplohemists

Terric Haplohemists consist of very deep, very poorly drained soils that formed in organic material over alluvium from volcanic rocks. These soils are in fens on stream terraces. Slopes range from 1 to 5 percent. The mean annual precipitation is about 65 inches (1,651 millimeters), and the mean annual air temperature is about 42 degrees F (5 degrees C).

Taxonomic Classification

Frigid Terric Haplohemists

Typical Pedon

Terric Haplohemists muck (fig. 104) on a south-southeast-facing (160 degrees) slope of 2 percent under a cover of sedges and rushes at an elevation of 5,707 feet (1,739 meters). When described on 8/28/2008, the soil was wet throughout. A water table was at a depth of 11 inches (28 centimeters). (Colors are for dry soil unless otherwise noted.)

Oe1—0 to 5 inches (0 to 12 centimeters); very dark grayish brown (10YR 3/2) muck (hemic material), very dark gray (10YR 3/1) moist; massive; moderately hard, very friable, nonsticky, nonplastic; many very fine to medium and few coarse roots; many very fine irregular pores; 60 percent live roots; 18 percent fibers after rubbing; neutral, pH 6.6 by Hellige-Truog; NaF pH 9.0; clear smooth boundary.

Oe2—5 to 20 inches (12 to 50 centimeters); dark grayish brown (10YR 4/2) herbaceous muck (hemic material), very dark gray (10YR 3/1) moist; massive; slightly hard, very friable, nonsticky, nonplastic; many very fine to medium and few coarse roots; many very fine irregular pores; 80 percent live roots; 18 percent fibers after rubbing; slightly acid, pH 6.3 by Hellige-Truog; NaF pH 9.0; clear smooth boundary.

A1—20 to 30 inches (50 to 77 centimeters); grayish brown (10YR 5/2) ashy silty clay loam, dark grayish brown (10YR 4/2) moist; 27 percent clay; massive; moderately hard, very friable, slightly sticky, nonplastic; many very fine and common fine roots; common very fine irregular pores; moderately acid, pH 5.8 by Hellige-Truog; NaF pH 9.0; clear smooth boundary.

A2—30 to 35 inches (77 to 90 centimeters); light gray (10YR 7/1) ashy silty clay loam, dark grayish brown (10YR 4/2) moist; 22 percent clay; massive; moderately hard, very friable, nonsticky, nonplastic; many very fine, common fine, and few medium roots; common very fine irregular pores; strongly acid, pH 5.4 by Hellige-Truog; NaF pH 9.0; clear smooth boundary.

C—35 to 43 inches (90 to 110 centimeters); light gray (10YR 7/1) ashy silt loam, grayish brown (10YR 5/2) moist; 15 percent clay; massive; hard, friable, nonsticky, nonplastic; many very fine and common fine and medium roots; common very fine irregular pores; very strongly acid, pH 5.0 by Hellige-Truog; NaF pH 9.0.



Figure 104.—Typical profile of Terric Haplohemists. Depth is marked in centimeters.

Type Location

Plumas County, California; about 0.25 mile west of Drakesbad, approximately 1,500 feet north and 2,800 feet west of the southeast corner of sec. 22, T. 30 N., R. 5 E.; 40 degrees 26 minutes 38 seconds north latitude and 121 degrees 24 minutes 23 seconds west longitude, NAD83; USGS Quad: Reading Peak, California.

Range in Characteristics

Depth to restrictive feature: More than 60 inches (152 centimeters) to bedrock

Mean annual soil temperature: 45 to 47 degrees F (7 to 8 degrees C)

Soil moisture control section: Moist throughout the year

Particle-size control section (weighted average): 22 to 27 percent clay and 0 percent rock fragments

Depth to fluctuating water table: 0 to 24 inches (0 to 60 centimeters)

O_e horizon:

Color (dry)—10YR 3/2, 4/2

Color (moist)—10YR 3/1

Texture—muck, herbaceous muck

Clay content—0 percent

Rock fragments—0 percent
Organic matter—20 to 30 percent
Base saturation by ammonium acetate—40 to 50 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.3 to 0.45
P retention—35 to 50 percent
Glass content—15 to 25 percent
NaF pH—9.0
Soil reaction—slightly acid or neutral

A horizon:

Color (dry)—10YR 5/2, 7/1
Color (moist)—10YR 4/2
Texture—ashy silty clay loam
Clay content—22 to 27 percent
Rock fragments—0 percent
Organic matter—5 to 10 percent
Base saturation by ammonium acetate—45 to 60 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.3 to 0.4
P retention—30 to 45 percent
Glass content—15 to 20 percent
NaF pH—9.0
Soil reaction—strongly acid or moderately acid

C horizon:

Color (dry)—10YR 7/1
Color (moist)—10YR 5/2
Texture—ashy silt loam
Clay content—15 percent
Rock fragments—0 percent
Organic matter—3 to 5 percent
Base saturation by ammonium acetate—15 to 25 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.1 to 0.3
P retention—15 to 25 percent
Glass content—15 to 25 percent
NaF pH—9.0
Soil reaction—very strongly acid

Typic Dystroxerepts

Typic Dystroxerepts consist of shallow to deep, well drained soils that formed in colluvium and residuum from hydrothermally altered volcanic rocks. These soils are on actively eroding mountain slopes in hydrothermally altered areas. Slopes range from 10 to 80 percent. The mean annual precipitation is about 117 inches (2,972 millimeters), and the mean annual air temperature is about 39 degrees F (4 degrees C).

Taxonomic Classification

Frigid Typic Dystroxerepts

Typical Pedon

Typic Dystroxerepts gravelly sandy loam (fig. 105) on a southwest-facing (220 degrees) slope of 60 percent under a cover of mountain hemlock, western white pine, and California red fir at an elevation of 7,766 feet (2,367 meters). When described on 8/29/2007, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)



Figure 105.—Typical profile of Typic Dystroxerepts. Depth is marked in centimeters.

- A—0 to 1 inch (0 to 3 centimeters); light gray (10YR 7/2) gravelly sandy loam, pale brown (10YR 6/3) moist; 16 percent clay; weak medium platy structure parting to single grain; loose, nonsticky, moderately plastic; few very fine roots; many very fine and fine interstitial pores; 15 percent subangular fine gravel and 10 percent angular medium and coarse gravel; extremely acid, pH 4.0 by Hellige-Truog; NaF pH 9.0; abrupt wavy boundary.
- Bw1—1 to 4 inches (3 to 11 centimeters); light yellowish brown (10YR 6/4) very gravelly loam, very pale brown (10YR 7/4) moist; 25 percent clay; moderate coarse and very coarse subangular blocky structure; hard, very firm, nonsticky, moderately plastic; few very fine to medium roots; many very fine and fine interstitial and common very fine tubular pores; 25 percent subangular fine gravel and 15 percent subangular medium and coarse gravel; extremely acid, pH 4.0 by Hellige-Truog; NaF pH 9.0; clear wavy boundary.
- Bw2—4 to 11 inches (11 to 28 centimeters); light yellowish brown (10YR 6/4) extremely paragravelly clay loam, very pale brown (10YR 7/4) moist; 28 percent clay; moderate very fine to medium subangular blocky structure; hard, very firm, slightly sticky, moderately plastic; common very fine to medium and few coarse and very coarse roots; common very fine irregular and few fine tubular pores; 35 percent subangular fine paragravel and 25 percent subangular medium and coarse paragravel; extremely acid, pH 4.0 by Hellige-Truog; NaF pH 9.0; clear wavy boundary.
- BC—11 to 16 inches (28 to 40 centimeters); pinkish gray (7.5YR 7/2) and reddish yellow (7.5YR 6/8) very paragravelly loam, very pale brown (10YR 8/2) and strong brown (7.5YR 5/8) moist; 22 percent clay; moderate fine subangular blocky structure; extremely hard, slightly rigid, nonsticky, moderately plastic; many very

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fine to medium and few coarse and very coarse roots; common very fine and fine tubular pores; 25 percent subangular fine paragravel and 25 percent subangular medium and coarse paragravel; extremely acid, pH 4.0 by Hellige-Truog; NaF pH 9.0; abrupt wavy boundary.

C—16 to 20 inches (40 to 52 centimeters); strong brown (7.5YR 4/6) and pale yellow (2.5Y 8/2) extremely gravelly sandy loam, strong brown (7.5YR 4/6) and yellow (2.5Y 7/6) moist; 8 percent clay; massive; rigid, nonsticky, moderately plastic; common very fine and fine and few medium roots; 15 percent angular fine gravel and 60 percent angular medium and coarse gravel; extremely acid, pH 4.0 by Hellige-Truog; NaF pH 9.0; clear wavy boundary.

Cr—20 to 28 inches (52 to 70 centimeters); yellowish brown (10YR 5/6), pale yellow (2.5Y 8/3), yellowish brown (10YR 5/4) moist, and pale yellow (2.5Y 8/4) moist; massive; few very fine and fine roots in cracks; extremely acid, pH 4.0 by Hellige-Truog; NaF pH 9.0.

Type Location

Shasta County, California; about 0.75 mile north-northwest of Diamond Peak, approximately 2,150 feet north and 1,000 feet east of the southwest corner of sec. 15, T. 30 N., R. 4 E.; 40 degrees 27 minutes 35 seconds north latitude and 121 degrees 31 minutes 49 seconds west longitude, NAD83; USGS Quad: Lassen Peak, California.

Range in Characteristics

Depth to restrictive feature: 10 to 60 inches (25 to 152 centimeters) to paralithic contact

Mean annual soil temperature: 42 to 47 degrees F (6 to 8 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (weighted average): 10 to 20 percent clay and 55 to 75 percent rock fragments

Surface fragments: 15 to 30 percent gravel, 0 to 8 percent cobbles, and 0 to 5 percent stones

A horizon:

Color (dry)—10YR 6/3, 6/4, 7/2, 7/3, 8/2

Color (moist)—10YR 5/4, 6/3, 6/4, 7/3

Texture—gravelly sandy loam, very gravelly sandy loam

Clay content—10 to 18 percent

Rock fragments—10 to 20 percent fine gravel, 5 to 15 percent medium and coarse gravel, 20 to 35 percent total gravel

Organic matter—1 to 3 percent

Base saturation by ammonium acetate—35 to 45 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.55 to 0.62

P retention—48 to 55 percent

Glass content—0 to 1 percent

NaF pH—9.0

Soil reaction—extremely acid

Bw horizon:

Color (dry)—10YR 6/3, 6/4, 7/3, 7/4, 8/1, 8/2

Color (moist)—10YR 6/3, 6/4, 7/3, 7/4

Texture—very gravelly loam, extremely paragravelly clay loam

Clay content—23 to 30 percent

Rock fragments—20 to 40 percent fine gravel, 10 to 30 percent medium and coarse gravel, 35 to 65 percent total gravel

Organic matter—0.5 to 1.2 percent

Base saturation by ammonium acetate—8 to 35 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.58 to 1.10

P retention—65 to 95 percent

Glass content—0 to 1 percent

NaF pH—9.0

Soil reaction—extremely acid

BC horizon:

Color (dry)—7.5YR 6/8; 10YR 7/1, 7/2, 7/3, 8/1, 8/2

Color (moist)—7.5YR 5/8; 10YR 7/1, 7/2, 7/3, 8/1, 8/2

Texture—paragravelly loam, very paragravelly loam

Clay content—20 to 24 percent

Rock fragments—15 to 30 percent fine paragravel, 15 to 30 percent medium and coarse paragravel, 30 to 60 percent total paragravel

Organic matter—0 to 0.8 percent

Base saturation by ammonium acetate—8 to 15 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.95 to 1.10

P retention—90 to 95 percent

Glass content—0 to 1 percent

NaF pH—9.0

Soil reaction—extremely acid

C horizon:

Color (dry)—7.5YR 4/6; 10YR 5/6; 2.5Y 8/2, 8/3

Color (moist)—7.5YR 4/6; 10YR 5/4; 2.5Y 7/6, 8/3, 8/4

Texture—extremely paragravelly sandy loam

Clay content—2 to 8 percent

Rock fragments—10 to 50 percent fine paragravel, 50 to 80 percent medium and coarse paragravel, 60 to 89 percent total paragravel

Organic matter—0 to 0.4 percent

Base saturation by ammonium acetate—0 to 10 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.95 to 1.10

P retention—90 to 95 percent

Glass content—0 to 1 percent

NaF pH—9.0

Soil reaction—extremely acid

Typic Dystroxerepts, landslides

Typic Dystroxerepts, landslides consist of very deep, well drained soils that formed in colluvium from hydrothermally altered volcanic rocks. These soils are on landslide deposits. Slopes range from 10 to 50 percent. The mean annual precipitation is about 105 inches (2,667 millimeters), and the mean annual air temperature is about 39 degrees F (4 degrees C).

Taxonomic Classification

Frigid Typic Dystroxerepts

Typical Pedon

Typic Dystroxerepts, landslides, ashy fine sandy loam (fig. 106) on an east-facing (100 degrees) slope of 10 percent under a cover of California red fir and mountain hemlock at an elevation of 7,350 feet (2,240 meters). When described on 10/24/2007, the soil was very slightly moist from the surface to a depth of 37 inches (94 centimeters) and dry to a depth of 60 inches (152 centimeters).



Figure 106.—Typical profile of Typic Dystrochrepts, landslides. Depth is marked in centimeters.

O_i—0 to 2 inches (0 to 4 centimeters); slightly decomposed cones, needles, and twig litter; abrupt wavy boundary.

A—2 to 5 inches (4 to 12 centimeters); grayish brown (10YR 5/2) ashy fine sandy loam, very dark grayish brown (10YR 3/2) moist; 13 percent clay; moderate

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coarse subangular blocky structure parting to weak very fine and fine subangular blocky; soft, very friable, nonsticky, nonplastic; common very fine to medium and few very coarse roots; few very fine and fine tubular and many very fine and fine irregular pores; 5 percent subangular fine gravel and 2 percent subangular medium and coarse gravel; very strongly acid, pH 5.0 by Hellige-Truog; NaF pH 10.0; clear wavy boundary.

Bw1—5 to 15 inches (12 to 38 centimeters); very pale brown (10YR 7/3) very stony sandy clay loam, yellowish brown (10YR 5/4) moist; 22 percent clay; weak very fine to medium subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; common very fine to medium and few coarse and few very coarse roots; many very fine and fine interstitial and few fine and medium tubular pores; 9 percent subangular fine gravel, 12 percent subangular medium and coarse gravel, 5 percent subangular cobbles, and 10 percent subangular stones; extremely acid, pH 4.3 by Hellige-Truog; NaF pH 9.0; clear smooth boundary.

Bw2—15 to 23 inches (38 to 58 centimeters); very pale brown (10YR 7/4) very stony sandy clay loam, yellowish brown (10YR 5/4) moist; 24 percent clay; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; few very fine and fine and common medium to very coarse roots; many very fine and fine vesicular and irregular pores; 13 percent subangular fine gravel, 19 percent subangular medium and coarse gravel, 5 percent subangular cobbles, and 10 percent subangular stones; extremely acid, pH 4.3 by Hellige-Truog; NaF pH 9.0; abrupt wavy boundary.

Bw3—23 to 41 inches (58 to 105 centimeters); very pale brown (10YR 7/3) very stony sandy clay loam, yellowish brown (10YR 5/4) moist; 26 percent clay; moderate coarse subangular blocky structure parting to weak very fine and fine subangular blocky; hard, very firm, slightly sticky, moderately plastic; few very fine, common fine and medium, and few coarse and very coarse roots; few very fine and fine tubular and many very fine and fine vesicular and irregular pores; 6 percent subangular fine gravel, 15 percent subangular medium and coarse gravel, 8 percent subangular cobbles, and 15 percent subangular stones; very strongly acid, pH 4.5 by Hellige-Truog; NaF pH 9.0; clear wavy boundary.

BC—41 to 60 inches (105 to 152 centimeters); very pale brown (10YR 7/3) very stony sandy clay loam, yellowish brown (10YR 5/4) moist; 28 percent clay; massive; hard, very firm, slightly sticky, moderately plastic; few fine, medium, and very coarse roots; few very fine and fine tubular and many very fine and fine vesicular and irregular pores; 8 percent subangular fine gravel, 4 percent subangular medium and coarse gravel, 10 percent subangular cobbles, and 15 percent subangular stones; very strongly acid, pH 4.6 by Hellige-Truog; NaF pH 9.0.

Type Location

Tehama County, California; about 0.6 mile northwest of the Southwest Entrance Station to Lassen Volcanic National Park, approximately 750 feet south and 2,300 feet east of the northwest corner of sec. 28, T. 30 N., R. 4 E.; 40 degrees 26 minutes 10 seconds north latitude and 121 degrees 32 minutes 42 seconds west longitude, NAD83; USGS Quad: Lassen Peak, California.

Range in Characteristics

Depth to restrictive feature: More than 60 inches (152 centimeters) to bedrock

Mean annual soil temperature: 42 to 47 degrees F (6 to 8 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (weighted average): 7 to 31 percent clay and 35 to 77 percent rock fragments

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Surface fragments: 8 to 20 percent gravel, 5 to 15 percent cobbles, 2 to 20 percent stones, and 5 to 20 percent boulders

A horizon:

Color (dry)—7.5YR 5/2; 10YR 5/2, 5/3, 6/4
Color (moist)—7.5YR 3/2; 10YR 3/2, 4/3, 5/4
Texture—ashy fine sandy loam, ashy clay loam, very gravelly ashy sandy loam, very gravelly ashy clay loam
Clay content—8 to 30 percent
Rock fragments—2 to 25 percent fine gravel, 2 to 23 percent medium and coarse gravel, 4 to 40 percent total gravel, 0 to 10 percent cobbles, 4 to 42 percent total rock fragments
Organic matter—14 to 18 percent
Base saturation by ammonium acetate—35 to 45 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.55 to 0.62
P retention—48 to 55 percent
Glass content—5 to 10 percent
NaF pH—9.0 to 10.0
Soil reaction—very strongly acid to slightly acid

Bw horizon:

Color (dry)—7.5YR 5/4, 6/6; 10YR 5/3, 5/4, 6/3, 7/3, 7/4, 8/1
Color (moist)—7.5YR 4/4, 5/6; 10YR 4/3, 4/4, 5/3, 5/4, 6/4, 7/3, 8/1
Texture—clay loam, very gravelly clay loam, very gravelly sandy clay loam, extremely gravelly sandy loam, extremely gravelly sandy clay loam, extremely paragravelly clay loam, extremely cobbly sandy loam, extremely cobbly clay loam, very stony sandy clay loam
Clay content—7 to 38 percent
Rock fragments—2 to 30 percent fine gravel, 10 to 45 percent medium and coarse gravel, 12 to 65 percent total gravel, 5 to 30 percent cobbles, 0 to 15 percent stones, 0 to 10 percent boulders, 12 to 78 percent total rock fragments
Organic matter—0.9 to 2.3 percent
Base saturation by ammonium acetate—16 to 35
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.58 to 0.82
P retention—65 to 80 percent
Glass content—0 to 1 percent
NaF pH—9.0 to 9.8
Soil reaction—extremely acid to slightly acid

BC horizon:

Color (dry)—10YR 7/2, 7/3, 8/3
Color (moist)—7.5YR 4/4; 10YR 5/3, 5/4
Texture—very stony sandy clay loam, extremely stony sandy loam
Clay content—4 to 28 percent
Rock fragments—6 to 9 percent fine gravel, 4 to 21 percent medium and coarse gravel, 10 to 30 percent total gravel, 10 to 20 percent cobbles, 15 to 20 percent stones, 0 to 10 percent boulders, 35 to 87 percent total rock fragments
Organic matter—0.5 to 1.2 percent
Base saturation by ammonium acetate—8 to 15 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.95 to 1.10
P retention—90 to 95 percent
Glass content—0 to 1 percent
NaF pH—9.0
Soil reaction—very strongly acid to neutral



Figure 107.—Typical profile of Typic Endoaquands. Depth is marked in centimeters.

Typic Endoaquands

Typic Endoaquands consist of deep and very deep, poorly drained soils that formed in alluvium and glaciolacustrine deposits from volcanic rocks. These soils are on stream terraces and lake terraces. Slopes range from 0 to 30 percent. The mean annual precipitation is about 61 inches (1,549 millimeters), and the mean annual air temperature is about 41 degrees F (5 degrees C).

Taxonomic Classification

Frigid Typic Endoaquands

Typical Pedon

Typic Endoaquands gravelly medial sandy loam (fig. 107) on an east-northeast-facing (60 degrees) slope of 3 percent under a cover of lodgepole pine, corn lily, yarrow, moss, clover, currant, apiaceae, dandelion, and timothy grass at an elevation of 6,524

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feet (1,989 meters). When described on 6/21/2007, the soil was moist from the surface to a depth of 33 inches (84 centimeters) and saturated below that. A water table was at a depth of 33 inches (84 centimeters). (Colors are for dry soil unless otherwise noted.)

- Oi—0 to 2 inches (0 to 4 centimeters); slightly decomposed grass, needles, and twig litter; abrupt smooth boundary.
- Oa—2 to 3 inches (4 to 7 centimeters); grayish brown (10YR 5/2) muck, very dark gray (10YR 3/1) moist; 8 percent clay; soft, very friable, nonsticky, nonplastic; many very fine and fine roots; 2 percent subrounded fine gravel and 2 percent subrounded medium and coarse gravel; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 9.0; abrupt smooth boundary.
- A1—3 to 11 inches (7 to 27 centimeters); grayish brown (10YR 5/2) gravelly medial sandy loam, very dark grayish brown (10YR 3/2) moist; 12 percent clay; moderate fine to coarse subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine and fine and few medium roots; many very fine and fine tubular and interstitial and common medium tubular pores; 10 percent subrounded fine gravel and 10 percent subrounded medium and coarse gravel; moderately acid, pH 5.7 by Hellige-Truog; NaF pH 10.5; clear wavy boundary.
- A2—11 to 17 inches (27 to 44 centimeters); grayish brown (10YR 5/2) gravelly medial sandy loam, dark brown (10YR 3/3) moist; 15 percent clay; moderate fine and medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine and fine and few medium roots; common very fine and fine interstitial and tubular and few medium tubular pores; 10 percent subrounded fine gravel and 10 percent subrounded medium and coarse gravel; moderately acid, pH 5.8 by Hellige-Truog; NaF pH 11.0; abrupt wavy boundary.
- Bw—17 to 29 inches (44 to 73 centimeters); pale brown (10YR 6/3) gravelly medial sandy loam, dark grayish brown (10YR 4/2) moist; 15 percent clay; moderate fine to coarse subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine and fine and few medium roots; common very fine and fine interstitial and tubular and few medium tubular pores; 10 percent subrounded fine gravel and 15 percent subrounded medium and coarse gravel; moderately acid, pH 6.0 by Hellige-Truog; NaF pH 11.5; abrupt wavy boundary.
- C1—29 to 52 inches (73 to 133 centimeters); very pale brown (10YR 7/3) extremely gravelly medial coarse sandy loam, brown (10YR 4/3) moist; 2 percent clay; single grain; loose, nonsticky, nonplastic; common very fine and fine roots; many very fine to coarse interstitial pores; 10 percent reddish yellow (7.5YR 6/8), dry, masses of oxidized iron around rock fragments; 20 percent subrounded fine gravel, 40 percent subrounded medium and coarse gravel, and 10 percent subrounded cobbles; slightly acid, pH 6.2 by Hellige-Truog; NaF pH 11.3; abrupt smooth boundary.
- C2—52 to 57 inches (133 to 145 centimeters); very pale brown (10YR 7/3) extremely gravelly medial loamy coarse sand, brown (10YR 4/3) moist; 1 percent clay; single grain; loose, nonsticky, nonplastic; few very fine roots; many very fine to coarse interstitial pores; 25 percent reddish yellow (7.5YR 6/8), dry, masses of oxidized iron around rock fragments; 25 percent subrounded fine gravel, 25 percent subrounded medium and coarse gravel, and 10 percent subrounded cobbles; slightly acid, pH 6.2 by Hellige-Truog; NaF pH 11.3.

Type Location

Shasta County, California; about 0.78 mile east of Hat Lake, approximately 1,600 feet east and 1,400 feet south of the northwest corner of sec. 32, T. 31 N., R. 5 E.; 40 degrees 30 minutes 30 seconds north latitude and 121 degrees 27 minutes 4 seconds west longitude, NAD83; USGS Quad: West Prospect Peak, California.

Range in Characteristics

Depth to restrictive feature: 40 to more than 60 inches (102 to more than 152 centimeters) to duripan or petroferric contact

Mean annual soil temperature: 41 to 43 degrees F (5 to 6 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days) in upper part of the profile

Particle-size control section (thickest part): 12 to 15 percent clay and 18 to 25 percent rock fragments

Surface fragments: 0 to 5 percent gravel

Fluctuating water table (if it occurs): 0 to 60 inches (152 centimeters)

Other characteristics: Some pedons have Bq, Bqm, or Bsm horizons below the Bw horizons

A horizon:

Color (dry)—10YR 4/2, 5/2, 5/3, 6/3, 7/3

Color (moist)—10YR 2/2, 3/2, 3/3, 3/4, 4/3, 4/4

Texture—medial very fine sandy loam, gravelly medial very fine sandy loam, gravelly medial sandy loam, medial fine sandy loam, medial sandy loam

Clay content—6 to 15 percent

Rock fragments—1 to 15 percent fine gravel, 0 to 15 percent medium and coarse gravel, 2 to 25 percent total gravel

Organic matter—4 to 6 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.5 to 2.5

P retention—80 to 90 percent

Glass content—15 to 25 percent

NaF pH—9.6 to 11.4

Soil reaction—strongly acid to slightly acid

Bw horizon:

Color (dry)—10YR 6/3, 6/4

Color (moist)—10YR 4/2, 4/3, 4/4

Texture—medial sandy loam, gravelly medial sandy loam, gravelly medial fine sandy loam, extremely gravelly medial sandy loam, very cobbly medial very fine sandy loam, stony medial very fine sandy loam

Clay content—8 to 15 percent

Rock fragments—2 to 15 percent fine gravel, 2 to 40 percent medium and coarse gravel, 5 to 55 percent total gravel, 0 to 25 percent cobbles, 0 to 15 percent stones, 5 to 80 percent total rock fragments

Organic matter—2.5 to 4 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—2.0 to 2.5

P retention—80 to 95 percent

Glass content—15 to 25 percent

NaF pH—11.0 to 11.5

Soil reaction—moderately acid or slightly acid

C horizon:

Color (dry)—10YR 7/3

Color (moist)—10YR 4/3

Texture—very gravelly medial sandy loam, extremely gravelly medial coarse sandy loam, extremely gravelly medial loamy coarse sand

Clay content—1 to 3 percent

Rock fragments—15 to 30 percent fine gravel, 20 to 45 percent medium and coarse gravel, 35 to 70 percent total gravel, 5 to 15 percent cobbles, 40 to 85 percent total rock fragments

Organic matter—0.5 to 1.5 percent



Figure 108.—Typical profile of Typic Endoaquents. Depth is marked in centimeters.

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.5 to 2.5
P retention—50 to 70 percent
Glass content—15 to 25 percent
NaF pH—11.3 to 11.5
Soil reaction—slightly acid

Typic Endoaquents

Typic Endoaquents consist of very deep, poorly drained soils that formed in alluvium redeposited from debris flows. These soils are on flood plains. Slopes range from 0 to 8 percent. The mean annual precipitation is about 71 inches (180 millimeters), and the mean annual air temperature is about 40 degrees F (4 degrees C).

Taxonomic Classification

Frigid Typic Endoaquents

Typical Pedon

Typic Endoaquents extremely gravelly ashy sand (fig. 108) on a southwest-facing (234

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degrees) slope of 2 percent under a cover of lodgepole pine, a few Jeffrey pine, lupine, and buckwheat at an elevation of 6,156 feet (1,877 meters). When described on 8/7/2006, the soil was dry at a depth of 0 to 19 inches (0 to 49 centimeters), very slightly moist at a depth of 19 to 26 inches (49 to 65 centimeters), moist at a depth of 26 to 31 inches (65 to 80 centimeters), and saturated at a depth of 31 to 39 inches (80 to 98 centimeters). A water table was at a depth of 39 inches (98 centimeters). (Colors are for dry soil unless otherwise noted.)

- C1—0 to 7 inches (0 to 17 centimeters); gray (7.5YR 6/1) extremely gravelly ashy sand, dark gray (7.5YR 4/1) moist; 0 percent clay; single grain; loose, nonsticky, nonplastic; common very fine and fine and few medium roots; many very fine and fine interstitial pores; 26 percent subangular fine gravel and 37 percent subangular medium and coarse gravel; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 9.7; clear smooth boundary.
- C2—7 to 14 inches (17 to 36 centimeters); light gray (10YR 7/1) very gravelly ashy sand, dark gray (10YR 4/1) moist; 0 percent clay; single grain; loose, nonsticky, nonplastic; many very fine and fine roots; many very fine and fine interstitial pores; 27 percent subangular fine gravel, 23 percent subangular medium and coarse gravel, and 2 percent subrounded cobbles; neutral, pH 6.7 by Hellige-Truog; NaF pH 9.6; abrupt wavy boundary.
- C3—14 to 17 inches (36 to 43 centimeters); gray (10YR 6/1) ashy sand, dark gray (10YR 4/1) moist; 0 percent clay; single grain; loose, nonsticky, nonplastic; few very fine and common fine to very coarse roots; many very fine and fine interstitial pores; 6 percent subangular fine gravel, 4 percent subangular medium and coarse gravel, and 2 percent subrounded cobbles; slightly acid, pH 6.6 by Hellige-Truog; NaF pH 9.8; abrupt wavy boundary.
- C4—17 to 19 inches (43 to 49 centimeters); light gray (7.5YR 7/1) very gravelly ashy sand, grayish brown (10YR 5/2) moist; 0 percent clay; single grain; loose, nonsticky, nonplastic; few fine and medium roots; many very fine and fine interstitial pores; 20 percent subangular fine gravel and 15 percent subangular medium and coarse gravel; slightly acid, pH 6.6 by Hellige-Truog; NaF pH 9.8; abrupt smooth boundary.
- C5—19 to 26 inches (49 to 65 centimeters); gray (7.5YR 6/1) gravelly ashy sand, gray (10YR 5/1) moist; 0 percent clay; single grain; loose, nonsticky, nonplastic; few very fine to medium roots; many very fine and fine interstitial pores; 15 percent subangular fine gravel and 7 percent subangular medium and coarse gravel; neutral, pH 6.8 by Hellige-Truog; NaF pH 9.8; abrupt smooth boundary.
- C6—26 to 31 inches (65 to 80 centimeters); gray (7.5YR 6/1) very gravelly ashy sand, gray (10YR 5/1) moist; 0 percent clay; single grain; loose, nonsticky, nonplastic; few very fine and fine roots; many very fine and fine interstitial pores; 18 percent subrounded fine gravel, 22 percent subangular medium and coarse gravel, and 2 percent subangular cobbles; neutral, pH 6.8 by Hellige-Truog; NaF pH 9.4; abrupt smooth boundary.
- C7—31 to 39 inches (80 to 98 centimeters); gray (7.5YR 6/1) extremely gravelly ashy coarse sand, gray (7.5YR 5/1) moist; 0 percent clay; single grain; loose, nonsticky, nonplastic; common fine and few medium roots; many very fine and fine interstitial pores; 25 percent subrounded fine gravel and 45 percent subangular medium and coarse gravel; neutral, pH 6.9 by Hellige-Truog; NaF pH 9.9.

Type Location

Shasta County, California; about 0.36 mile south-southeast of Hot Rock, approximately 1,900 feet west and 200 feet north of the southeast corner of sec. 14, T. 31 N., R. 4 E.; 40 degrees 31 minutes 39 seconds north latitude and 121 degrees 29 minutes 21 seconds west longitude, NAD83; USGS Quad: West Prospect Peak, California.

Range in Characteristics

Depth to restrictive feature: More than 60 inches (152 centimeters) to bedrock

Mean annual soil temperature: 43 to 45 degrees F (6 to 7 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days) in upper part of the profile

Particle-size control section (weighted average): 0 percent clay and 43 percent rock fragments

Surface fragments: 70 to 80 percent gravel, 10 to 20 percent cobbles, and 0 to 5 percent stones

Depth to fluctuating water table (if it occurs): 0 to 39 inches (0 to 99 centimeters)

Upper C horizon:

Color (dry)—7.5YR 6/1; 10YR 6/1, 7/1

Color (moist)—7.5YR 4/1; 10YR 4/1

Texture—ashy sand, very gravelly ashy sand, extremely gravelly ashy sand

Clay content—0 to 1 percent

Rock fragments—5 to 30 percent fine gravel, 2 to 40 percent medium and coarse gravel, 10 to 65 percent total gravel, 0 to 5 percent cobbles, 10 to 70 percent total rock fragments

Organic matter—0.1 to 0.3 percent

Base saturation by ammonium acetate—58 to 85 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.15 to 0.30

P retention—8 to 15 percent

Glass content—20 to 28 percent

NaF pH—9.6 to 9.8

Soil reaction—slightly acid or neutral

Lower C horizon:

Color (dry)—7.5YR 6/1, 7/1

Color (moist)—7.5YR 5/1; 10YR 5/1, 5/2

Texture—gravelly ashy sand, very gravelly ashy sand, extremely gravelly ashy coarse sand

Clay content—0 to 1 percent

Rock fragments—10 to 30 percent fine gravel, 5 to 50 percent medium and coarse gravel, 20 to 75 percent total gravel, 0 to 5 percent cobbles, 20 to 80 percent total rock fragments

Organic matter—0 to 0.1 percent

Base saturation by ammonium acetate—85 to 95 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.12 to 0.23

P retention—5 to 15 percent

Glass content—20 to 28 percent

NaF pH—9.4 to 9.9

Soil reaction—neutral

Typic Haploxerands

Typic Haploxerands consist of very deep, well drained soils that formed in colluvium over residuum from volcanic rocks. These soils are on unglaciated shield volcanoes. Slopes range from 5 to 40 percent. The mean annual precipitation is about 41 inches (1,041 millimeters), and the mean annual air temperature is about 45 degrees F (7 degrees C).

Taxonomic Classification

Frigid Typic Haploxerands



Figure 109.—Typical profile of Typic Haploxerands. Depth is marked in centimeters.

Typical Pedon

Typic Haploxerands gravelly medial sandy loam (fig. 109) on a south-facing (192 degrees) slope of 30 percent under a cover of Jeffrey pine, white fir, Douglas-fir, and

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incense cedar at an elevation of 6,221 feet (1,896 meters). When described on 5/16/2007, the soil was dry to a depth of 2 centimeters, very slightly moist at a depth of 2 to 6 centimeters, slightly moist at a depth of 6 to 113 centimeters, and moist below a depth of 113 centimeters. (Colors are for dry soil unless otherwise noted.)

- Oi—0 to 1 inch (0 to 2 centimeters); pine needles and twig litter; abrupt smooth boundary.
- A—1 to 2 inches (2 to 6 centimeters); brown (7.5YR 5/2) gravelly medial sandy loam, dark brown (7.5YR 3/2) moist; 2 percent clay; single grain; loose, nonsticky, nonplastic; common very fine and fine roots; common very fine irregular pores; 10 percent subangular fine gravel and 5 percent subangular medium and coarse gravel; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 10.0; abrupt smooth boundary.
- AB—2 to 5 inches (6 to 12 centimeters); light brown (7.5YR 6/3) gravelly medial sandy loam, brown (7.5YR 4/2) moist; 3 percent clay; single grain; loose, nonsticky, nonplastic; many very fine and fine and common medium roots; common very fine irregular pores; 10 percent subangular fine gravel and 15 percent subangular medium and coarse gravel; neutral, pH 6.7 by Hellige-Truog; NaF pH 10.5; clear smooth boundary.
- Bw1—5 to 12 inches (12 to 30 centimeters); light brown (7.5YR 6/3) very gravelly medial sandy loam, brown (7.5YR 4/3) moist; 4 percent clay; single grain; loose, nonsticky, nonplastic; many very fine to medium, common coarse, and few very coarse roots; many very fine and fine irregular and few fine tubular pores; 9 percent subangular fine gravel, 18 percent subangular medium and coarse gravel, and 10 percent subangular cobbles; slightly acid, pH 6.6 by Hellige-Truog; NaF pH 10.0; clear smooth boundary.
- Bw2—12 to 20 inches (30 to 51 centimeters); light brown (7.5YR 6/3) very cobbly medial sandy loam, brown (7.5YR 4/4) moist; 6 percent clay; weak very fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine to coarse and few very coarse roots; many very fine and fine irregular and few fine and medium tubular pores; 12 percent subangular fine gravel, 16 percent subangular medium and coarse gravel, 20 percent subangular cobbles, and 10 percent subangular stones; neutral, pH 6.7 by Hellige-Truog; NaF pH 9.8; abrupt smooth boundary.
- Bw3—20 to 30 inches (51 to 76 centimeters); light yellowish brown (10YR 6/4) very gravelly medial sandy loam, dark yellowish brown (10YR 4/4) moist; 8 percent clay; weak fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine to medium and few coarse and very coarse roots; common very fine and fine irregular and few fine tubular pores; 17 percent subangular fine gravel, 26 percent subangular medium and coarse gravel, and 15 percent subangular cobbles; neutral, pH 6.8 by Hellige-Truog; NaF pH 9.3; abrupt smooth boundary.
- Bw4—30 to 37 inches (76 to 94 centimeters); very pale brown (10YR 7/4) extremely gravelly medial sandy loam, dark yellowish brown (10YR 4/4) moist; 10 percent clay; weak fine subangular blocky structure; soft, very friable, nonsticky, nonplastic; few very fine and fine and common medium and coarse roots; common very fine and fine irregular and few fine tubular pores; 17 percent subangular fine gravel, 30 percent subangular medium and coarse gravel, 10 percent subangular cobbles, and 5 percent subangular stones; neutral, pH 6.8 by Hellige-Truog; NaF pH 9.1; abrupt wavy boundary.
- 2Bw5—37 to 44 inches (94 to 113 centimeters); very pale brown (10YR 7/4) extremely stony medial sandy loam, dark yellowish brown (10YR 4/4) moist; 12 percent clay; weak fine and medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; few very fine to coarse roots; common very fine and fine irregular

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- pores; 8 percent subangular fine gravel, 8 percent subangular medium and coarse gravel, 10 percent subangular cobbles, and 50 percent subangular stones; neutral, pH 6.8 by Hellige-Truog; NaF pH 9.1; abrupt wavy boundary.
- 2Bw6—44 to 50 inches (113 to 128 centimeters); very pale brown (10YR 7/4) extremely paragravelly medial sandy loam, yellowish brown (10YR 5/4) moist; 14 percent clay; weak fine and medium subangular blocky structure; slightly hard, friable, nonsticky, nonplastic; few very fine to coarse roots; common very fine and fine vesicular and few fine tubular pores; 30 percent subangular fine paragravel, 20 percent subangular medium and coarse paragravel, 10 percent subangular cobbles, and 5 percent subangular stones; neutral, pH 6.8 by Hellige-Truog; NaF pH 9.0; abrupt smooth boundary.
- 2BC—50 to 61 inches (128 to 155 centimeters); very pale brown (10YR 7/4) extremely paragravelly sandy loam, dark yellowish brown (10YR 4/4) moist; 12 percent clay; massive; moderately hard, firm, nonsticky, nonplastic; few very fine and fine roots; common very fine and fine vesicular pores; 30 percent subangular fine paragravel and 40 percent subangular medium and coarse paragravel; neutral, pH 7.0 by Hellige-Truog; NaF pH 9.0.

Type Location

Shasta County, California; about 0.5 mile east-northeast of the junction of Highway 89 and Highway 44, near the northwest entrance of Lassen Park, approximately 2,350 feet east and 1,400 feet north of the southwest corner of sec. 7, T. 31 N., R. 4 E.; 40 degrees 32 minutes 50 seconds north latitude and 121 degrees 34 minutes 4 seconds west longitude, NAD83; USGS Quad: Manzanita Lake, California.

Range in Characteristics

Depth to restrictive feature: More than 60 inches (152 centimeters) to bedrock

Mean annual soil temperature: 45 to 47 degrees F (7 to 8 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (thickest part): 5 to 15 percent clay and 37 to 70 percent rock fragments

Surface fragments: 5 to 10 percent gravel, 10 to 30 percent cobbles, 2 to 20 percent stones, and 2 to 20 percent boulders

A horizon:

Color (dry)—7.5YR 4/2, 4/3, 5/3; 10YR 4/3, 5/2, 5/3

Color (moist)—7.5YR 3/2, 3/3; 10YR 3/2, 3/3

Texture—medial sandy loam, gravelly medial sandy loam

Clay content—1 to 3 percent

Rock fragments—5 to 15 percent fine gravel, 5 to 10 percent medium and coarse gravel, 10 to 25 percent total gravel

Organic matter—12.0 to 15.0 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—2.10 to 2.75

P retention—80 to 95 percent

Glass content—8 to 14 percent

NaF pH—10.0 to 10.3

Soil reaction—slightly acid or neutral

AB horizon:

Color (dry)—7.5YR 6/3, 6/4; 10YR 6/3, 6/4

Color (moist)—7.5YR 4/2, 4/3, 4/4

Texture—medial sandy loam, gravelly medial sandy loam, very gravelly medial sandy loam

Clay content—2 to 5 percent

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Rock fragments—5 to 15 percent fine gravel, 8 to 20 percent medium and coarse gravel, 13 to 35 percent total gravel
Organic matter—9.7 to 12.5 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—3.00 to 4.00
P retention—90 to 100 percent
Glass content—9 to 13 percent
NaF pH—10.3 to 10.5
Soil reaction—slightly acid or neutral

Bw horizon:

Color (dry)—7.5YR 6/3, 6/4, 7/3, 7/4; 10YR 6/3, 6/4, 7/3
Color (moist)—7.5YR 4/3, 4/4; 10YR 4/4
Texture—very gravelly medial sandy loam, very cobbly medial sandy loam
Clay content—3 to 8 percent
Rock fragments—9 to 17 percent fine gravel, 16 to 26 percent medium and coarse gravel, 25 to 43 percent total gravel, 10 to 20 percent cobbles, 0 to 10 percent stones, 35 to 60 percent total rock fragments
Organic matter—4.5 to 7.5 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—4.10 to 5.50
P retention—92 to 100 percent
Glass content—9 to 21 percent
NaF pH—9.3 to 10.0
Soil reaction—slightly acid or neutral

2Bw horizon:

Color (dry)—7.5YR 7/3, 7/4; 10YR 7/3, 7/4
Color (moist)—7.5YR 4/4, 5/4; 10YR 4/4, 5/4
Texture—extremely gravelly medial sandy loam, extremely stony medial sandy loam, extremely paragravelly medial loam, extremely paragravelly medial sandy loam
Clay content—8 to 14 percent
Rock fragments—8 to 30 percent fine gravel/paragravel, 8 to 30 percent medium and coarse paragravel/gravel, 16 to 50 percent total gravel, 5 to 10 percent cobbles, 5 to 50 percent stones, 60 to 85 percent total rock fragments
Organic matter—1.0 to 4.5 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—3.65 to 4.10
P retention—90 to 100 percent
Glass content—3 to 18 percent
NaF pH—9.0 to 9.1
Soil reaction—neutral

2BC horizon:

Color (dry)—10YR 6/4, 7/4
Color (moist)—10YR 4/4, 4/6, 5/4
Texture—extremely paragravelly loam, extremely paragravelly sandy loam
Clay content—10 to 14 percent
Rock fragments—30 to 35 percent fine paragravel, 30 to 50 percent medium and coarse paragravel, 60 to 85 percent total paragravel
Organic matter—0.05 to 2.00 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—3.15 to 3.65
P retention—90 to 100 percent
Glass content—3 to 10 percent
NaF pH—9.0
Soil reaction—neutral



Figure 110.—Typical profile of Typic Petraquepts. Depth is marked in centimeters.

Typic Petraquepts

Typic Petraquepts consist of shallow to moderately deep, poorly drained soils that formed in geothermal spring alluvium from volcanic rocks. These soils are in seeps on strath terraces. Slopes range from 4 to 30 percent. The mean annual precipitation is about 63 inches (1,600 millimeters), and the mean annual air temperature is about 41 degrees F (5 degrees C).

Taxonomic Classification

Frigid Typic Petraquepts

Typical Pedon

Typic Petraquepts peaty silt loam (fig. 110) on a north-facing (15 degrees) slope of 9 percent under a cover of sedges and bluegrass at an elevation of 5,684 feet (1,732 meters). When described on 9/11/2007, the soil was moist at a depth of 0 to 25 inches (64 centimeters) and saturated at a depth of 25 to 33 inches (64 to 83 centimeters). A water table was at a depth of 25 inches (64 centimeters). (Colors are for dry soil unless otherwise noted.)

A1—0 to 2 inches (0 to 6 centimeters); grayish brown (10YR 5/2) peaty silt loam, very dark gray (10YR 3/1) moist; 10 percent clay; moderate fine and medium granular structure; slightly hard, friable, slightly sticky, slightly plastic; many very fine to coarse roots; many very fine and fine irregular pores; 2 percent subangular fine

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- gravel; slightly acid, pH 6.6 by Hellige-Truog; NaF pH 9.0; abrupt smooth boundary.
- A2—2 to 7 inches (6 to 19 centimeters); light brownish gray (10YR 6/2) mucky silt loam, very dark grayish brown (10YR 3/2) moist; 12 percent clay; massive; slightly hard, friable, slightly sticky, slightly plastic; many fine and medium roots; many very fine and fine irregular pores; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 9.0; clear smooth boundary.
- Cg1—7 to 12 inches (19 to 30 centimeters); light gray (10YR 7/1) gravelly ashy loam, dark grayish brown (10YR 4/2) moist; 16 percent clay; massive; slightly hard, friable, slightly sticky, slightly plastic; common fine and medium roots; common very fine and fine irregular pores; 10 percent subangular fine gravel and 7 percent subangular medium and coarse gravel; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 9.0; abrupt smooth boundary.
- Cg2—12 to 19 inches (30 to 49 centimeters); white (10YR 8/1) ashy loam, gray (10YR 5/1) moist; 22 percent clay; massive; slightly hard, friable, slightly sticky, slightly plastic; common fine and medium roots; common very fine and fine irregular and tubular pores; 8 percent subangular fine gravel and 4 percent subangular medium and coarse gravel; slightly alkaline, pH 7.8 by Hellige-Truog; NaF pH 9.0; clear smooth boundary.
- Cg3—19 to 25 inches (49 to 64 centimeters); white (10YR 8/1) gravelly ashy loam, gray (10YR 6/1) moist; 24 percent clay; massive; slightly hard, friable, slightly sticky, slightly plastic; common fine and medium roots; common very fine and fine tubular and irregular pores; 15 percent subangular fine gravel and 5 percent subangular medium and coarse gravel; slightly alkaline, pH 7.7 by Hellige-Truog; NaF pH 9.0; abrupt smooth boundary.
- Bqgm—25 to 33 inches (64 to 83 centimeters); white (10YR 8/1) cemented very gravelly ashy loam, light gray (10YR 7/1) moist; 18 percent clay; massive; very hard, extremely firm, moderately cemented, slightly sticky, slightly plastic; few very fine and fine roots at the top of horizon; few very fine and fine tubular and irregular pores; 20 percent silica masses; 10 percent subangular fine gravel and 30 percent subangular medium and coarse gravel; moderately alkaline, pH 8.0 by Hellige-Truog; NaF pH 9.0.

Type Location

Plumas County, California; about 0.19 mile southeast of Drakesbad, approximately 800 feet north and 1,400 feet west of the southeast corner of sec. 22, T. 30 N., R. 5 E.; 40 degrees 26 minutes 31 seconds north latitude and 121 degrees 24 minutes 5 seconds west longitude, NAD83; USGS Quad: Reading Peak, California.

Range in Characteristics

Depth to restrictive feature: 10 to 40 inches (25 to 102 centimeters) to duripan

Mean annual soil temperature: 38 to 43 degrees F (3.5 to 6 degrees C)

Soil moisture control section: Moist throughout the year

Particle-size control section (weighted average): 22 to 24 percent clay and 10 to 20 percent rock fragments

Depth to fluctuating water table (if it occurs): 0 to 30 inches (0 to 76 centimeters)

A horizon:

Color (dry)—10YR 5/2, 6/2

Color (moist)—10YR 3/1, 3/2

Texture—peaty silt loam, mucky silt loam

Clay content—10 to 12 percent

Rock fragments—0 to 5 percent fine gravel

Organic matter—11 to 30 percent

Base saturation by ammonium acetate—40 to 50 percent

Glass content—15 to 25 percent
NaF pH—9.0
Soil reaction—slightly acid or neutral

Upper Cg horizon:

Color (dry)—10YR 7/1
Color (moist)—10YR 4/2
Texture—gravelly ashy loam
Clay content—15 to 17 percent
Rock fragments—10 to 15 percent fine gravel, 5 to 10 percent medium and coarse gravel, 15 to 25 percent total gravel
Organic matter—3 to 5 percent
Glass content—15 to 25 percent
NaF pH—9.0
Soil reaction—slightly acid to moderately alkaline

Lower Cg horizon:

Color (dry)—10YR 8/1
Color (moist)—10YR 5/1, 6/1, 7/1
Texture—gravelly ashy loam, ashy loam
Clay content—20 to 24 percent
Rock fragments—5 to 20 percent fine gravel, 2 to 10 percent medium and coarse gravel, 10 to 30 percent total gravel
Organic matter—1 to 5 percent
Glass content—15 to 25 percent
NaF pH—9.0
Soil reaction—slightly acid to moderately alkaline

Bqgm horizon:

Color (dry)—10YR 8/1
Color (moist)—10YR 7/1
Texture—cemented very gravelly ashy loam
Clay content—16 to 20 percent
Rock fragments—5 to 15 percent fine gravel, 25 to 35 percent medium and coarse gravel, 35 to 50 percent total gravel
Organic matter—1 to 3 percent
Glass content—15 to 25 percent
NaF pH—9.0
Rupture resistance—very weakly cemented to strongly cemented
Soil reaction—moderately alkaline

Typic Petraquepts, bedrock

Typic Petraquepts, bedrock consist of shallow to moderately deep, poorly drained soils that formed in colluvium from volcanic rocks. These soils are in seeps on glacial-valley walls and floors. Slopes range from 2 to 45 percent. The mean annual precipitation is about 65 inches (1,651 millimeters), and the mean annual air temperature is about 42 degrees F (5 degrees C).

Taxonomic Classification

Typic Petraquepts

Typical Pedon

Typic Petraquepts, bedrock, very bouldery ashy loamy sand (fig. 111) on a south-southeast facing (152 degrees) slope of 40 percent under a cover of sedges and



Figure 111.—Typical profile of Typic Petraquepts, bedrock. Depth is marked in centimeters.

grasses at an elevation of 5,785 feet (1,763 meters). When described on 9/12/2007, the soil was saturated throughout. A water table was at a depth of 4 inches (10 centimeters). (Colors are for dry soil unless otherwise noted.)

- Oi1—0 to 2 inches (0 to 4 centimeters); slightly decomposed roots and leaf litter; many very fine to medium roots; abrupt smooth boundary.
- Oi2—2 to 7 inches (4 to 18 centimeters); extremely gravelly slightly decomposed roots and leaf litter; many very fine to medium and few coarse roots; 20 percent angular fine gravel, 40 percent subangular medium and coarse gravel, 15 percent angular cobbles, and 5 percent angular stones; clear smooth boundary.
- Ag1—7 to 13 inches (18 to 33 centimeters); grayish brown (10YR 5/2) very bouldery ashy loamy sand, very dark gray (10YR 3/1) moist; 1 percent clay; single grain; loose, nonsticky, nonplastic; common very fine and fine and few medium roots; many very fine and fine interstitial pores; 7 percent angular fine gravel, 14 percent

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subangular medium and coarse gravel, 15 percent angular cobbles, 5 percent angular stones, and 10 percent angular boulders; slightly acid, pH 6.6 by Hellige-Truog; NaF pH 9.0; clear smooth boundary.

Ag2—13 to 28 inches (33 to 71 centimeters); gray (10YR 5/1) extremely bouldery ashy coarse sandy loam, very dark gray (10YR 3/1) moist; 2 percent clay; single grain; loose, nonsticky, nonplastic; common very fine and fine and few medium roots; many very fine to medium interstitial pores; 6 percent angular fine gravel, 17 percent subangular medium and coarse gravel, 20 percent angular cobbles, 10 percent angular stones, and 15 percent angular boulders; moderately acid, pH 6.0 by Hellige-Truog; NaF pH 9.0; clear smooth boundary.

Cg—28 to 35 inches (71 to 89 centimeters); light gray (10YR 7/1) extremely bouldery ashy loamy coarse sand, very dark grayish brown (10YR 3/2) moist; 1 percent clay; single grain; loose, nonsticky, nonplastic; few very fine and fine roots; many very fine to medium interstitial pores; 20 percent angular fine gravel, 20 percent subangular medium and coarse gravel, 20 percent angular cobbles, 10 percent angular stones, and 15 percent angular boulders; neutral, pH 6.7 by Hellige-Truog; NaF pH 9.0; abrupt irregular boundary.

R—35 inches (89 centimeters); indurated dacite bedrock.

Type Location

Plumas County, California; about 0.38 mile west of Drakesbad, approximately 2,500 feet east and 2,000 feet north of southwest corner of sec. 22, T. 30 N., R. 5 E.; 40 degrees 26 minutes 42 seconds north latitude and 121 degrees 24 minutes 39 seconds west longitude, NAD83; USGS Quad: Reading Peak, California.

Range in Characteristics

Depth to restrictive feature: 10 to 40 inches (25 to 102 centimeters) to lithic contact

Mean annual soil temperature: 38 to 43 degrees F (3.5 to 6 degrees C)

Soil moisture control section: Moist throughout the year

Particle-size control section (weighted average): 1 to 3 percent clay and 40 to 85 percent rock fragments

Surface fragments: 1 to 3 percent stones and 1 to 3 percent boulders

Depth to fluctuating water table (if it occurs): From the soil surface to bedrock

Ag horizon:

Color (dry)—10YR 5/2, 6/1, 6/2

Color (moist)—10YR 3/1

Texture—very bouldery ashy loamy sand, extremely bouldery ashy coarse sandy loam, very cobbly ashy loamy sand, extremely cobbly ashy coarse sandy loam

Clay content—1 to 3 percent

Rock fragments—5 to 10 percent fine gravel, 10 to 20 percent medium and coarse gravel, 15 to 30 percent total gravel, 15 to 20 percent cobbles, 5 to 15 percent stones, 10 to 20 percent boulders, 45 to 80 percent total rock fragments

Organic matter—5 to 20 percent

Base saturation by ammonium acetate—40 to 50 percent

Glass content—15 to 25 percent

NaF pH—9.0 to 9.6

Soil reaction—moderately acid to neutral

Cg horizon:

Color (dry)—10YR 6/1, 7/1

Color (moist)—10YR 2/2, 3/2

Texture—extremely bouldery ashy loamy coarse sand

Clay content—0 to 2 percent

Rock fragments—15 to 25 percent fine gravel, 15 to 25 percent medium and

coarse gravel, 35 to 45 percent total gravel, 15 to 25 percent cobbles, 5 to 15 percent stones, 10 to 20 percent boulders, 60 to 88 percent total rock fragments

Organic matter—1 to 3 percent

Glass content—15 to 25 percent

NaF pH—9.0 to 9.6

Soil reaction—slightly acid or neutral

Typic Psammaquents

Typic Psammaquents consist of very deep, poorly drained soils that formed in alluvium redeposited from debris flows formed from volcanic rocks. These soils are on flood plains. Slopes range from 0 to 3 percent. The mean annual precipitation is about 45 inches (1,143 millimeters), and the mean annual air temperature is about 44 degrees F (6.5 degrees C).

Taxonomic Classification

Frigid Typic Psammaquents

Typical Pedon

Typic Psammaquents ashy fine sand on a west-facing (260 degrees) slope of 2 percent under a cover of willows, rushes, grasses, and sedges at an elevation of 5,893 feet (1,796 meters). When described on 8/6/07, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

Oi—0 to 1 inch (0 to 3 centimeters); slightly decomposed leaves, twigs, and bark; abrupt smooth boundary.

C—1 to 4 inches (3 to 9 centimeters); light brownish gray (10YR 6/2) ashy fine sand, dark grayish brown (10YR 4/2) moist; 1 percent clay; weak coarse granular structure parting to single grain; loose, nonsticky, nonplastic; few fine roots; few fine vesicular and many very fine and fine irregular and interstitial pores; 1 percent subrounded medium gravel and 2 percent subrounded fine gravel; moderately acid, pH 6.0 by Hellige-Truog; NaF pH 9.3; abrupt smooth boundary.

Ab—4 to 5 inches (9 to 13 centimeters); grayish brown (10YR 5/2) gravelly ashy loamy coarse sand, dark grayish brown (10YR 4/2) moist; 1 percent clay; single grain; loose, nonsticky, nonplastic; many very fine and fine roots; many very fine to medium interstitial pores; 15 percent subrounded fine gravel and 17 percent subrounded medium and coarse gravel; slightly acid, pH 6.3 by Hellige-Truog; NaF pH 9.0; abrupt smooth boundary.

C1—5 to 9 inches (13 to 22 centimeters); light gray (10YR 7/2) gravelly ashy coarse sand, grayish brown (10YR 5/2) moist; 0 percent clay; single grain; loose, nonsticky, nonplastic; few very fine roots; many very fine to medium interstitial pores; 15 percent subrounded fine gravel and 15 percent subrounded medium and coarse gravel; slightly acid, pH 6.4 by Hellige-Truog; NaF pH 9.5; abrupt smooth boundary.

C2—9 to 17 inches (22 to 44 centimeters); light gray (10YR 7/1) ashy sand, dark gray (10YR 4/1) moist; 0 percent clay; weak medium subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; few very fine and fine roots; common fine vesicular and many very fine and fine irregular and interstitial pores; 1 percent subangular medium gravel, 2 percent subangular fine gravel, and 3 percent subrounded cobbles; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 10.0; abrupt smooth boundary.

C3—17 to 26 inches (44 to 66 centimeters); light brownish gray (10YR 6/2) gravelly ashy coarse sand, dark grayish brown (10YR 4/2) moist; 0 percent clay; weak

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- medium and coarse subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; many very fine to coarse roots; many very fine to medium interstitial and irregular pores; 12 percent subrounded fine gravel and 13 percent subrounded medium and coarse gravel; slightly acid, pH 6.4 by Hellige-Truog; NaF pH 9.6; abrupt smooth boundary.
- C4—26 to 33 inches (66 to 85 centimeters); light gray (10YR 7/1) gravelly ashy coarse sand, grayish brown (10YR 5/2) moist; 0 percent clay; single grain; loose, nonsticky, nonplastic; few fine and medium roots; many very fine to medium interstitial pores; 5 percent subrounded medium gravel and 10 percent subrounded fine gravel; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 9.7; abrupt smooth boundary.
- C5—33 to 39 inches (85 to 99 centimeters); light gray (10YR 7/1) ashy sand, grayish brown (10YR 5/2) moist; 0 percent clay; single grain; loose, nonsticky, nonplastic; many very fine and fine interstitial pores; 2 percent subangular medium gravel and 5 percent subangular fine gravel; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 10.0; abrupt smooth boundary.
- C6—39 to 48 inches (99 to 123 centimeters); white (10YR 8/1) ashy fine sand, grayish brown (10YR 5/2) moist; 0 percent clay; massive parting to single grain; loose, nonsticky, nonplastic; few fine and very fine roots; many very fine and fine interstitial pores; 1 percent rounded fine gravel and 1 percent rounded medium gravel; slightly acid, pH 6.4 by Hellige-Truog; NaF pH 9.7; abrupt smooth boundary.
- C7—48 to 55 inches (123 to 140 centimeters); pale brown (10YR 6/3) ashy very fine sand, dark grayish brown (10YR 4/2) moist; 0 percent clay; massive; loose, nonsticky, nonplastic; common medium and coarse roots; many very fine and fine interstitial and many very fine and fine tubular pores; 20 percent coarse strong brown (7.5YR 5/6), dry, and brownish yellow (10YR 6/6), dry, masses of oxidized iron; 1 percent rounded medium gravel and 2 percent rounded fine gravel; slightly acid, pH 6.3 by Hellige-Truog; NaF pH 9.7; abrupt smooth boundary.
- C8—55 to 63 inches (140 to 160 centimeters); light gray (10YR 7/1) ashy sand, dark grayish brown (10YR 4/2) moist; 0 percent clay; single grain; loose, nonsticky, nonplastic; few coarse roots; many very fine and fine interstitial pores; 5 percent rounded fine gravel and 5 percent rounded medium and coarse gravel; slightly acid, pH 6.4 by Hellige-Truog; NaF pH 9.7.

Type Location

Shasta County, California; about 0.32 mile east of Manzanita Lake, approximately 750 feet west and 2,600 feet north of the southeast corner of sec. 18, T. 31 N., R. 4 E.; 40 degrees 32 minutes 10 seconds north latitude and 121 degrees 33 minutes 41 seconds west longitude, NAD83; USGS Quad: Manzanita Lake, California.

Range in Characteristics

Depth to restrictive feature: More than 60 inches (152 centimeters) to bedrock

Mean annual soil temperature: 45 to 47 degrees F (7 to 8 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (weighted average): 0 percent clay and 14 percent rock fragments

Surface fragments: 0 to 10 percent gravel and 0 to 2 percent cobbles

Depth to fluctuating water table (if it occurs): 0 to 60 inches (152 centimeters)

Redoximorphic features (if they occur): Masses of oxidized iron in the finer textured C horizons

Upper C horizon:

Color (dry)—10YR 6/2

Color (moist)—10YR 4/2

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Texture—ashy fine sand

Clay content—0 to 1 percent

Rock fragments—0 to 5 percent fine gravel, 0 to 5 percent medium and coarse gravel, 0 to 5 percent total gravel, 0 to 5 percent cobbles, 0 to 10 percent total rock fragments

Organic matter—0.1 to 0.3 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.2 to 0.3

P retention—10 to 15 percent

Glass content—25 to 35 percent

NaF pH—9.0 to 9.5

Soil reaction—moderately acid or slightly acid

Ab horizon:

Color (dry)—10YR 5/2

Color (moist)—10YR 4/2

Texture—gravelly ashy loamy coarse sand

Clay content—0 to 1 percent

Rock fragments—10 to 20 percent fine gravel, 10 to 20 percent medium and coarse gravel, 20 to 35 percent total gravel, 0 to 5 percent cobbles, 20 to 35 percent total rock fragments

Organic matter—0.3 to 0.5 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.2 to 0.3

P retention—10 to 15 percent

Glass content—25 to 35 percent

NaF pH—9.0 to 9.5

Soil reaction—slightly acid

Lower C horizon:

Color (dry)—10YR 6/2, 6/3, 7/1, 7/2, 8/1

Color (moist)—10YR 4/1, 4/2, 5/2

Texture—gravelly ashy coarse sand, ashy sand, ashy fine sand, ashy very fine sand

Clay content—0 to 1 percent

Rock fragments—0 to 15 percent fine gravel, 0 to 15 percent medium and coarse gravel, 0 to 30 percent total gravel, 0 to 5 percent cobbles, 0 to 30 percent rock fragments

Organic matter—0 to 0.1 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.15 to 0.25

P retention—2 to 14 percent

Glass content—15 to 21 percent

NaF pH—9.5 to 10.0

Soil reaction—slightly acid

Typic Vitrixerands

Typic Vitrixerands consist of moderately deep and deep, well drained soils that formed in debris and avalanche deposits from Lassen Peak over glacial till from volcanic rocks. These soils are on moraines. Slopes range from 3 to 60 percent. The mean annual precipitation is about 65 inches (1,651 millimeters), and the mean annual air temperature is about 40.5 degrees F (4.75 degrees C).

Taxonomic Classification

Frigid Typic Vitrixerands

Typical Pedon

Typic Vitrixerands very gravelly ashy loamy sand on a southeast-facing (136 degrees) slope of 9 percent under a cover of lupine, mountain monardella, rubber rabbitbrush, and Jeffrey pine at an elevation of 6,506 feet (1,983 meters). When described on 8/9/06, the soil was dry to a depth of 31 inches (80 centimeters) and very slightly moist at a depth of 31 to 52 inches (80 to 131 centimeters). (Colors are for dry soil unless otherwise noted.)

- A1—0 to 2 inches (0 to 6 centimeters); light brownish gray (2.5Y 6/2) very gravelly ashy loamy sand, dark grayish brown (2.5Y 4/2) moist; 3 percent clay; single grain; loose, nonsticky, nonplastic; few very fine and fine roots; many very fine interstitial pores; 14 percent subangular medium and coarse gravel and 21 percent subangular fine gravel; moderately acid, pH 6.0 by Hellige-Truog; NaF pH 10.5; clear smooth boundary.
- A2—2 to 4 inches (6 to 11 centimeters); light brownish gray (2.5Y 6/2) gravelly ashy loamy fine sand, dark grayish brown (2.5Y 4/2) moist; 2 percent clay; weak very fine granular structure parting to single grain; loose, nonsticky, nonplastic; common very fine and fine roots; many very fine and fine interstitial pores; 2 percent subangular stones, 11 percent subangular medium and coarse gravel, and 14 percent subangular fine gravel; moderately acid, pH 6.0 by Hellige-Truog; NaF pH 10.7; clear smooth boundary.
- 2Bwb1—4 to 8 inches (11 to 21 centimeters); pale brown (10YR 6/3) gravelly ashy loamy fine sand, brown (10YR 4/3) moist; 4 percent clay; weak fine and medium subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; few very fine and fine roots; many very fine interstitial pores; 3 percent subangular cobbles, 3 percent subangular stones, 11 percent subangular medium and coarse gravel, and 14 percent subangular fine gravel; slightly acid, pH 6.4 by Hellige-Truog; NaF pH 11.0; clear smooth boundary.
- 2Bwb2—8 to 18 inches (21 to 46 centimeters); pale brown (10YR 6/3) gravelly ashy loamy sand, brown (10YR 4/3) moist; 3 percent clay; weak medium and coarse subangular blocky structure; loose, nonsticky, nonplastic; few very fine and fine roots; common very fine and fine interstitial pores; 7 percent subangular cobbles, 11 percent subangular medium and coarse gravel, and 14 percent subangular fine gravel; slightly acid, pH 6.4 by Hellige-Truog; NaF pH 11.2; clear smooth boundary.
- 2Bwb3—18 to 31 inches (46 to 80 centimeters); very pale brown (10YR 7/3) very gravelly ashy loamy sand, brown (10YR 4/3) moist; 3 percent clay; weak medium and coarse subangular blocky structure; loose, nonsticky, nonplastic; few very fine and fine roots; common very fine and fine interstitial pores; 5 percent subangular cobbles, 13 percent subangular fine gravel, and 22 percent subangular medium and coarse gravel; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 11.4; abrupt irregular boundary.
- 2Cdq—31 to 52 inches (80 to 131 centimeters); light gray (10YR 7/1) very gravelly ashy loamy sand, gray (2.5Y 5/1) moist; 2 percent clay; massive parting to moderate coarse platy structure and single grain; very hard, extremely firm, nonsticky, nonplastic; common very fine and fine interstitial pores; 2 percent fine threadlike strong brown (7.5YR 5/8), dry, masses of oxidized iron on surfaces along pores; 2 percent silica masses on horizontal faces of peds; 5 percent subangular cobbles, 5 percent subangular stones, 14 percent subangular fine gravel, and 26 percent subangular medium and coarse gravel; neutral, pH 6.8 by Hellige-Truog; NaF pH 11.0.

Type Location

Shasta County, California; about 0.7 mile north-northeast of Hat Lake, approximately

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300 feet east and 2,300 feet north of the southwest corner of sec. 30, T. 31 N., R. 5 E.; 40 degrees 31 minutes 7 seconds north latitude and 121 degrees 27 minutes 46 seconds west longitude, NAD83; USGS Quad: West Prospect Peak, California.

Range in Characteristics

Depth to restrictive feature: 20 to 60 inches (51 to 152 centimeters) to densic contact

Mean annual soil temperature: 43 to 44 degrees F (6 to 6.7 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (thickest part): 3 percent clay and 39 percent rock fragments

Surface fragments: 50 to 80 percent gravel, 0 to 20 percent cobbles, 0 to 10 percent stones, and 0 to 5 percent boulders

Other characteristics: Debris and avalanche deposits range from 4 to 9 inches (10 to 24 centimeters) in thickness

A horizon:

Color (dry)—2.5Y 6/2

Color (moist)—10YR 4/2

Texture—very gravelly ashy loamy sand, gravelly ashy loamy fine sand

Clay content—1 to 3 percent

Rock fragments—10 to 25 percent fine gravel, 5 to 20 percent medium and coarse gravel, 20 to 35 percent total gravel, 0 to 5 percent cobbles, 0 to 5 percent stones, 0 to 5 percent boulders, 20 to 50 percent total rock fragments

Organic matter—0.1 to 0.3 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.12 to 0.3

P retention—8 to 15 percent

Glass content—25 to 35 percent

NaF pH—10.0 to 11.0

Soil reaction—moderately acid or slightly acid

2Bwb horizon:

Color (dry)—10YR 6/3, 7/3

Color (moist)—10YR 4/3

Texture—gravelly ashy loamy fine sand, gravelly ashy loamy sand, very gravelly ashy loamy sand

Clay content—0 to 5 percent

Rock fragments—10 to 20 percent fine gravel, 10 to 25 percent medium and coarse gravel, 25 to 35 percent total gravel, 0 to 10 percent cobbles, 0 to 5 percent stones, 0 to 5 percent boulders, 30 to 50 percent total rock fragments

Organic matter—0.5 to 3 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.0 to 1.5

P retention—45 to 55 percent

Glass content—30 to 40 percent

NaF pH—11.0 to 11.5

Soil reaction—slightly acid or neutral

2Cdq horizon:

Color (dry)—10YR 7/1

Color (moist)—2.5Y 5/1

Texture—very gravelly ashy loamy sand, very gravelly ashy loamy coarse sand

Clay content—1 to 5 percent

Rock fragments—10 to 25 percent fine gravel, 15 to 25 percent medium and coarse gravel, 40 to 60 percent total gravel, 0 to 10 percent cobbles, 0 to 5 percent stones, 0 to 5 percent boulders, 40 to 60 percent total rock fragments

Organic matter—0 to 0.3 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.5 to 0.8

P retention—25 to 35 percent
Glass content—15 to 30 percent
NaF pH—11.0 to 11.5
Soil reaction—slightly acid or neutral

Typic Vitrixerands, bouldery

Typic Vitrixerands, bouldery consist of very deep, somewhat excessively drained soils that formed in tephra mixed with colluvium from rhyodacite. These soils are on volcanic domes. Slopes range from 15 to 60 percent. The mean annual precipitation is about 43 inches (1,092 millimeters), and the mean annual air temperature is about 43 degrees F (6 degrees C).

Taxonomic Classification

Frigid Typic Vitrixerands

Typical Pedon

Typic Vitrixerands, bouldery, very stony ashy sand (fig. 112) on a east-facing (86 degrees) slope of 35 percent under a cover of white fir, sugar pine, Jeffrey pine, pinemat manzanita, and bush chinquapin at an elevation of 5,992 feet (1,826 meters). When described on 7/27/07, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

- Oi—0 to 2 inches (0 to 4 centimeters); slightly decomposed plant material; abrupt smooth boundary.
- A—2 to 5 inches (4 to 12 centimeters); light gray (2.5Y 7/1) very stony ashy sand, grayish brown (2.5Y 5/2) moist; 1 percent clay; weak very fine granular structure parting to single grain; loose, nonsticky, nonplastic; many very fine and fine, common medium, and few coarse roots; many very fine and fine interstitial pores; 5 percent subangular medium gravel, 9 percent subangular fine gravel, 15 percent subangular stones, and 15 percent subangular cobbles; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 10.0; abrupt smooth boundary.
- AC—5 to 11 inches (12 to 27 centimeters); light gray (2.5Y 7/2) very stony ashy loamy coarse sand, grayish brown (2.5Y 5/2) moist; 3 percent clay; single grain; loose, nonsticky, nonplastic; common very fine and fine, many medium and coarse, and common very coarse roots; many very fine and fine interstitial pores; 4 percent subangular medium gravel, 6 percent subangular fine gravel, 20 percent subangular cobbles, and 20 percent subangular stones; neutral, pH 6.8 by Hellige-Truog; NaF pH 10.8; clear smooth boundary.
- C1—11 to 34 inches (27 to 86 centimeters); light gray (2.5Y 7/2) ashy boulders, light olive brown (2.5Y 5/3) moist; 2 percent clay; single grain; loose, nonsticky, nonplastic; few coarse and common very fine to medium roots; many very fine and fine interstitial pores; 1 percent subangular fine gravel, 1 percent subangular medium gravel, 10 percent subangular cobbles, 20 percent subangular stones, and 60 percent subangular boulders; neutral, pH 6.7 by Hellige-Truog; NaF pH 10.8; clear smooth boundary.
- C2—34 to 56 inches (86 to 142 centimeters); white (10YR 8/1) ashy boulders, brown (10YR 5/3) moist; 2 percent clay; single grain; loose, nonsticky, nonplastic; few very fine to coarse roots; many very fine and fine interstitial pores; 2 percent subangular fine gravel, 2 percent subangular medium gravel, 10 percent subangular cobbles, 10 percent subangular stones, and 70 percent subangular boulders; neutral, pH 6.7 by Hellige-Truog; NaF pH 10.0; clear smooth boundary.
- 2Bwb—56 to 60 inches (142 to 152 centimeters); very pale brown (10YR 8/3) ashy boulders, yellowish brown (10YR 5/4) moist; 8 percent clay; single grain; loose,

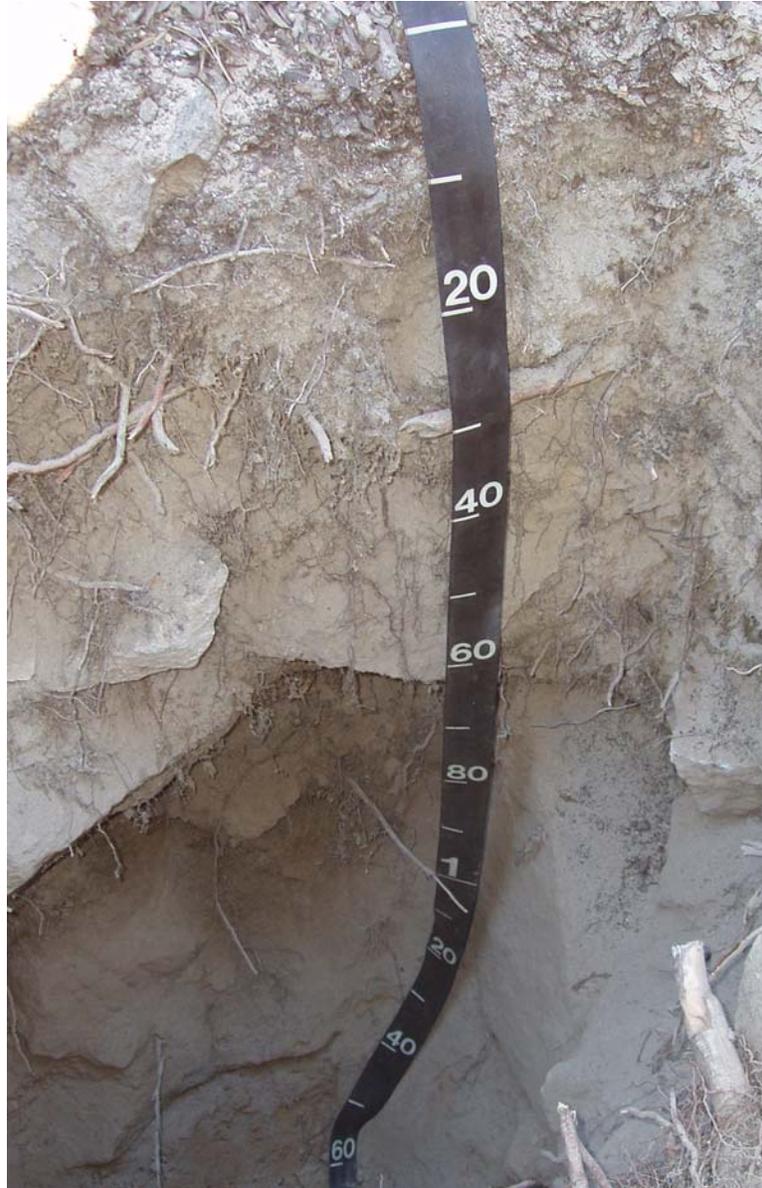


Figure 112.—Typical profile of Typic Vitrixerands, bouldery. Depth is marked in centimeters.

nonsticky, nonplastic; few very fine to very coarse roots; many very fine and fine interstitial pores; 2 percent subangular fine gravel, 4 percent subangular medium and coarse gravel, 10 percent subangular cobbles, 10 percent subangular stones, and 70 percent subangular boulders; slightly acid, pH 6.6 by Hellige-Truog; NaF pH 9.9.

Type Location

Shasta County, California; about 0.63 mile south-southeast of Craggs Campground, approximately 1,100 feet east and 1,300 feet south of the northwest corner of sec. 10, T. 31 N., R. 4 E.; 40 degrees 33 minutes 16 seconds north latitude and 121 degrees 30 minutes 58 seconds west longitude, NAD83; USGS Quad: Manzanita Lake, California.

Range in Characteristics

Depth to restrictive feature: More than 60 inches (152 centimeters) to bedrock

Mean annual soil temperature: 44 to 46 degrees F (6.6 to 7.7 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section: Ashy-skeletal part—1 to 2 percent clay and 35 to 60 percent rock fragments; fragmental or cindery part—2 to 4 percent clay and 90 to 99 percent rock fragments

Surface fragments: 10 to 25 percent gravel, 2 to 15 percent cobbles, 10 to 35 percent stones, and 10 to 50 percent boulders

A horizon:

Color (dry)—2.5Y 7/1

Color (moist)—2.5Y 5/2

Texture—very stony ashy sand, very bouldery ashy sand, extremely bouldery ashy sand

Clay content—1 to 3 percent

Rock fragments—5 to 15 percent fine gravel, 3 to 10 percent medium and coarse gravel, 8 to 25 percent total gravel, 10 to 25 percent cobbles, 10 to 25 percent stones, 0 to 50 percent boulders, 35 to 80 percent total rock fragments

Organic matter—2 to 4 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.4 to 0.7

P retention—25 to 40 percent

Glass content—30 to 50 percent

NaF pH—9.0 to 10.5

Soil reaction—slightly acid

AC horizon:

Color (dry)—2.5Y 7/2

Color (moist)—2.5Y 5/2

Texture—very stony ashy loamy coarse sand, very bouldery ashy loamy coarse sand, extremely bouldery ashy loamy coarse sand

Clay content—1 to 4 percent

Rock fragments—5 to 15 percent fine gravel, 3 to 10 percent medium and coarse gravel, 5 to 25 percent total gravel, 10 to 25 percent cobbles, 10 to 25 percent stones, 0 to 50 percent boulders, 35 to 80 percent total rock fragments

Organic matter—1 to 3 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.4 to 0.5

P retention—25 to 35 percent

Glass content—35 to 45 percent

NaF pH—10.0 to 11.0

Soil reaction—neutral

C horizon:

Color (dry)—2.5Y 7/2; 10YR 8/1

Color (moist)—2.5Y 5/3; 10YR 5/3

Texture—ashy boulders

Clay content—0 to 3 percent

Rock fragments—0 to 5 percent fine gravel, 0 to 5 percent medium and coarse gravel, 1 to 10 percent total gravel, 5 to 15 percent cobbles, 10 to 40 percent stones, 50 to 80 percent boulders, 90 to 99 percent total rock fragments

Organic matter—0.5 to 3 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.4 to 0.5

P retention—25 to 35 percent

Glass content—35 to 45 percent

NaF pH—10.0 to 11.0
Soil reaction—neutral

2Bwb horizon:

Color (dry)—10YR 8/3
Color (moist)—10YR 5/4
Texture—ashy boulders
Clay content—2 to 10 percent
Rock fragments—0 to 5 percent fine gravel, 0 to 5 percent medium and coarse gravel, 1 to 10 percent total gravel, 5 to 15 percent cobbles, 10 to 40 percent stones, 50 to 80 percent boulders, 90 to 99 percent total rock fragments
Organic matter—1 to 2 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.0 to 1.5
P retention—60 to 75 percent
Glass content—21 to 30 percent
NaF pH—9.5 to 10.0
Soil reaction—neutral

Typic Vitrixerands, tephra over colluvium

Typic Vitrixerands, tephra over colluvium consist of very deep, well drained soils that formed in tephra over colluvium from rhyodacite. These soils are on volcanic domes. Slopes range from 15 to 60 percent. The mean annual precipitation is about 43 inches (1,092 millimeters), and the mean annual air temperature is about 43 degrees F (6 degrees C).

Taxonomic Classification

Frigid Typic Vitrixerands

Typical Pedon

Typic Vitrixerands, tephra over colluvium, ashy sandy loam (fig. 113) on a north-northeast-facing (28 degrees) slope of 53 percent under a cover of white fir and sugar pine at an elevation of 6,003 feet (1,830 meters). When described on 8/3/06, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

- Oi—0 to 1 inch (0 to 2 centimeters); slightly decomposed needles and twigs; abrupt smooth boundary.
- A1—1 to 2 inches (2 to 6 centimeters); gray (10YR 5/1) ashy sandy loam, very dark gray (10YR 3/1) moist; 4 percent clay; moderate very thick platy structure; loose, nonsticky, nonplastic; common very fine roots; common very fine and fine irregular pores; 2 percent subangular medium gravel and 10 percent subangular fine gravel; strongly acid, pH 5.5 by Hellige-Truog; NaF pH 9.0; abrupt smooth boundary.
- A2—2 to 4 inches (6 to 10 centimeters); light brownish gray (10YR 6/2) ashy sandy loam, dark grayish brown (10YR 4/2) moist; 5 percent clay; single grain; loose, nonsticky, nonplastic; many very fine and fine, common medium, and few very coarse roots; common very fine and fine irregular pores; 2 percent subangular medium gravel and 12 percent subangular fine gravel; moderately acid, pH 5.7 by Hellige-Truog; NaF pH 9.1; abrupt smooth boundary.
- C1—4 to 7 inches (10 to 19 centimeters); pale yellow (2.5Y 7/3) ashy fine sandy loam, brown (10YR 4/3) moist; 8 percent clay; weak very fine to medium subangular blocky structure; loose, nonsticky, nonplastic; common very fine to medium roots; few fine tubular and common very fine and fine irregular pores; 1 percent subangular medium gravel and 4 percent subangular fine gravel; moderately acid, pH 5.9 by Hellige-Truog; NaF pH 10.1; abrupt wavy boundary.



Figure 113.—Typical profile of Typic Vitrixerands, tephra over colluvium. Depth is marked in centimeters.

C2—7 to 14 inches (19 to 35 centimeters); very pale brown (10YR 8/2) extremely gravelly ashy coarse sand, dark grayish brown (10YR 4/2) moist; 1 percent clay; single grain; loose, nonsticky, nonplastic; few coarse and very coarse and common very fine to medium roots; common fine and medium interstitial pores; 25 percent subangular fine gravel and 45 percent subangular medium and coarse

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- gravel; slightly acid, pH 6.2 by Hellige-Truog; NaF pH 9.9; abrupt smooth boundary.
- 2Ab—14 to 20 inches (35 to 51 centimeters); light yellowish brown (10YR 6/4) very gravelly ashy sandy loam, dark yellowish brown (10YR 4/4) moist; 6 percent clay; weak very fine to medium subangular blocky structure; loose, nonsticky, nonplastic; many medium, few coarse and very coarse, and common very fine roots; common fine tubular and common very fine and fine irregular pores; 5 percent subangular cobbles, 18 percent subangular fine gravel, and 25 percent subangular medium gravel; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 10.4; abrupt smooth boundary.
- 2Bwb1—20 to 28 inches (51 to 71 centimeters); light yellowish brown (2.5Y 6/3) very gravelly ashy sandy loam, brown (10YR 4/3) moist; 5 percent clay; weak very fine to medium subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; many medium, few coarse and very coarse, and common very fine roots; common fine tubular and many very fine and fine irregular pores; 5 percent subangular cobbles, 18 percent subangular medium and coarse gravel, and 22 percent subangular fine gravel; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 10.4; clear smooth boundary.
- 2Bwb2—28 to 41 inches (71 to 105 centimeters); pale yellow (2.5Y 7/3) very gravelly ashy sandy loam, brown (10YR 4/3) moist; 3 percent clay; weak very fine to medium subangular blocky structure; loose, nonsticky, nonplastic; many fine and medium, few coarse and very coarse, and common very fine roots; common fine tubular and many very fine and fine irregular pores; 5 percent subangular stones, 10 percent subangular cobbles, 15 percent subangular medium and coarse gravel, and 20 percent subangular fine gravel; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 10.5; clear smooth boundary.
- 2C1—41 to 51 inches (105 to 129 centimeters); pale yellow (2.5Y 7/3) extremely cobbly ashy sandy loam, light olive brown (2.5Y 5/3) moist; 3 percent clay; single grain; loose, nonsticky, nonplastic; many fine and medium, few coarse and very coarse, and common very fine roots; common very fine and fine interstitial pores; 10 percent subangular stones, 13 percent subangular fine gravel, 20 percent subangular cobbles, and 30 percent subangular medium and coarse gravel; slightly acid, pH 6.6 by Hellige-Truog; NaF pH 11.0; abrupt smooth boundary.
- 2C2—51 to 61 inches (129 to 156 centimeters); very pale brown (10YR 8/3) extremely stony ashy loamy coarse sand, brown (10YR 5/3) moist; 2 percent clay; single grain; loose, nonsticky, nonplastic; many fine and common medium roots; common very fine and fine interstitial pores; 10 percent subangular cobbles, 13 percent subangular fine gravel, 20 percent subangular stones, and 35 percent subangular medium and coarse gravel; slightly acid, pH 6.6 by Hellige-Truog; NaF pH 10.9.

Type Location

Shasta County, California; about 0.76 mile south-southeast of Crags Campgrounds, approximately 2,050 feet south and 1,500 feet east of the northwest corner of sec. 10, T. 31 N., R. 4 E.; 40 degrees 33 minutes 8 seconds north latitude and 121 degrees 30 minutes 55 seconds west longitude, NAD83; USGS Quad: Manzanita Lake, California.

Range in Characteristics

Depth to restrictive feature: More than 60 inches (152 centimeters) to bedrock

Mean annual soil temperature: 44 to 46 degrees F (6.6 to 7.7 degrees C)

Period that soil moisture control section is dry: July to August (about 90 days)

Particle-size control section (thickest part): 3 to 6 percent clay and 45 to 50 percent rock fragments

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Surface fragments: 0 to 10 percent gravel, 0 to 5 percent cobbles, 0 to 5 percent stones, and 0 to 5 percent boulders

A horizon:

Color (dry)—10YR 5/1, 6/2
Color (moist)—10YR 3/1, 4/2
Texture—ashy sandy loam, ashy loamy coarse sand
Clay content—1 to 5 percent
Rock fragments—5 to 15 percent fine gravel, 0 to 5 percent medium and coarse gravel, 5 to 15 percent total gravel
Organic matter—2 to 12 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.3 to 0.7
P retention—15 to 40 percent
Glass content—30 to 50 percent
NaF pH—9.0 to 10.5
Soil reaction—strongly acid or moderately acid

C horizon:

Color (dry)—2.5Y 7/3; 10YR 8/2
Color (moist)—10YR 4/2, 4/3
Texture—ashy fine sandy loam, extremely gravelly ashy coarse sand
Clay content—0 to 8 percent
Rock fragments—2 to 30 percent fine gravel, 0 to 50 percent medium and coarse gravel, 5 to 75 percent total gravel
Organic matter—0.5 to 3 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.3 to 0.5
P retention—10 to 35 percent
Glass content—35 to 45 percent
NaF pH—9.0 to 10.5
Soil reaction—moderately acid or slightly acid

2Ab horizon:

Color (dry)—10YR 6/4
Color (moist)—10YR 4/4
Texture—very gravelly ashy sandy loam
Clay content—2 to 6 percent
Rock fragments—15 to 25 percent fine gravel, 15 to 30 percent medium and coarse gravel, 40 to 50 percent total gravel, 0 to 10 percent cobbles, 0 to 5 percent stones, 35 to 60 percent total rock fragments
Organic matter—2 to 4 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.0 to 1.5
P retention—60 to 75 percent
Glass content—30 to 40 percent
NaF pH—10.0 to 11.0
Soil reaction—slightly acid

2Bwb horizon:

Color (dry)—2.5Y 6/3, 7/3
Color (moist)—10YR 4/3
Texture—very gravelly ashy sandy loam
Clay content—2 to 6 percent
Rock fragments—15 to 25 percent fine gravel, 15 to 30 percent medium and coarse gravel, 35 to 50 percent total gravel, 0 to 10 percent cobbles, 0 to 5 percent stones, 35 to 60 percent total rock fragments
Organic matter—1 to 3 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.0 to 1.5

P retention—60 to 75 percent
Glass content—30 to 40 percent
NaF pH—10.0 to 11.0
Soil reaction—slightly acid

2C horizon:

Color (dry)—2.5Y 7/3; 10YR 8/3
Color (moist)—2.5Y 5/3; 10YR 5/3
Texture—extremely cobbly ashy sandy loam, extremely stony ashy loamy coarse sand
Clay content—1 to 3 percent
Rock fragments—10 to 15 percent fine gravel, 25 to 40 percent medium and coarse gravel, 40 to 50 percent total gravel, 10 to 25 percent cobbles, 5 to 25 percent stones, 60 to 90 percent total rock fragments
Organic matter—0.5 to 1.5 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.0 to 1.5
P retention—45 to 55 percent
Glass content—15 to 30 percent
NaF pH—10.0 to 11.0
Soil reaction—neutral

Typic Vitrixerands, unglaciated

Typic Vitrixerands, unglaciated consist of moderately deep or deep, well drained soils that formed in ash over colluvium over residuum from rhyodacite. These soils are on unglaciated rhyodacite lava flows. Slopes range from 5 to 20 percent. The mean annual precipitation is about 57 inches (1,448 millimeters), and the mean annual air temperature is about 43 degrees F (6 degrees C).

Taxonomic Classification

Frigid Typic Vitrixerands

Typical Pedon

Typic Vitrixerands, unglaciated, ashy fine sandy loam (fig. 114) on a north-northwest-facing (344 degrees) slope of 13 percent under a cover of pinemat manzanita, greenleaf manzanita, bush chinquapin, snowbrush ceanothus, and Jeffrey pine at an elevation of 6,608 feet (2,014 meters). When described on 7/23/07, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

Oi—0 to 1 inch (0 to 3 centimeters); slightly decomposed plant material; abrupt smooth boundary.

A—1 to 3 inches (3 to 7 centimeters); light brownish gray (10YR 6/2) ashy fine sandy loam, dark grayish brown (10YR 4/2) moist; 4 percent clay; weak very thick platy structure parting to single grain; loose, nonsticky, nonplastic; many very fine and fine and few medium roots; many very fine interstitial pores; 3 percent subangular fine gravel; moderately acid, pH 5.7 by Hellige-Truog; NaF pH 9.0; abrupt wavy boundary.

2Bw1—3 to 8 inches (7 to 20 centimeters); very pale brown (10YR 7/3) ashy sandy loam, brown (10YR 5/3) moist; 4 percent clay; weak very fine and fine subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; few coarse and common very fine to medium roots; many very fine interstitial pores; 3 percent subangular medium and coarse gravel and 9 percent subangular fine gravel; slightly acid, pH 6.6 by Hellige-Truog; NaF pH 10.8; clear smooth boundary.

2Bw2—8 to 15 inches (20 to 38 centimeters); very pale brown (10YR 7/3) gravelly ashy sandy loam, brown (10YR 5/3) moist; 4 percent clay; weak very fine and fine



Figure 114.—Typical profile of Typic Vitrixerands, unglaciated. Depth is marked in centimeters.

subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; common very fine to very coarse roots; many very fine interstitial pores; 5 percent subangular medium and coarse gravel, 10 percent subangular fine gravel, and 10 percent subangular cobbles; slightly acid, pH 6.3 by Hellige-Truog; NaF pH 10.0; clear smooth boundary.

3Bw3—15 to 25 inches (38 to 63 centimeters); very pale brown (10YR 8/3) very gravelly ashy loamy coarse sand, pale brown (10YR 6/3) moist; 3 percent clay; weak fine and medium subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; few coarse and very coarse and common very fine to medium roots; many fine interstitial pores; 5 percent subangular cobbles, 15 percent subangular fine gravel, and 19 percent subangular medium and coarse gravel; slightly acid, pH 6.6 by Hellige-Truog; NaF pH 10.6; clear smooth boundary.

3C—25 to 39 inches (63 to 100 centimeters); white (10YR 8/1) very gravelly ashy loamy coarse sand, pale brown (10YR 6/3) moist; 2 percent clay; single grain; loose, nonsticky, nonplastic; common very fine and fine and few medium roots;

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many very fine and fine interstitial pores; 5 percent subangular stones, 10 percent subangular cobbles, 20 percent subangular medium and coarse gravel, and 20 percent subangular fine gravel; neutral, pH 6.8 by Hellige-Truog; NaF pH 10.6; abrupt wavy boundary.

3Cr—39 to 43 inches (100 to 110 centimeters); moderately cemented rhyodacite bedrock.

Type Location

Shasta County, California; about 1.6 miles east of Deep Hole, approximately 250 feet north and 900 feet east of the southwest corner of sec. 19, T. 31 N., R. 4 E.; 40 degrees 30 minutes 55 seconds north latitude and 121 degrees 34 minutes 27 seconds west longitude, NAD83; USGS Quad: Manzanita Lake, California.

Range in Characteristics

Depth to restrictive feature: 20 to 60 inches (51 to 152 centimeters) to paralithic contact

Mean annual soil temperature: 45 to 47 degrees F (7 to 8 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (thickest part): 1 to 4 percent clay and 35 to 75 percent rock fragments

Surface fragments: 0 to 20 percent gravel, 0 to 5 percent cobbles, 0 to 5 percent stones, and 0 to 5 percent boulders

A horizon:

Color (dry)—10YR 6/2

Color (moist)—10YR 4/2

Texture—ashy fine sandy loam, ashy loamy coarse sand

Clay content—1 to 4 percent

Rock fragments—3 to 15 percent fine gravel, 0 to 5 percent medium and coarse gravel, 3 to 15 percent total gravel

Organic matter—2 to 5.5 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.55 to 0.95

P retention—30 to 60 percent

Glass content—30 to 40 percent

NaF pH—9.0 to 11.0

Soil reaction—moderately acid to slightly acid

2Bw and 3Bw horizons:

Color (dry)—10YR 6/3, 7/3, 8/3

Color (moist)—10YR 4/3, 5/3, 6/3

Texture—ashy sandy loam, gravelly ashy sandy loam, gravelly ashy loamy sand, gravelly ashy loamy coarse sand, very gravelly ashy loamy coarse sand

Clay content—1 to 5 percent

Rock fragments—5 to 20 percent fine gravel, 2 to 40 percent medium and coarse gravel, 10 to 50 percent total gravel, 0 to 15 percent cobbles, 10 to 60 percent total rock fragments

Organic matter—2 to 4 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.2 to 1.5

P retention—55 to 70 percent

Glass content—30 to 35 percent

NaF pH—10.0 to 11.5

Soil reaction—slightly acid to neutral

3C horizon:

Color (dry)—10YR 8/1; 5YR 7/2

Color (moist)—10YR 6/3; 7.5YR 4/3

Texture—very gravelly ashy loamy coarse sand, extremely cobbly ashy loamy fine sand
Clay content—1 to 4 percent
Rock fragments—5 to 25 percent fine gravel, 15 to 35 percent medium and coarse gravel, 30 to 50 percent total gravel, 5 to 30 percent cobbles, 5 to 15 percent stones, 50 to 80 percent total rock fragments
Organic matter—0 to 1.5 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—2.0 to 2.8
P retention—70 to 85 percent
Glass content—30 to 40 percent
NaF pH—10.5 to 11.0
Soil reaction—neutral

Typic Vitrixerands, very deep

Typic Vitrixerands, very deep consist of very deep, well drained soils that formed in ash mixed with colluvium and residuum from rhyodacite. These soils are on glaciated rhyodacite lava flows. Slopes range from 5 to 50 percent. The mean annual precipitation is about 55 inches (1,397 millimeters), and the mean annual air temperature is about 43 degrees F (6 degrees C).

Taxonomic Classification

Frigid Typic Vitrixerands

Typical Pedon

Typic Vitrixerands, very deep, gravelly ashy sandy loam (fig. 115) on a northeast-facing (52 degrees) slope of 9 percent under a cover of white fir, Jeffrey pine, bush chinquapin, snowbrush ceanothus, and greenleaf manzanita at an elevation of 6,087 feet (1,855 meters). When described on 5/30/07, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

- Oi—0 to 2 inches (0 to 5 centimeters); slightly decomposed plant material; abrupt smooth boundary.
- Oe—2 to 4 inches (5 to 10 centimeters); moderately decomposed plant material; common very fine and fine roots; abrupt smooth boundary.
- A1—4 to 6 inches (10 to 16 centimeters); light brownish gray (10YR 6/2) gravelly ashy sandy loam, dark grayish brown (10YR 4/2) moist; 4 percent clay; weak very fine to medium granular structure parting to single grain; soft, very friable, nonsticky, nonplastic; many very fine and fine and few medium and coarse roots; many very fine and fine tubular and interstitial pores; 1 percent subrounded medium and coarse gravel and 20 percent subrounded fine gravel; neutral, pH 6.8 by Hellige-Truog; NaF pH 11.6; abrupt smooth boundary.
- A2—6 to 10 inches (16 to 25 centimeters); pale brown (10YR 6/3) gravelly ashy sandy loam, brown (10YR 4/3) moist; 4 percent clay; weak very fine to medium subangular blocky structure parting to single grain; soft, very friable, nonsticky, nonplastic; common very fine to very coarse roots; many very fine and fine interstitial and tubular pores; 1 percent subrounded medium and coarse gravel and 20 percent subrounded fine gravel; neutral, pH 6.8 by Hellige-Truog; NaF pH 11.4; clear smooth boundary.
- Bw1—10 to 22 inches (25 to 56 centimeters); very pale brown (10YR 7/3) stony ashy sandy loam, brown (10YR 4/3) moist; 4 percent clay; weak very fine to medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; common fine to very coarse and few very fine roots; common very fine and fine interstitial and tubular pores; 2 percent subrounded medium and coarse gravel, 15 percent



Figure 115.—Typical profile of Typic Vitrixerands, very deep. Depth is marked in centimeters.

subrounded stones and 17 percent subrounded fine gravel; neutral, pH 6.8 by Hellige-Truog; NaF pH 11.3; clear smooth boundary.

Bw2—22 to 31 inches (56 to 79 centimeters); very pale brown (10YR 7/3) very stony ashy loamy sand, brown (10YR 5/3) moist; 3 percent clay; weak very fine to medium subangular blocky structure; loose, nonsticky, nonplastic; common fine to very coarse and few very fine roots; many very fine and fine interstitial pores; 4 percent subrounded medium and coarse gravel, 10 percent subrounded stones, 10 percent subrounded cobbles, and 12 percent subrounded fine gravel; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 11.0; clear smooth boundary.

Bw3—31 to 39 inches (79 to 100 centimeters); very pale brown (10YR 8/3) very gravelly ashy loamy sand, pale brown (10YR 6/3) moist; 3 percent clay; weak fine and medium subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; common fine and medium and few very fine roots; many very fine and

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fine interstitial pores; 10 percent subangular cobbles, 10 percent subangular stones, 16 percent subangular fine gravel, and 28 percent subangular medium and coarse gravel; slightly acid, pH 6.3 by Hellige-Truog; NaF pH 10.7; clear smooth boundary.

Bw4—39 to 60 inches (100 to 152 centimeters); very pale brown (10YR 8/3) extremely stony ashy loamy sand, light yellowish brown (10YR 6/4) moist; 3 percent clay; single grain; loose, nonsticky, nonplastic; few very fine to medium roots; many very fine and fine interstitial pores; 11 percent subangular fine gravel, 15 percent subangular cobbles, 22 percent subangular medium and coarse gravel, and 30 percent subangular stones; slightly acid, pH 6.3 by Hellige-Truog; NaF pH 10.9.

Type Location

Shasta County, California; about 0.76 mile south of the Manzanita Lake Entrance Station, approximately 600 feet south and 1,700 feet east of the northwest corner of sec. 19, T. 31 N., R. 4 E.; 40 degrees 31 minutes 39 seconds north latitude and 121 degrees 34 minutes 18 seconds west longitude, NAD83; USGS Quad: Manzanita Lake, California.

Range in Characteristics

Depth to restrictive feature: More than 60 inches (152 centimeters) to bedrock

Mean annual soil temperature: 45 to 47 degrees F (7 to 8 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (thickest part): 1 to 4 percent clay and 35 to 80 percent rock fragments

Surface fragments: 2 to 10 percent gravel, 0 to 5 percent cobbles, 0 to 5 percent stones, and 0 to 5 percent boulders

Other characteristics: Some pedons have C horizons in the lower part of the profile

A horizon:

Color (dry)—10YR 6/2, 6/3

Color (moist)—10YR 3/2, 4/2, 4/3

Texture—gravelly ashy sandy loam, ashy loamy sand, gravelly ashy loamy sand

Clay content—1 to 5 percent

Rock fragments—10 to 25 percent fine gravel, 0 to 5 percent medium and coarse gravel, 10 to 25 percent total gravel

Organic matter—4 to 5.5 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.55 to 0.70

P retention—30 to 50 percent

Glass content—30 to 35 percent

NaF pH—9.0 to 11.6

Soil reaction—strongly acid to neutral

Upper Bw horizon:

Color (dry)—10YR 7/3

Color (moist)—10YR 4/3, 5/3

Texture—stony ashy sandy loam, very stony ashy loamy sand, gravelly ashy loamy sand, very gravelly ashy loamy sand

Clay content—2 to 5 percent

Rock fragments—10 to 20 percent fine gravel, 2 to 10 percent medium and coarse gravel, 15 to 25 percent total gravel, 0 to 20 percent cobbles, 0 to 25 percent stones, 20 to 50 percent total rock fragments

Organic matter—2 to 3 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.8 to 0.95

P retention—45 to 60 percent

Glass content—35 to 40 percent

NaF pH—10.5 to 11.0
Soil reaction—slightly acid or neutral

Lower Bw horizon:

Color (dry)—10YR 7/3, 8/3
Color (moist)—10YR 5/3, 6/3, 6/4
Texture—very gravelly ashy loamy sand, extremely stony ashy loamy sand, very stony ashy loamy sand
Clay content—1 to 3 percent
Rock fragments—10 to 20 percent fine gravel, 10 to 30 percent medium and coarse gravel, 20 to 45 percent total gravel, 5 to 15 percent cobbles, 5 to 30 percent stones, 35 to 80 percent total rock fragments
Organic matter—0.5 to 3 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.2 to 2.8
P retention—55 to 85 percent
Glass content—30 to 40 percent
NaF pH—10.5 to 11.0
Soil reaction—slightly acid or neutral

Typic Xerorthents

Typic Xerorthents consist of very deep, excessively drained soils that formed in tephra from Cinder Cone over till, outwash, or lacustrine deposits. These soils are on tephra-covered moraines, outwash plains, and lake terraces. Slopes range from 1 to 20 percent. The mean annual precipitation is about 31 inches (787 millimeters), and the mean annual air temperature is about 43 degrees F (6 degrees C).

Taxonomic Classification

Frigid Typic Xerorthents

Typical Pedon

Typic Xerorthents very gravelly sand on a north-facing (348 degrees) slope of 3 percent under a cover of Jeffrey pine, white fir, and needlegrass at an elevation of 6,304 feet (1,922 meters). When described on 7/19/2006, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

Oi—0 to 1 inch (0 to 3 centimeters); slightly decomposed pine and fir needles and twig litter; smooth boundary.

A—1 to 4 inches (3 to 10 centimeters); dark gray (2.5Y 4/1) very gravelly sand, very dark gray (2.5Y 3/1) moist; 0 percent clay; single grain; loose, nonsticky, nonplastic; many very fine roots; many very fine and fine interstitial pores; 30 percent subangular fine gravel and 10 percent subangular medium gravel; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 9.0; abrupt smooth boundary.

C1—4 to 33 inches (10 to 85 centimeters); very dark gray (5Y 3/1) very gravelly sand, black (5Y 2.5/1) moist; 0 percent clay; single grain; loose, nonsticky, nonplastic; common very fine to medium roots; many very fine and fine interstitial pores; 35 percent subangular fine gravel and 5 percent subangular medium gravel; slightly acid, pH 6.6 by Hellige-Truog; NaF pH 9.5; abrupt smooth boundary. [Note: This horizon has alternating beds of coarse and fine ash—six fine ash beds (2 to 4 centimeters thick). The upper two, one at a depth of 15 centimeters and one at a depth of 23 centimeters, have concentrated root layers. Those two layers have many very fine to very coarse roots. The fine ash layers also have few very fine and fine roots, 10 percent fine subangular gravel, pH 6.5 by Hellige-Truog, NaF pH 10.0, and 10 percent subangular fine gravel.]

C2—33 to 46 inches (85 to 118 centimeters); light olive brown (2.5Y 5/3) extremely

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- gravelly coarse sand, dark grayish brown (2.5Y 4/2) moist; 0 percent clay; single grain; loose, nonsticky, nonplastic; few very fine and fine roots; many very fine to medium interstitial pores; 25 percent subangular fine gravel and 55 percent subangular medium gravel; slightly acid, pH 6.6 by Hellige-Truog; NaF pH 9.9; abrupt smooth boundary.
- C3—46 to 50 inches (118 to 128 centimeters); dark gray (2.5Y 4/1) gravelly coarse sand, black (2.5Y 2.5/1) moist; 0 percent clay; single grain; loose, nonsticky, nonplastic; few very fine to medium roots; many very fine and fine interstitial pores; 20 percent subangular fine gravel and 10 percent subangular medium gravel; slightly acid, pH 6.6 by Hellige-Truog; NaF pH 9.0; abrupt smooth boundary.
- C4—50 to 55 inches (128 to 140 centimeters); light olive brown (2.5Y 5/3) very gravelly coarse sand, dark grayish brown (2.5Y 4/2) moist; 0 percent clay; single grain; loose, nonsticky, nonplastic; few very fine to medium roots; many very fine to medium interstitial pores; 30 percent subangular fine gravel and 15 percent subangular medium gravel; neutral, pH 6.7 by Hellige-Truog; NaF pH 9.9; abrupt smooth boundary.
- 2Ab—55 to 59 inches (140 to 150 centimeters); pale brown (10YR 6/3) very gravelly ashy sandy loam, dark grayish brown (10YR 4/2) moist; 5 percent clay; weak very fine to medium subangular blocky structure; loose, nonsticky, nonplastic; few very fine to medium roots; common very fine and fine irregular and tubular pores; 25 percent subangular fine gravel and 15 percent subangular medium gravel; neutral, pH 6.7 by Hellige-Truog; NaF pH 10.3.

Type Location

Lassen County, California; about 0.36 mile west-southwest from the Butte Lake campground, approximately 2,350 feet west and 2,450 feet north from the southeast corner of sec. 9, T. 31 N., R. 6 E.; 40 degrees 33 minutes 42 seconds north latitude and 121 degrees 18 minutes 44 seconds west longitude, NAD83; USGS Quad: Prospect Peak, California.

Range in Characteristics

Depth to restrictive feature: More than 60 inches (152 centimeters) to dense till or duripan contact

Mean annual soil temperature: 45 to 47 degrees F (7 to 8 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (weighted average): 0 to 1 percent clay and 35 to 80 percent rock fragments

Surface fragments: 0 to 100 percent gravel, 0 to 1 percent cobbles, 0 to 1 percent stones, and 0 to 1 percent boulders

Other characteristics: The thickness of the tephra corresponds to the proximity to Cinder Cone; areas with tephra that is 150 to 200 centimeters thick are near Cinder Cone, and areas with less than 150 centimeters of tephra over the buried soil are farther away

A horizon:

Color (dry)—10YR 3/1, 4/1; 2.5Y 2.5/1, 3/1, 4/1, 4/2; 5Y 2/1, 2.5/1, 3/2

Color (moist)—10YR 2/1, 3/1; 2.5Y 2.5/1, 3/1; 5Y 2/1, 2.5/1

Texture—sand, gravelly sand, very gravelly sand, loamy sand, sandy loam, coarse sand

Clay content—0 to 2 percent

Rock fragments—3 to 30 percent fine gravel, 1 to 10 percent medium and coarse gravel, 4 to 40 percent total gravel

Organic matter—0.5 to 3.5 percent

Base saturation by ammonium acetate—70 to 95 percent

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Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.05 to 0.15

P retention—2 to 6 percent

Glass content—9 to 18 percent

NaF pH—9.0 to 10.5

Soil reaction—moderately acid to neutral

C horizon:

Color (dry)—N 3/0, 4/0, 5/0; 10YR 3/1, 3/2, 4/1, 4/2, 4/4, 6/6, 7/2, 7/4; 2.5Y 3/1, 4/1, 4/2, 5/1, 5/2, 5/3; 5Y 2/1; 2.5/1, 3/1, 4/1, 5/2

Color (moist)—N 2.5/0, 3/0; 5B 4/1, 5/1, 6/1; 7.5YR 2.5/1; 10YR 2/1, 3/1, 3/4, 4/1, 4/2, 4/3, 5/6; 2.5Y 2.5/1, 3/1, 3/2, 4/2; 5Y 2/1, 2.5/1, 2.5/2, 4/3

Texture—sand, gravelly sand, very gravelly sand, gravelly coarse sand, very gravelly coarse sand, extremely gravelly coarse sand, gravel

Clay content—0 to 1 percent

Rock fragments—3 to 40 percent fine gravel, 0 to 85 percent medium and coarse gravel, 3 to 95 percent total gravel, 0 to 5 percent cobbles, 0 to 5 percent stones, 3 to 95 percent total rock fragments

Organic matter—0 to 0.8 percent

Base saturation by ammonium acetate—58 to 75 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.05 to 0.25

P retention—2 to 10 percent

Glass content—3 to 8 percent

NaF pH—9.0 to 10.3

Soil reaction—slightly acid to slightly alkaline

2Ab horizon:

Color (dry)—10YR 4/3, 5/3, 6/3; 2.5Y 5/3

Color (moist)—10YR 2/2, 3/2, 4/2, 4/3; 2.5Y 3/2

Texture—gravelly ashy sandy loam, very gravelly ashy sandy loam

Clay content—3 to 10 percent

Rock fragments—10 to 25 percent fine gravel, 10 to 15 percent medium and coarse gravel, 20 to 40 percent total gravel

Organic matter—0.7 to 3.5 percent

Base saturation by ammonium acetate—43 to 58 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.4 to 1.9

P retention—25 to 35 percent

Glass content—30 to 35 percent

NaF pH—10.3 to 10.7

Soil reaction—slightly acid or neutral

Typic Xerorthents, tephra

Typic Xerorthents, tephra consist of very deep, excessively drained soils that formed in tephra from Cinder Cone. These soils are on tephra-covered moraines, outwash plains, lake terraces, and lava flows. Slopes range from 2 to 50 percent. The mean annual precipitation is about 31 inches (787 millimeters), and the mean annual air temperature is about 43 degrees F (6 degrees C).

Taxonomic Classification

Frigid Typic Xerorthents

Typical Pedon

Typic Xerorthents, tephra, loamy sand on an east-facing (80 degrees) slope of 11 percent under a sparse cover of buckwheat at an elevation of 6,272 feet (1,912 meters). When described on 6/20/2007, the soil was dry at a depth of 0 to 20

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centimeters, slightly moist at a depth of 20 to 35 centimeters, slightly dry at a depth of 35 to 90 centimeters, and moderately dry at a depth of 90 to 152 centimeters. (Colors are for dry soil unless otherwise noted.)

- C1—0 to 5 inches (0 to 12 centimeters); dark gray (N 4/0) loamy sand, black (N 2.5/0) moist; 1 percent clay; single grain; loose, nonsticky, nonplastic; many very fine interstitial pores; 5 percent subangular fine gravel, 2 percent subangular medium and coarse gravel, and 5 percent subangular stones; neutral, pH 6.7 by Hellige-Truog; NaF pH 9.3; abrupt smooth boundary.
- C2—5 to 8 inches (12 to 20 centimeters); very dark gray (N 3/0) sand, black (N 2.5/0) moist; single grain; loose, nonsticky, nonplastic; few very fine roots; many very fine and fine interstitial pores; 7 percent subangular fine gravel, 1 percent subangular medium and coarse gravel, and 5 percent subangular stones; neutral, pH 6.7 by Hellige-Truog; NaF pH 9.0; abrupt smooth boundary.
- C3—8 to 12 inches (20 to 30 centimeters); dark gray (N 4/0) gravelly sand, black (2.5Y 2.5/1) moist; 1 percent clay; single grain; loose, nonsticky, nonplastic; few very fine roots; many very fine to medium interstitial pores; 15 percent subangular fine gravel and 4 percent subangular medium and coarse gravel; slightly acid, pH 6.4 by Hellige-Truog; NaF pH 10.0; abrupt smooth boundary.
- C4—12 to 14 inches (30 to 35 centimeters); dark gray (2.5Y 4/1) loamy sand, black (2.5Y 2.5/1) moist; 1 percent clay; single grain; loose, nonsticky, nonplastic; few very fine and fine roots; many very fine and fine interstitial pores; 12 percent subangular fine gravel and 1 percent subangular medium gravel; slightly acid, pH 6.4 by Hellige-Truog; NaF pH 9.8; abrupt smooth boundary.
- C5—14 to 25 inches (35 to 63 centimeters); dark gray (N 4/0) stratified gravelly coarse sand to sand, black (N 2.5/0) moist; 0 percent clay; single grain; loose, nonsticky, nonplastic; few very fine and fine roots in the top half of horizon; many very fine to medium interstitial pores; 25 percent subangular fine gravel and 7 percent subangular medium and coarse gravel; neutral, pH 6.9 by Hellige-Truog; NaF pH 9.0; abrupt smooth boundary.
- C6—25 to 35 inches (63 to 90 centimeters); dark gray (N 4/0) stratified very gravelly coarse sand to loamy sand, black (N 2.5/0) moist; 0 to 1 percent clay; single grain; loose, nonsticky, nonplastic; many very fine to medium interstitial pores; 26 percent subangular fine gravel and 10 percent subangular medium and coarse gravel; neutral, pH 7.0 by Hellige-Truog; NaF pH 9.0; abrupt smooth boundary.
- C7—35 to 49 inches (90 to 125 centimeters); dark gray (N 4/0) extremely gravelly coarse sand, black (N 2.5/0) moist; 0 percent clay; single grain; loose, nonsticky, nonplastic; many very fine to very coarse interstitial pores; 30 percent subangular fine gravel and 30 percent subangular medium and coarse gravel; neutral, pH 6.8 by Hellige-Truog; NaF pH 9.0; abrupt smooth boundary.
- C8—49 to 60 inches (125 to 152 centimeters); dark gray (N 4/0) gravelly coarse sand, black (N 2.5/0) moist; 0 percent clay; single grain; loose, nonsticky, nonplastic; many very fine to medium interstitial pores; 21 percent subangular fine gravel and 7 percent subangular medium and coarse gravel; neutral, pH 6.7 by Hellige-Truog; NaF pH 9.0.

Type Location

Lassen County, California; about 0.01 mile north of Cinder Cone, approximately 1,550 feet south and 1,850 feet east of the northwest corner of sec. 16, T. 31 N., R. 6 E.; 40 degrees 33 minutes 5 seconds north latitude and 121 degrees 18 minutes 59 seconds west longitude, NAD83; USGS Quad: Prospect Peak, California.

Range in Characteristics

Depth to restrictive feature: More than 60 inches (152 centimeters) to duripan, bedrock, or densic contact

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Mean annual soil temperature: 45 to 47 degrees F (7 to 8 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (weighted average): 0 to 1 percent clay and 20 to 33 percent rock fragments

Surface fragments: 65 to 99 percent gravel, 0 to 5 percent cobbles, 0 to 1 percent stones, and 0 to 1 percent boulders

Other characteristics: Some horizons have 5 to 20 percent secondary silica on rock fragments; some pedons have cinders underlying the soil

C horizon:

Color (dry)—N 3/0, 4/0, 5/0; 10YR 3/1, 3/2, 4/1, 4/2, 4/4, 6/6, 7/2, 7/4; 2.5Y 3/1, 4/1, 4/2, 5/1, 5/2, 5/3; 5Y 2/1, 2.5/1, 3/1, 4/1, 5/2

Color (moist)—N 2.5/0, 3/0; 5B 4/1, 5/1, 6/1; 7.5YR 2.5/1; 10YR 2/1, 3/1, 3/4, 4/1, 4/2, 4/3, 5/6; 2.5Y 2.5/1, 3/1, 3/2, 4/2; 5Y 2/1, 2.5/1, 2.5/2, 4/3

Texture—sand, loamy sand, gravelly sand, very gravelly sand, gravelly coarse sand, very gravelly coarse sand, extremely gravelly coarse sand, gravelly very coarse sand, very gravelly very coarse sand, extremely gravelly very coarse sand, gravel

Clay content—0 to 1 percent

Rock fragments—3 to 45 percent fine gravel, 0 to 55 percent medium and coarse gravel, 3 to 95 percent total gravel, 0 to 5 percent cobbles, 0 to 5 percent stones, 3 to 95 percent total rock fragments

Organic matter—0 to 0.8 percent

Base saturation by ammonium acetate—58 to 75 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.05 to 0.25

P retention—0 to 10 percent

Glass content—3 to 8 percent

NaF pH—9.0 to 10.8

Soil reaction—slightly acid or neutral

Typic Xerorthents, welded

Typic Xerorthents, welded consist of very shallow and shallow, excessively drained soils that formed in tephra from Cinder Cone. These soils are on knolls on lava flows. Slopes range from 2 to 30 percent. The mean annual precipitation is about 31 inches (787 millimeters), and the mean annual air temperature is about 43 degrees F (6 degrees C).

Taxonomic Classification

Frigid, shallow Typic Xerorthents

Typical Pedon

Typic Xerorthents, welded, gravelly ashy coarse sand (fig. 116) on a southeast-facing (145 degrees) slope of 15 percent under a cover of very sparse Jeffrey pine, lodgepole pine, and buckwheat at an elevation of 6,284 feet (1,915 meters). When described on 6/19/07, the soil was dry to a depth of 1 inch (3 centimeters), very slightly moist at a depth of 1 to 26 inches (3 to 67 centimeters), and dry at a depth of 26 to 60 inches (67 to 152 centimeters). (Colors are for dry soil unless otherwise noted.)

C1—0 to 1 inch (0 to 3 centimeters); weak red (10R 4/4) gravelly ashy coarse sand, dusky red (10R 3/4) moist; 0 percent clay; single grain; loose, nonsticky, nonplastic; many very fine to coarse interstitial pores; 4 percent angular medium and coarse gravel and 16 percent angular fine gravel; neutral, pH 6.9 by pH meter 1:1 water; NaF pH 8.8; abrupt smooth boundary.

C2—1 to 3 inches (3 to 8 centimeters); weak red (10R 5/3) welded very gravelly ashy

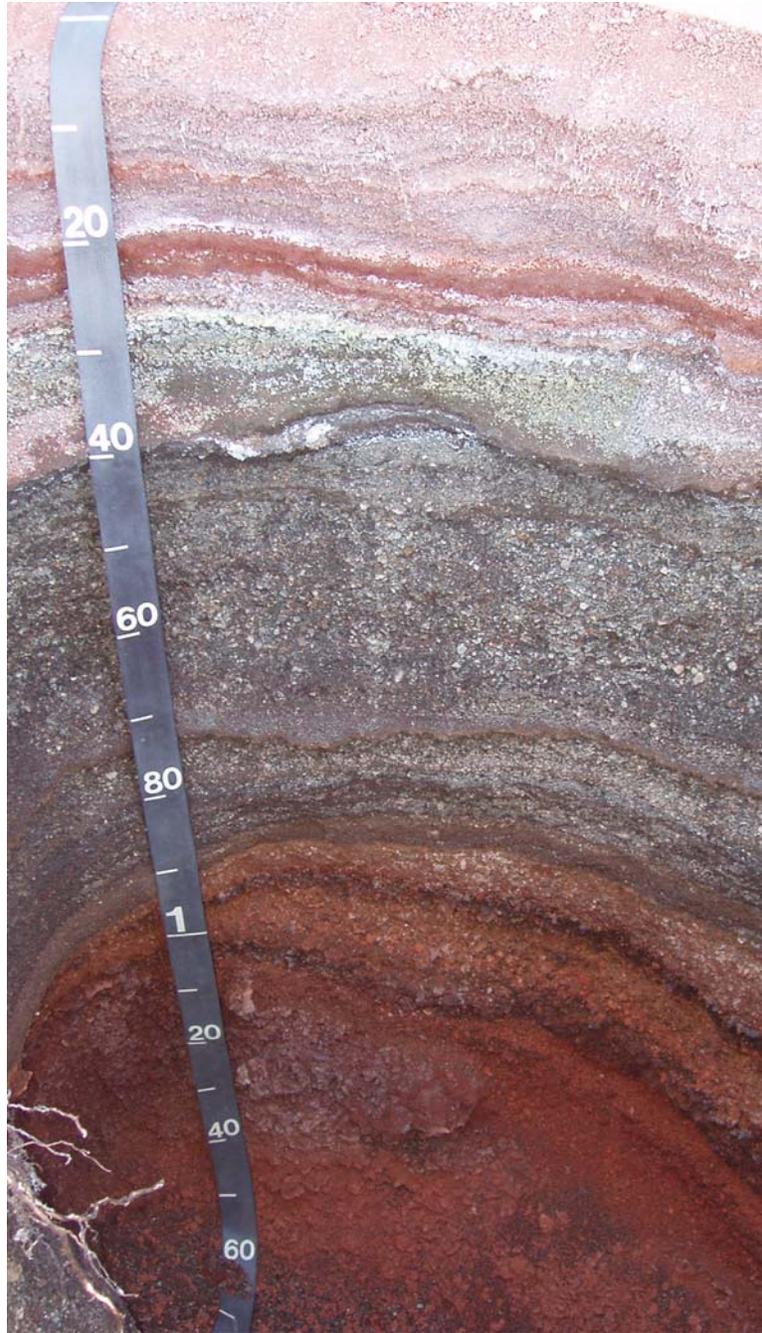


Figure 116.—Typical profile of Typic Xerorthents, welded. Depth is marked in centimeters.

coarse sand, dusky red (10R 3/3) moist; 0 percent clay; weak medium platy structure parting to single grain; moderately hard, firm, weakly cemented, nonsticky, nonplastic; few fine and medium and common very fine roots; many very fine to coarse interstitial pores; 8 percent angular medium gravel and 30 percent angular fine gravel; neutral, pH 6.8 by pH meter 1:1 water; NaF pH 8.8; abrupt smooth boundary.

C3—3 to 7 inches (8 to 17 centimeters); reddish brown (2.5YR 4/3) welded very

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- gravelly coarse sand, dark reddish brown (2.5YR 3/3) moist; 1 percent clay; strong very thick and thick platy structure; very hard, extremely firm, moderately cemented, nonsticky, nonplastic; few coarse and very coarse and common very fine to medium roots; many very fine to coarse interstitial pores; 5 percent angular medium gravel and 30 percent angular fine gravel; moderately alkaline, pH 8.1 by pH meter 1:1 water; NaF pH 8.5; abrupt smooth boundary.
- Cqm1—7 to 9 inches (17 to 23 centimeters); brown (10YR 5/3) welded gravelly coarse sand, dark reddish brown (2.5YR 3/3) moist; 0 percent clay; strong thick and medium platy structure; hard, very firm, moderately cemented, nonsticky, nonplastic; few very fine roots; many very fine to coarse interstitial pores; 15 percent silica masses around rock fragments; 16 percent angular fine gravel and 4 percent angular medium and coarse gravel; neutral, pH 7.0 by pH meter 1:1 water; NaF pH 8.3; abrupt smooth boundary.
- Cq1—9 to 12 inches (23 to 30 centimeters); dark gray (5Y 4/1) very gravelly coarse sand, black (5Y 2.5/1) moist; 1 percent clay; single grain; loose, nonsticky, nonplastic; few very fine and fine roots; many very fine to coarse interstitial pores; 20 percent silica masses around rock fragments; 10 percent subangular medium gravel and 40 percent angular fine gravel; neutral, pH 7.0 by pH meter 1:1 water; NaF pH 8.7; abrupt smooth boundary.
- Cqm2—12 to 15 inches (30 to 38 centimeters); dark gray (5YR 4/1) welded very gravelly coarse sand, very dark gray (5YR 3/1) moist; 1 percent clay; strong very thick platy structure; extremely hard, slightly rigid, very strongly cemented, nonsticky, nonplastic; few very fine to medium roots; many very fine to coarse interstitial pores; 40 percent silica masses around rock fragments; 5 percent subangular medium gravel and 40 percent subangular fine gravel; slightly alkaline, pH 7.4 by pH meter 1:1 water; NaF pH 9.1; abrupt smooth boundary.
- C4—15 to 25 inches (38 to 64 centimeters); dark gray (2.5Y 4/1) gravelly coarse sand, very dark gray (2.5Y 3/1) moist; 0 percent clay; single grain; loose, nonsticky, nonplastic; few very fine roots; many very fine to coarse interstitial pores; 10 percent angular medium gravel and 20 percent angular fine gravel; neutral, pH 7.1 by pH meter 1:1 water; NaF pH 8.8; abrupt smooth boundary.
- Cq2—25 to 26 inches (64 to 67 centimeters); brown (10YR 5/3) gravelly coarse sand, brown (10YR 4/3) moist; 1 percent clay; massive parting to single grain; loose, nonsticky, nonplastic; many very fine to coarse interstitial pores; 2 percent silica masses on bottom of rock fragments; 10 percent subangular medium gravel and 20 percent angular fine gravel; neutral, pH 7.1 by pH meter 1:1 water; NaF pH 9.0; abrupt smooth boundary.
- C6—26 to 34 inches (67 to 87 centimeters); very dark grayish brown (10YR 3/2) gravelly coarse sand, black (10YR 2/1) and very dark gray (10YR 3/1) moist; 0 percent clay; single grain; loose, nonsticky, nonplastic; few very fine roots; many very fine to medium interstitial pores; 5 percent angular medium gravel and 20 percent angular fine gravel; neutral, pH 6.9 by pH meter 1:1 water; NaF pH 8.0; abrupt smooth boundary.
- C7—34 to 37 inches (87 to 93 centimeters); reddish brown (5YR 5/3) very gravelly coarse sand, dark reddish brown (5YR 3/3) moist; 1 percent clay; single grain; loose, nonsticky, nonplastic; few very fine roots; many very fine to medium interstitial pores; 15 percent angular medium gravel and 30 percent angular fine gravel; neutral, pH 7.1 by pH meter 1:1 water; NaF pH 8.4; abrupt smooth boundary.
- C8—37 to 39 inches (93 to 99 centimeters); reddish brown (2.5YR 4/4) extremely gravelly coarse sand, dark reddish brown (2.5YR 3/4) moist; 1 percent clay; single grain; loose, nonsticky, nonplastic; few very fine roots; many very fine to very coarse interstitial pores; 12 percent angular fine gravel and 72 percent angular

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medium and coarse gravel; neutral, pH 7.1 by pH meter 1:1 water; NaF pH 8.8; abrupt smooth boundary.

C9—39 to 43 inches (99 to 110 centimeters); reddish brown (2.5YR 5/4) extremely gravelly coarse sand, reddish brown (2.5YR 4/4) moist; 0 percent clay; single grain; loose, nonsticky, nonplastic; few very fine roots; many very fine to very coarse interstitial pores; 20 percent angular medium gravel and 40 percent angular fine gravel; neutral, pH 7.1 by pH meter 1:1 water; NaF pH 8.1; abrupt smooth boundary.

C10—43 to 59 inches (110 to 150 centimeters); weak red (10R 4/3) and reddish brown (2.5YR 4/3) extremely gravelly coarse sand, dusky red (10R 3/3) moist; 1 percent clay; single grain; loose, nonsticky, nonplastic; few very fine roots; many very fine to very coarse interstitial pores; 10 percent angular cobbles, 14 percent angular fine gravel, and 65 percent angular medium and coarse gravel; neutral, pH 6.6 by pH meter 1:1 water; NaF pH 8.7.

Type Location

Lassen County, California; about 1.5 miles south-southwest of Butte Lake Ranger Station, approximately 2,500 feet west and 1,500 feet north of the southeast corner of sec. 16, T. 31 N., R. 6 E.; 40 degrees 32 minutes 43 seconds north latitude and 121 degrees 18 minutes 47 seconds west longitude, NAD83; USGS Quad: Prospect Peak, California.

Range in Characteristics

Depth to restrictive feature: 7 to 20 inches (17 to 51 centimeters) to welded material

Mean annual soil temperature: 45 to 47 degrees F (7 to 8 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (weighted average): 1 percent clay and 28 percent rock fragments

Surface fragments: 80 to 90 percent gravel, 0 to 2 percent cobbles, and 0 to 1 percent stones

Welded surface crust: Discontinuous, platy, and 1 to 1.5 centimeters thick

Upper C horizon and Cq horizon:

Color (dry)—10YR 4/4, 5/3; 2.5YR 4/3

Color (moist)—10YR 3/3, 3/4; 2.5YR 3/3

Texture—gravelly ashy coarse sand, welded very gravelly ashy coarse sand, welded very gravelly coarse sand, very gravelly coarse sand, gravelly coarse sand

Clay content—0 to 1 percent

Rock fragments—15 to 30 percent fine gravel, 3 to 10 percent medium and coarse gravel, 20 to 40 percent total gravel

Organic matter—0.03 to 0.05 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.02 to 0.10

P retention—1 to 8 percent

Glass content—28 to 35 percent

NaF pH—8.5 to 9.0

Soil reaction—neutral to moderately alkaline

Cqm horizon:

Color (dry)—10YR 5/3; 5Y 4/1; 5YR 4/1

Color (moist)—2.5YR 3/3; 5Y 3/1; 5YR 3/1

Texture—welded gravelly coarse sand, welded very gravelly coarse sand

Clay content—0 to 1 percent

Rock fragments—15 to 40 percent fine gravel, 3 to 10 percent medium and coarse gravel, 20 to 50 percent total gravel

Organic matter—0.03 to 0.1 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.02 to 0.14
P retention—3 to 18 percent
Glass content—0.5 to 4 percent
NaF pH—8.3 to 9.1
Rupture resistance—moderately cemented to very strongly cemented;
cementation due to welding not secondary silica accumulation
Soil reaction—neutral or slightly alkaline

Lower C horizon:

Color (dry)—2.5Y 4/1; 10YR 3/2, 4/3, 5/3; 5YR 5/3; 2.5YR 4/3, 4/4, 5/4
Color (moist)—2.5Y 3/1; 10YR 2/1, 3/1, 3/3, 4/3; 5YR 3/3; 2.5YR 3/4, 4/4
Texture—gravelly coarse sand, very gravelly coarse sand, extremely gravelly coarse sand
Clay content—0 to 1 percent
Rock fragments—10 to 40 percent fine gravel, 5 to 75 percent medium and coarse gravel, 25 to 85 percent total gravel
Organic matter—0 to 0.07 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.01 to 0.04
P retention—0 to 2 percent
Glass content—0 to 6 percent
NaF pH—8.1 to 9.0
Soil reaction—neutral

Vitrantic Cryofluvents

Vitrantic Cryofluvents consist of very deep, poorly drained soils that formed in glaciolacustrine deposits from volcanic rocks. These soils are in meadows that formed in glacial lakes. Slopes range from 0 to 8 percent. The mean annual precipitation is about 59 inches (1,499 millimeters), and the mean annual air temperature is about 40.6 degrees F (4.75 degrees C).

Taxonomic Classification

Vitrantic Cryofluvents

Typical Pedon

Vitrantic Cryofluvents gravelly ashy sandy loam (fig. 117) on a northwest-facing (320 degrees) slope of 1 percent under a cover of sedges at an elevation of 6,627 feet (2,020 meters). When described on 10/10/06, the soil was slightly moist at a depth of 0 to 3 inches (0 to 7 centimeters), moist at a depth of 3 to 8 inches (7 to 21 centimeters), very moist at a depth of 8 to 11 inches (21 to 28 centimeters), moist at a depth of 11 to 55 inches (28 to 140 centimeters), and saturated at a depth of 55 to more than 61 inches (140 to 155 centimeters). An artesian water table was at a depth of 55 inches (140 centimeters) and filled the pit up to a depth of 8 inches (20 centimeters). (Colors are for dry soil unless otherwise noted.)

Oi—0 to 3 inches (0 to 7 centimeters); peat; many very fine and fine and common medium roots; many very fine and fine irregular pores; slightly acid, pH 6.5 by Hellige-Truog; abrupt smooth boundary.

A—3 to 8 inches (7 to 21 centimeters); light gray (10YR 7/1) gravelly ashy sandy loam, dark grayish brown (10YR 4/2) moist; 12 percent clay; massive; moderately hard, friable, nonsticky, nonplastic; many very fine to medium roots; many very fine and fine irregular and many very fine and fine tubular pores; 5 percent subangular medium gravel and 10 percent subangular fine gravel; strongly acid, pH 5.2 by pH meter 1:1 water; NaF pH 8.0; abrupt smooth boundary.



Figure 117.—Typical profile of Vitrandic Cryofluvents. Depth is marked in centimeters.

- C—8 to 11 inches (21 to 28 centimeters); light gray (10YR 7/2) very gravelly ashy coarse sand, brown (10YR 5/3) moist; 2 percent clay; single grain; loose, nonsticky, nonplastic; many very fine to medium roots; many very fine and fine interstitial pores; 15 percent subangular medium and coarse gravel and 30 percent subangular fine gravel; moderately acid, pH 5.7 by pH meter 1:1 water; NaF pH 8.5; abrupt smooth boundary.
- Oa—11 to 13 inches (28 to 33 centimeters); light brownish gray (10YR 6/2) mucky clay loam, very dark grayish brown (10YR 3/2) moist; 31 percent clay; massive; moderately hard, firm, nonsticky, nonplastic; many very fine to medium roots; common very fine tubular pores; 1 percent subangular fine gravel and 2 percent subrounded medium gravel; moderately acid, pH 5.6 by pH meter 1:1 water; NaF pH 8.0; abrupt smooth boundary.

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- Ab—13 to 16 inches (33 to 41 centimeters); light gray (10YR 7/1) silty clay, very dark grayish brown (10YR 3/2) moist; 45 percent clay; massive; very hard, very firm, nonsticky, nonplastic; many very fine and fine and common medium roots; many very fine and fine tubular and common coarse tubular pores; 1 percent subangular medium and coarse gravel and 2 percent subangular fine gravel; moderately acid, pH 6.0 by pH meter 1:1 water; NaF pH 7.9; clear smooth boundary.
- Cg1—16 to 23 inches (41 to 58 centimeters); white (10YR 8/1) silty clay loam, dark grayish brown (10YR 4/2) moist; 33 percent clay; massive; hard, very firm, nonsticky, slightly plastic; many very fine and fine and common medium roots; many very fine and fine irregular and many very fine and fine tubular pores; 5 percent subangular fine gravel; moderately acid, pH 5.9 by pH meter 1:1 water; NaF pH 8.6; abrupt smooth boundary.
- Cg2—23 to 28 inches (58 to 72 centimeters); white (10YR 8/1) gravelly ashy coarse sandy loam, dark grayish brown (10YR 4/2) moist; 11 percent clay; massive; moderately hard, firm, slightly sticky, nonplastic; many very fine and fine and common medium roots; many very fine to medium irregular and many very fine to coarse tubular pores; 10 percent subangular medium and coarse gravel and 20 percent subangular fine gravel; slightly acid, pH 6.2 by pH meter 1:1 water; NaF pH 9.4; abrupt smooth boundary.
- Cg3—28 to 36 inches (72 to 92 centimeters); white (10YR 8/1) ashy silt loam, dark grayish brown (2.5Y 4/2) moist; 19 percent clay; massive; hard, very firm, slightly sticky, slightly plastic; many very fine and fine and few medium roots; common very fine and fine tubular, common medium irregular, and common coarse tubular pores; 1 percent subangular medium and coarse gravel and 5 percent subangular fine gravel; slightly acid, pH 6.3 by pH meter 1:1 water; NaF pH 8.3; clear smooth boundary.
- A¹b—36 to 55 inches (92 to 140 centimeters); light gray (10YR 7/2) ashy silt loam, dark grayish brown (10YR 4/2) moist; 22 percent clay; massive; hard, very firm, nonsticky, slightly plastic; many very fine and fine roots; common medium irregular and many very fine to coarse tubular pores; 3 percent subangular fine gravel and 5 percent subangular medium gravel; slightly acid, pH 6.5 by pH meter 1:1 water; NaF pH 8.1; abrupt smooth boundary.
- Cg4—55 to 61 inches (140 to 155 centimeters); light gray (10YR 7/1) extremely gravelly ashy coarse sand, dark gray (10YR 4/1) moist; 1 percent clay; single grain; loose, nonsticky, nonplastic; common very fine and fine roots; many very fine and fine interstitial pores; 30 percent subangular fine gravel and 35 percent subangular medium and coarse gravel; slightly acid, pH 6.5 by pH meter 1:1 water; NaF pH 8.5.

Type Location

Shasta County, California; about 0.38 mile north of Summit Lake, approximately 2,500 feet west and 450 feet north of the southeast corner of sec. 33, T. 31 N., R. 5 E.; 40 degrees 29 minutes 56 seconds north latitude and 121 degrees 25 minutes 38 seconds west longitude, NAD83; USGS Quad: Reading Peak, California.

Range in Characteristics

Depth to restrictive feature: More than 60 inches (152 centimeters) to bedrock

Mean annual soil temperature: 38 to 42 degrees F (3.3 to 5.6 degrees C)

Mean annual summer soil temperature: 43 to 46 degrees F (6 to 8 degrees C)

Soil moisture control section: Moist all year

Particle-size control section: Loamy part—11 to 33 percent clay and 3 to 30 percent rock fragments; ashy part—19 percent clay and 6 percent rock fragments

Depth to fluctuating water table (if it occurs): 0 to 60 inches (152 centimeters)

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A horizon:

Color (dry)—10YR 7/1
Color (moist)—10YR 4/2
Texture—gravelly ashy sandy loam, ashy sandy loam
Clay content—10 to 15 percent
Rock fragments—5 to 15 percent fine gravel, 0 to 10 percent medium and coarse gravel, 5 to 25 percent total gravel
Organic matter—5 to 10 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.15 to 0.20
P retention—15 to 20 percent
Glass content—20 to 30 percent
NaF pH—8.0 to 9.0
Soil reaction—strongly acid

C horizon:

Color (dry)—10YR 7/2
Color (moist)—10YR 5/3
Texture—very gravelly ashy coarse sand, gravelly ashy coarse sand, ashy coarse sand
Clay content—1 to 3 percent
Rock fragments—0 to 30 percent fine gravel, 0 to 20 percent medium and coarse gravel, 5 to 50 percent total gravel
Organic matter—1 to 2 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.15 to 0.20
P retention—10 to 15 percent
Glass content—20 to 40 percent
NaF pH—7.5 to 8.5
Soil reaction—moderately acid or slightly acid

Oa horizon:

Color (dry)—10YR 6/2, 7/1
Color (moist)—10YR 3/2
Texture—mucky clay loam, mucky silty clay
Clay content—20 to 45 percent
Rock fragments—0 to 3 percent fine gravel, 0 to 5 percent medium and coarse gravel, 0 to 8 percent total gravel
Organic matter—10 to 30 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.30 to 0.60
P retention—25 to 55 percent
Glass content—10 to 20 percent
NaF pH—7.5 to 8.5
Soil reaction—moderately acid or slightly acid

Ab and A' b horizons:

Color (dry)—10YR 6/2, 7/1, 7/2
Color (moist)—10YR 3/2, 4/2
Texture—mucky clay loam, silty clay, ashy silt loam
Clay content—20 to 45 percent
Rock fragments—0 to 3 percent fine gravel, 0 to 5 percent medium and coarse gravel, 0 to 8 percent total gravel
Organic matter—10 to 30 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.30 to 0.60
P retention—25 to 55 percent
Glass content—10 to 20 percent
NaF pH—7.5 to 8.5
Soil reaction—moderately acid or slightly acid

Upper Cg horizon:

Color (dry)—10YR 8/1
Color (moist)—10YR 4/2; 2.5Y 4/2
Texture—silty clay loam, gravelly ashy coarse sandy loam, ashy silt loam
Clay content—10 to 35 percent
Rock fragments—5 to 20 percent fine gravel, 0 to 10 percent medium and coarse gravel, 5 to 30 percent total gravel
Organic matter—3 to 10 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.30 to 0.60
P retention—15 to 40 percent
Glass content—20 to 40 percent
NaF pH—8.0 to 9.5
Soil reaction—moderately acid or slightly acid

Lower Cg horizon:

Color (dry)—10YR 7/1
Color (moist)—10YR 4/1
Texture—extremely gravelly ashy coarse sand
Clay content—0 to 2 percent
Rock fragments—25 to 40 percent fine gravel, 25 to 45 percent medium and coarse gravel, 50 to 70 percent total gravel
Organic matter—0 to 0.5 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.05 to 0.10
P retention—0 to 5 percent
Glass content—20 to 40 percent
NaF pH—8.0 to 9.0
Soil reaction—slightly acid or neutral

Vitrandic Cryorthents

Vitrandic Cryorthents consist of very deep, excessively drained soils that formed in pumiceous pyroclastic flow and fall deposits from Chaos Crags. These soils are on pyroclastic flows in hanging valleys. Slopes range from 5 to 60 percent. The mean annual precipitation is about 97 inches (2,464 millimeters), and the mean annual air temperature is about 40 degrees F (4 degrees C).

Taxonomic Classification

Vitrandic Cryorthents

Typical Pedon

Vitrandic Cryorthents very gravelly ashy loamy coarse sand (fig. 118) on an east-facing (106 degrees) slope of 6 percent under a cover of buckwheat and a few whitebark pine at an elevation of 7,656 feet (2,334 meters). When described on 8/12/2008, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

A—0 to 4 inches (0 to 10 centimeters); light gray (10YR 7/2) very gravelly ashy loamy coarse sand, grayish brown (10YR 5/2) moist; 1 percent clay; single grain; loose, nonsticky, nonplastic; many very fine and common fine roots; many very fine and fine interstitial pores; 25 percent subangular fine gravel and 20 percent subangular medium and coarse gravel; slightly acid, pH 6.2 by Hellige-Truog; NaF pH 10.0; clear wavy boundary.

AC—4 to 9 inches (10 to 24 centimeters); very pale brown (10YR 8/3) very gravelly ashy loamy coarse sand, grayish brown (10YR 5/2) moist; 1 percent clay; single grain; loose, nonsticky, nonplastic; common very fine and few fine roots; many very fine and fine interstitial pores; 25 percent subangular fine gravel and 25



Figure 118.—Typical profile of Vitrandic Cryorthents. Depth is marked in centimeters.

percent subangular medium and coarse gravel; slightly acid, pH 6.3 by Hellige-Truog; NaF pH 11.0; abrupt smooth boundary.

C1—9 to 17 inches (24 to 42 centimeters); light gray (10YR 7/1) extremely gravelly ashy coarse sand, gray (10YR 5/1) moist; 0 percent clay; single grain; loose, nonsticky, nonplastic; few very fine roots; many very fine to coarse interstitial pores; 35 percent subangular fine gravel and 35 percent subangular medium and coarse gravel; neutral, pH 6.9 by Hellige-Truog; NaF pH 9.8; abrupt smooth boundary.

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- C2—17 to 19 inches (42 to 48 centimeters); very pale brown (10YR 8/2) very gravelly ashy loamy coarse sand, light brownish gray (10YR 6/2) moist; 1 percent clay; weak very thick platy structure parting to single grain; loose, nonsticky, nonplastic; many very fine to medium interstitial pores; 25 percent subangular fine gravel and 12 percent subangular medium and coarse gravel; neutral, pH 6.7 by Hellige-Truog; NaF pH 11.5; abrupt smooth boundary.
- C3—19 to 27 inches (48 to 68 centimeters); white (10YR 8/1) extremely gravelly ashy coarse sand, light brownish gray (10YR 6/2) moist; 1 percent clay; single grain; loose, nonsticky, nonplastic; many very fine to coarse interstitial pores; 40 percent subangular fine gravel and 35 percent subangular medium and coarse gravel; neutral, pH 6.9 by Hellige-Truog; NaF pH 9.9; abrupt smooth boundary.
- C4—27 to 30 inches (68 to 75 centimeters); white (10YR 8/1) very gravelly ashy coarse sand, gray (10YR 6/1) moist; 0 percent clay; single grain; loose, nonsticky, nonplastic; many very fine to medium interstitial pores; 15 percent nonflat subangular medium and coarse gravel and 35 percent nonflat subangular fine gravel; neutral, pH 6.9 by Hellige-Truog; NaF pH 10.0; abrupt smooth boundary.
- C5—30 to 35 inches (75 to 90 centimeters); light gray (10YR 7/1) very gravelly ashy coarse sand, gray (10YR 5/1) moist; 0 percent clay; single grain; loose, nonsticky, nonplastic; many very fine to coarse interstitial pores; 18 percent subangular fine gravel, 18 percent subangular medium and coarse gravel, and 2 percent subangular cobbles; neutral, pH 6.8 by Hellige-Truog; NaF pH 9.9; abrupt smooth boundary.
- C6—35 to 38 inches (90 to 97 centimeters); white (10YR 8/1) very gravelly ashy coarse sand, light brownish gray (10YR 6/2) moist; 0 percent clay; single grain; loose, nonsticky, nonplastic; many very fine to medium interstitial pores; 18 percent subangular fine gravel, 18 percent subangular medium and coarse gravel, and 2 percent subangular cobbles; neutral, pH 6.7 by Hellige-Truog; NaF pH 10.1; abrupt smooth boundary.
- C7—38 to 60 inches (97 to 152 centimeters); pinkish white (7.5YR 8/2) extremely gravelly ashy coarse sand, pinkish gray (7.5YR 7/2) moist; 0 percent clay; single grain; loose, nonsticky, nonplastic; many very fine to medium interstitial pores; 13 percent subangular fine gravel, 35 percent subangular medium and coarse gravel, 10 percent subangular cobbles, and 2 percent subangular stones; slightly acid, pH 6.6 by Hellige-Truog; NaF pH 9.0.

Type Location

Shasta County, California; about 2.13 miles west of the Emigrant Pass/Devastated Area parking lot, approximately 350 feet south and 1,150 feet west of the northeast corner of sec. 27, T. 31 N., R. 4 E.; 40 degrees 30 minutes 48 seconds north latitude and 121 degrees 30 minutes 22 seconds west longitude, NAD83; USGS Quad: Manzanita Lake, California.

Range in Characteristics

Depth to restrictive feature: More than 60 inches (152 centimeters) to bedrock

Mean annual soil temperature: 40 to 44 degrees F (4 to 7 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (thickest part): 0 to 1 percent clay and 38 to 75 percent rock fragments

Surface fragments: 70 to 80 percent gravel, 10 to 20 percent cobbles, 0 to 10 percent stones, and 0 to 5 percent boulders

A horizon:

Color (dry)—10YR 7/2, 7/3

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Color (moist)—10YR 5/2, 5/3
Texture—very gravelly ashy loamy coarse sand
Clay content—0 to 1 percent
Rock fragments—20 to 30 percent fine gravel, 15 to 25 percent medium and coarse gravel, 40 to 55 percent total gravel
Organic matter—0.1 to 0.3 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.15 to 0.30
P retention—8 to 15 percent
Glass content—35 to 45 percent
NaF pH—10.0 to 10.3
Soil reaction—slightly acid

AC horizon:

Color (dry)—10YR 8/2, 8/3
Color (moist)—10YR 5/2, 5/3
Texture—very gravelly ashy loamy coarse sand
Clay content—0 to 1 percent
Rock fragments—20 to 30 percent fine gravel, 20 to 30 percent medium and coarse gravel, 40 to 55 percent total gravel
Organic matter—0 to 0.2 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.15 to 0.30
P retention—8 to 15 percent
Glass content—30 to 35 percent
NaF pH—10.8 to 11.1
Soil reaction—slightly acid

Upper C horizon:

Color (dry)—10YR 7/1, 8/1, 8/2
Color (moist)—10YR 5/1, 6/1, 6/2
Texture—very gravelly ashy coarse sand, extremely gravelly ashy coarse sand, very gravelly ashy loamy coarse sand
Clay content—0 to 1 percent
Rock fragments—20 to 45 percent fine gravel, 10 to 40 percent medium and coarse gravel, 35 to 80 percent total gravel
Organic matter—0 to 0.2 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.12 to 0.23
P retention—5 to 15 percent
Glass content—25 to 30 percent
NaF pH—9.8 to 11.5
Soil reaction—neutral

Lower C horizon:

Color (dry)—10YR 7/1, 8/1, 8/2
Color (moist)—10YR 5/1, 6/2, 7/2
Texture—very gravelly ashy coarse sand, extremely gravelly ashy coarse sand
Clay content—0 to 0.5 percent
Rock fragments—10 to 25 percent fine gravel, 15 to 45 percent medium and coarse gravel, 30 to 65 percent total gravel, 0 to 15 percent cobbles, 0 to 5 percent stones, 35 to 80 percent total rock fragments
Organic matter—0 to 0.2 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.12 to 0.23
P retention—5 to 15 percent
Glass content—25 to 30 percent
NaF pH—9.0 to 10.1
Soil reaction—neutral

Vitrandid Cryorthents, debris flows

Vitrandid Cryorthents, debris flows consist of moderately deep to very deep, moderately well drained and well drained soils that formed in pyroclastic and debris flows over glacial till from volcanic rocks or debris flows and pyroclastic flows from volcanic rocks. These soils are on Lassen Peak and moraines at the base of the peak. Slopes range from 10 to 95 percent. The mean annual precipitation is about 89 inches (2,260 millimeters), and the mean annual air temperature is about 40 degrees F (4.4 degrees C).

Taxonomic Classification

Vitrandid Cryorthents

Typical Pedon

Vitrandid Cryorthents, debris flows, very gravelly ashy loamy coarse sand on a north-facing (5 degrees) slope of 11 percent under a cover of lupine, mountain monardella, California red fir, lodgepole pine, and western white pine at an elevation of 7,145 feet (2,178 meters). When described on 7/25/07, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

- A—0 to 4 inches (0 to 9 centimeters); light brownish gray (10YR 6/2) very gravelly ashy loamy coarse sand, brown (10YR 4/3) moist; 0 percent clay; weak thick platy structure parting to single grain; loose, nonsticky, nonplastic; common very fine roots; many very fine and fine interstitial and many very fine and fine irregular pores; 3 percent subangular cobbles, 18 percent subangular medium and coarse gravel, and 19 percent subangular fine gravel; moderately acid, pH 6.0 by Hellige-Truog; NaF pH 10.0; abrupt smooth boundary.
- C1—4 to 13 inches (9 to 32 centimeters); light brownish gray (10YR 6/2) very gravelly ashy loamy coarse sand, dark grayish brown (10YR 4/2) moist; 0 percent clay; weak fine subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; many very fine and fine and common medium roots; many very fine and fine irregular and many very fine and fine interstitial pores; 5 percent subangular cobbles, 14 percent subangular fine gravel, and 19 percent subangular medium and coarse gravel; moderately acid, pH 6.1 by Hellige-Truog; NaF pH 10.5; clear smooth boundary.
- C2—13 to 19 inches (32 to 47 centimeters); light brownish gray (10YR 6/2) extremely gravelly ashy loamy coarse sand, dark grayish brown (10YR 4/2) moist; 0 percent clay; single grain; loose, nonsticky, nonplastic; few very fine to medium roots; many very fine to medium interstitial pores; 10 percent masses of oxidized iron around rock fragments; 10 percent subangular cobbles, 12 percent subangular fine gravel, and 52 percent subangular medium and coarse gravel; slightly acid, pH 6.2 by Hellige-Truog; NaF pH 10.7; abrupt wavy boundary.
- 2Bq—19 to 32 inches (47 to 82 centimeters); pale brown (10YR 6/3) extremely stony ashy loamy sand, dark brown (7.5YR 3/3) moist; 3 percent clay; massive; loose, nonsticky, nonplastic; few fine and medium roots; many very fine to medium irregular and many very fine to medium interstitial pores; 30 percent masses of oxidized iron around rock fragments; 5 percent threadlike silica masses around rock fragments; 9 percent subangular fine gravel, 20 percent subangular stones, 25 percent subangular medium and coarse gravel, and 25 percent subangular cobbles; slightly acid, pH 6.3 by Hellige-Truog; NaF pH 11.4; abrupt wavy boundary.
- 2Cdq—32 to 41 inches (82 to 103 centimeters); light gray (10YR 7/2) very cobbly ashy loamy sand, brown (10YR 4/3) moist; 1 percent clay; massive; hard, very firm, nonsticky, nonplastic; many very fine and fine irregular and few very fine vesicular pores; 15 percent threadlike silica masses around rock fragments; 5 percent

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subangular stones, 15 percent subangular cobbles, 16 percent subangular fine gravel, and 20 percent subangular medium and coarse gravel; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 11.2.

Type Location

Shasta County, California; about 0.75 mile southwest of Hat Lake, approximately 1,000 feet east and 1,400 feet north of the southwest corner of sec. 25, T. 31 N., R. 4 E.; 40 degrees 30 minutes 14 seconds north latitude and 121 degrees 28 minutes 42 seconds west longitude, NAD83; USGS Quad: West Prospect Peak, California.

Range in Characteristics

Depth to restrictive feature: 20 to more than 60 inches (51 to 152 centimeters) to densic contact

Mean annual soil temperature: 38 to 43 degrees F (3.3 to 6.1 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (thickest part): 0 percent clay and 73 percent rock fragments

Surface fragments: 70 to 90 percent gravel, 5 to 15 percent cobbles, 2 to 10 percent stones, and 0 to 10 percent boulders

Other characteristics: Some pedons do not have A, 2Bq, and 2Cdq horizons; some pedons have 2Ab or 2Bwb horizons

A horizon:

Color (dry)—10YR 6/2

Color (moist)—10YR 4/3

Texture—very gravelly ashy loamy coarse sand, very gravelly ashy coarse sand

Clay content—0 to 1 percent

Rock fragments—15 to 30 percent fine gravel, 15 to 30 percent medium and coarse gravel, 35 to 60 percent total gravel, 0 to 10 percent cobbles, 0 to 3 percent stones, 0 to 30 percent boulders, 35 to 60 percent total rock fragments

Organic matter—0 to 0.3 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.12 to 0.3

P retention—8 to 15 percent

Glass content—30 to 35 percent

NaF pH—9.5 to 10.2

Soil reaction—moderately acid to neutral

C horizon:

Color (dry)—10YR 6/1, 6/2, 7/1; 2.5Y 4/1

Color (moist)—10YR 3/1, 4/1, 4/2,

Texture—extremely gravelly ashy loamy coarse sand, gravelly ashy coarse sand, very gravelly ashy coarse sand, very gravelly ashy loamy coarse sand

Clay content—0 to 1 percent

Rock fragments—10 to 25 percent fine gravel, 10 to 55 percent medium and coarse gravel, 25 to 65 percent total gravel, 0 to 15 percent cobbles, 0 to 15 percent stones, 0 to 5 percent boulders, 30 to 80 percent total rock fragments

Organic matter—0 to 0.2 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.12 to 0.30

P retention—8 to 15 percent

Glass content—30 to 35 percent

NaF pH—10.0 to 11.0

Soil reaction—slightly acid or neutral

2Bq horizon:

Color (dry)—10YR 6/3, 7/3

Color (moist)—7.5YR 3/3; 10YR 3/4

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Texture—extremely stony ashy loamy sand, extremely stony ashy loamy coarse sand, ashy stones
Clay content—1 to 3 percent
Rock fragments—5 to 15 percent fine gravel, 25 to 35 percent medium and coarse gravel, 30 to 40 percent total gravel, 10 to 30 percent cobbles, 5 to 50 percent stones, 0 to 15 percent boulders, 60 to 95 percent total rock fragments
Organic matter—0.5 to 1.5 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.0 to 1.5
P retention—45 to 55 percent
Glass content—15 to 30 percent
NaF pH—10.5 to 11.5
Soil reaction—slightly acid or neutral

2Cdq horizon:

Color (dry)—10YR 7/2, 7/3
Color (moist)—10YR 4/3, 4/4
Texture—very cobbly ashy loamy sand, extremely gravelly ashy loamy sand, extremely stony ashy loamy coarse sand, ashy stones
Clay content—1 to 3 percent
Rock fragments—5 to 20 percent fine gravel, 20 to 30 percent medium and coarse gravel, 35 to 40 percent total gravel, 10 to 30 percent cobbles, 5 to 50 percent stones, 0 to 15 percent boulders, 60 to 99 percent total rock fragments
Organic matter—0 to 0.3 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.5 to 0.8
P retention—25 to 35 percent
Glass content—15 to 30 percent
NaF pH—11.0 to 11.5
Soil reaction—slightly acid or neutral

Vitrandic Xerofluvents

Vitrandic Xerofluvents consist of very deep, well drained soils that formed in debris flows from Lassen Peak over tephra from volcanic rocks. These soils are on debris flows. Slopes range from 0 to 15 percent. The mean annual precipitation is about 57 inches (1,448 millimeters), and the mean annual air temperature is about 43 degrees F (6 degrees C).

Taxonomic Classification

Frigid Vitrandic Xerofluvents

Typical Pedon

Vitrandic Xerofluvents gravelly ashy loamy sand (fig. 119) on a north-facing (358 degrees) slope of 2 percent under a cover of Jeffrey pine, lodgepole pine, and snowplant at an elevation of 6,134 feet (1,870 meters). When described on 6/17/2007, the soil was very slightly moist throughout. (Colors are for dry soil unless otherwise noted.)

- Oi—0 to 2 inches (0 to 5 centimeters); slightly decomposed needles and cone litter; abrupt wavy boundary.
- A1—2 to 4 inches (5 to 9 centimeters); light gray (10YR 7/2) gravelly ashy loamy sand, dark grayish brown (10YR 4/2) moist; 2 percent clay; weak very fine and fine granular structure parting to single grain; soft, very friable, nonsticky, nonplastic; common very fine and few fine roots; many very fine and fine interstitial pores; 16 percent subangular fine gravel and 4 percent subangular medium gravel; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 10.7; abrupt smooth boundary.



Figure 119.—Typical profile of Vitrandic Xerofluvents. Depth is marked in centimeters.

- A2—4 to 6 inches (9 to 14 centimeters); light gray (10YR 7/2) gravelly ashy loamy sand, dark grayish brown (10YR 4/2) moist; 3 percent clay; weak fine and medium subangular blocky structure parting to single grain; soft, very friable, nonsticky, nonplastic; common very fine and fine roots; many very fine and fine interstitial and few fine and medium tubular pores; 12 percent subangular fine gravel and 5 percent subangular medium gravel; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 10.7; abrupt smooth boundary.
- C1—6 to 12 inches (14 to 31 centimeters); light gray (10YR 7/2) gravelly ashy loamy sand, dark grayish brown (10YR 4/2) moist; 3 percent clay; weak fine and medium subangular blocky structure parting to single grain; soft, very friable, nonsticky, nonplastic; common very fine to very coarse roots; many very fine and fine interstitial and common fine and medium tubular pores; 20 percent subangular fine gravel and 10 percent subangular medium gravel; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 9.9; abrupt smooth boundary.
- C2—12 to 32 inches (31 to 82 centimeters); light gray (10YR 7/2) very gravelly ashy loamy coarse sand, dark grayish brown (10YR 4/2) moist; 3 percent clay; massive parting to single grain; loose, nonsticky, nonplastic; common very fine and few fine and medium roots; many very fine and fine interstitial and few medium tubular pores; 15 percent subangular fine gravel and 25 percent subangular medium and coarse gravel; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 9.3; abrupt smooth boundary.

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- C3—32 to 34 inches (82 to 86 centimeters); white (10YR 8/1) ashy sand, brown (10YR 4/3) moist; 1 percent clay; massive parting to single grain; loose, nonsticky, nonplastic; few very fine roots; common fine and medium tubular pores; 8 percent subangular fine gravel and 1 percent subangular medium and coarse gravel; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 10.7; abrupt smooth boundary.
- C4—34 to 50 inches (86 to 127 centimeters); white (10YR 8/1) very gravelly ashy loamy sand, brown (10YR 5/3) moist; 2 percent clay; massive parting to single grain; loose, nonsticky, nonplastic; few very fine and fine roots; many very fine and fine interstitial pores; 25 percent subangular fine gravel and 15 percent subangular medium gravel; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 10.6; abrupt smooth boundary.
- Oe—50 to 51 inches (127 to 129 centimeters); very dark gray (10YR 3/1) moderately decomposed needles, roots, and woody litter, black (10YR 2/1) moist; single grain; many very fine to very coarse roots; many very fine to medium interstitial pores; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 9.0; abrupt smooth boundary.
- 2Ab—51 to 56 inches (129 to 141 centimeters); light gray (10YR 7/2) gravelly ashy loamy sand, very dark grayish brown (10YR 3/2) moist; 4 percent clay; weak fine and medium subangular blocky structure parting to single grain; soft, very friable, nonsticky, nonplastic; common very fine and fine and many medium to very coarse roots; many very fine and fine interstitial and common fine and medium tubular pores; 16 percent subangular fine gravel and 7 percent subangular medium and coarse gravel; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 9.0; abrupt irregular boundary.
- 2C1—56 to 62 inches (141 to 158 centimeters); white (10YR 8/1) gravelly ashy loamy sand, brown (10YR 5/3) moist; 4 percent clay; weak medium and thick platy structure parting to single grain; soft, very friable, nonsticky, nonplastic; common very fine and fine and many medium to very coarse roots; many very fine and fine interstitial and few medium tubular pores; 5 percent yellowish red (5YR 4/6), dry, and strong brown (7.5YR 5/8), dry, masses of oxidized iron around rock fragments and lining pores; 15 percent subangular fine gravel and 12 percent subangular medium and coarse gravel; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 11.0; clear smooth boundary.
- 2C2—62 to 63 inches (158 to 160 centimeters); white (10YR 8/1) very gravelly ashy sandy loam, brown (10YR 5/3) moist; 7 percent clay; weak medium and thick platy structure; soft, very friable, nonsticky, nonplastic; common fine and medium roots; many very fine and fine interstitial pores; 10 percent strong brown (7.5YR 5/8), dry, and yellowish red (5YR 4/6), dry, masses of oxidized iron around rock fragments and lining pores; 15 percent subangular fine gravel and 25 percent subangular medium and coarse gravel; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 10.3.

Type Location

Shasta County, California; about 0.35 mile north-northeast of Hot Rock, approximately 2,600 feet west and 1,600 feet south of the northeast corner of sec. 14, T. 31 N., R. 4 E.; 40 degrees 32 minutes 15 seconds north latitude and 121 degrees 29 minutes 29 seconds west longitude, NAD83; USGS Quad: West Prospect Peak, California.

Range in Characteristics

Depth to restrictive feature: More than 60 inches (152 centimeters) to bedrock

Mean annual soil temperature: 43 to 45 degrees F (6 to 7 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (weighted average): 3 percent clay and 38 percent rock fragments

Surface fragments: 15 to 25 percent gravel, 0 to 5 percent cobbles, 0 to 3 percent stones, and 0 to 10 percent boulders

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A horizon:

Color (dry)—10YR 6/2, 7/2
Color (moist)—10YR 4/2, 4/3
Texture—gravelly ashy loamy sand, cobbly ashy loamy sand
Clay content—2 to 3 percent
Rock fragments—5 to 20 percent fine gravel, 0 to 8 percent medium and coarse gravel, 10 to 25 percent total gravel, 0 to 15 percent cobbles, 15 to 35 percent total rock fragments
Organic matter—0.2 to 1.06 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.15 to 0.3
P retention—60 to 90 percent
Glass content—35 to 45 percent
NaF pH—10.2 to 10.7
Soil reaction—slightly acid or neutral

Upper C horizon:

Color (dry)—10YR 7/2; 2.5Y 6/2
Color (moist)—10YR 4/2, 4/3
Texture—gravelly ashy loamy sand, very gravelly ashy loamy coarse sand, extremely gravelly ashy loamy sand, very cobbly ashy loamy sand
Clay content—3 to 4 percent
Rock fragments—5 to 25 percent fine gravel, 5 to 40 percent medium and coarse gravel, 20 to 55 percent total gravel, 0 to 20 percent cobbles, 0 to 15 percent stones, 20 to 85 percent total rock fragments
Organic matter—0.2 to 0.5 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.2 to 0.3
P retention—10 to 25 percent
Glass content—25 to 30 percent
NaF pH—9.3 to 10.5
Soil reaction—9.3 to 10.5

Lower C horizon:

Color (dry)—10YR 8/1; 2.5Y 6/2
Color (moist)—10YR 4/3, 5/3
Texture—ashy sand, very gravelly ashy loamy sand, extremely gravelly ashy loamy sand
Clay content—1 to 3 percent
Rock fragments—5 to 30 percent fine gravel, 0 to 25 percent medium and coarse gravel, 5 to 50 percent total gravel, 0 to 25 percent cobbles, 0 to 25 percent stones, 5 to 85 percent total rock fragments
Organic matter—0 to 0.5 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.2 to 0.3
P retention—10 to 25 percent
Glass content—25 to 30 percent
NaF pH—10.5 to 10.7
Soil reaction—slightly acid or neutral

2Ab horizon:

Color (dry)—10YR 7/2
Color (moist)—10YR 3/2, 3/3
Texture—gravelly ashy loamy sand, very gravelly ashy loamy sand
Clay content—1 to 6 percent
Rock fragments—10 to 20 percent fine gravel, 5 to 10 percent medium and coarse gravel, 15 to 30 percent total gravel, 0 to 15 percent cobbles, 0 to 15 percent stones, 15 to 60 percent total rock fragments
Organic matter—3 to 5 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.4 to 0.7

P retention—25 to 40 percent

Glass content—35 to 50 percent

NaF pH—9.0 to 9.2

Soil reaction—slightly acid or neutral

2C horizon:

Color (dry)—10YR 8/1

Color (moist)—10YR 5/3

Texture—gravelly ashy sandy loam, very gravelly ashy sandy loam, extremely gravelly ashy sandy loam, gravelly ashy loamy sand, gravelly ashy loamy coarse sand, very gravelly ashy coarse sand, gravelly ashy sand

Clay content—0 to 7 percent

Rock fragments—10 to 20 percent fine gravel, 10 to 30 percent medium and coarse gravel, 20 to 45 percent total gravel, 0 to 15 percent cobbles, 0 to 15 percent stones, 20 to 70 percent rock fragments

Organic matter—0.5 to 3 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.3 to 1.2

P retention—15 to 35 percent

Glass content—35 to 45 percent

NaF pH—10.3 to 11.0

Soil reaction—slightly acid or neutral

Vitrandic Xerofluvents, debris flows

Vitrandic Xerofluvents, debris flows consist of very deep, somewhat poorly drained soils that formed in debris flows from Lassen Peak over alluvium from volcanic rocks. These soils are on low stream terraces. Slopes range from 0 to 8 percent. The mean annual precipitation is about 57 inches (1,448 millimeters), and the mean annual air temperature is about 40 degrees F (6.4 degrees C).

Taxonomic Classification

Frigid Vitrandic Xerofluvents

Typical Pedon

Vitrandic Xerofluvents, debris flows, ashy very fine sandy loam on a northeast-facing (40 degrees) slope of 1 percent under a cover of lodgepole pine, white fir, aspen, grasses, and Sierra gooseberry at an elevation of 6,165 feet (1,879 meters). When described on 8/15/07, the soil was dry to a depth of 17 inches (42 centimeters), slightly moist at a depth of 17 to 50 inches (42 to 127 centimeters), and moist at a depth of 50 to 60 inches (127 to 170 centimeters). (Colors are for dry soil unless otherwise noted.)

Oi—0 to 1 inch (0 to 2 centimeters); slightly decomposed grass and needle litter; abrupt wavy boundary.

Oe—1 to 3 inches (2 to 7 centimeters); moderately decomposed needles and twigs; many very fine and fine roots; abrupt wavy boundary.

C1—3 to 6 inches (7 to 16 centimeters); light brownish gray (10YR 6/2) ashy very fine sandy loam, dark grayish brown (10YR 4/2) moist; 6 percent clay; single grain; loose, nonsticky, nonplastic; many very fine and fine and few medium and coarse roots; many very fine and fine interstitial pores; 3 percent subangular fine gravel; moderately acid, pH 6.0 by Hellige-Truog; NaF pH 9.7; abrupt wavy boundary.

C2—6 to 9 inches (16 to 22 centimeters); light brownish gray (10YR 6/2) ashy very fine sandy loam, dark grayish brown (10YR 4/2) moist; 7 percent clay; single grain; loose, nonsticky, nonplastic; common very fine to medium roots; many very fine and fine interstitial pores; 1 percent subangular medium gravel and 3 percent

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- subangular fine gravel; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 10.5; abrupt smooth boundary.
- C3—9 to 13 inches (22 to 32 centimeters); light brownish gray (10YR 6/2) ashy very fine sandy loam, dark grayish brown (10YR 4/2) moist; 6 percent clay; weak fine and medium subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; few very fine and fine roots; many very fine and fine interstitial pores; 2 percent subangular medium gravel and 3 percent subangular fine gravel; neutral, pH 6.7 by Hellige-Truog; NaF pH 10.6; abrupt smooth boundary.
- C4—13 to 17 inches (32 to 42 centimeters); light brownish gray (10YR 6/2) ashy loamy coarse sand, dark grayish brown (10YR 4/2) moist; 3 percent clay; massive parting to single grain; loose, nonsticky, nonplastic; few very fine and fine roots; many very fine and fine interstitial pores; 1 percent subangular medium gravel and 6 percent subangular fine gravel; neutral, pH 6.8 by Hellige-Truog; NaF pH 11.0; abrupt smooth boundary.
- C5—17 to 35 inches (42 to 89 centimeters); light brownish gray (10YR 6/2) very gravelly ashy loamy coarse sand, dark grayish brown (10YR 4/2) moist; 2 percent clay; massive parting to single grain; loose, nonsticky, nonplastic; few very fine and fine roots; many very fine and fine interstitial pores; 5 percent subangular medium gravel and 40 percent subangular fine gravel; neutral, pH 7.0 by Hellige-Truog; NaF pH 10.7; abrupt smooth boundary.
- C6—35 to 50 inches (89 to 127 centimeters); light brownish gray (10YR 6/2) very gravelly ashy loamy coarse sand, dark grayish brown (10YR 4/2) moist; 2 percent clay; massive parting to single grain; loose, nonsticky, nonplastic; few very fine and fine roots; many very fine and fine interstitial pores; 25 percent subangular medium gravel and 35 percent subangular fine gravel; neutral, pH 6.8 by Hellige-Truog; NaF pH 11.2; abrupt smooth boundary.
- 2Ab1—50 to 55 inches (127 to 139 centimeters); light brownish gray (10YR 6/2) very gravelly ashy fine sandy loam, very dark gray (10YR 3/1) moist; 8 percent clay; weak fine to coarse subangular blocky structure; soft, very friable, nonsticky, nonplastic; few very fine to medium roots; many very fine and fine interstitial pores; 15 percent subangular medium gravel and 25 percent subangular fine gravel; slightly acid, pH 6.3 by Hellige-Truog; NaF pH 10.3; abrupt smooth boundary.
- 2Ab2—55 to 67 inches (139 to 170 centimeters); light brownish gray (10YR 6/2) very gravelly ashy fine sandy loam, very dark grayish brown (10YR 3/2) moist; 11 percent clay; weak fine to coarse subangular blocky structure; soft, very friable, nonsticky, nonplastic; few very fine to medium roots; many very fine and fine interstitial pores; 18 percent subangular medium gravel and 23 percent subangular fine gravel; neutral, pH 6.7 by Hellige-Truog; NaF pH 10.2.

Type Location

Shasta County, California; about 2.25 miles northeast of Hat Lake, approximately 1,750 feet west and 1,400 feet south of the northeast corner of sec. 20, T. 31 N., R. 5 E.; 40 degrees 32 minutes 15 seconds north latitude and 121 degrees 26 minutes 37 seconds west longitude, NAD83; USGS Quad: West Prospect Peak, California.

Range in Characteristics

Depth to restrictive feature: More than 60 inches (152 centimeters) to lithic contact

Mean annual soil temperature: 43 to 45 degrees F (6 to 7 degrees C)

Period that soil moisture control section is dry: August to October (about 60 days)

Particle-size control section (weighted average): 2 percent clay and 43 percent rock fragments

Surface fragments: 0 to 20 percent gravel, 0 to 10 percent cobbles, 0 to 10 percent stones, and 0 to 10 percent boulders

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Depth to fluctuating water table (if it occurs): 10 to 65 inches (25 to 165 centimeters)

Redoximorphic features (if they occur): Masses of oxidized iron in the C horizon

Other characteristics: The debris, both the initial pulse and the reworked surficial material combined, ranges from 10 to 50 inches (25 to 125 centimeters) in thickness; some pedons that have thinner layers of debris have 2Bwb horizons within a depth of 60 inches (152 centimeters) under the 2Ab horizon

Upper C horizon:

Color (dry)—10YR 4/1, 5/2, 5/3, 6/1, 6/2, 6/3, 7/2

Color (moist)—10YR 3/1, 3/2, 3/3, 4/1, 4/2

Texture—ashy very fine sandy loam, ashy loamy sand, ashy coarse sand, gravelly ashy sandy loam, ashy fine sandy loam, ashy sandy loam, gravelly ashy loamy coarse sand

Clay content—0 to 8 percent

Rock fragments—3 to 10 percent fine gravel, 0 to 10 percent medium and coarse gravel, 3 to 20 percent total gravel, 0 to 5 percent cobbles, 0 to 5 percent stones, 0 to 5 percent boulders, 3 to 35 percent total rock fragments

Organic matter—0.5 to 2 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.2 to 0.3

P retention—10 to 25 percent

Glass content—35 to 45 percent

NaF pH—9.0 to 10.7

Soil reaction—moderately acid to neutral

Lower C horizon:

Color (dry)—10YR 6/2, 7/2

Color (moist)—10YR 4/2

Texture—ashy loamy coarse sand, very gravelly ashy loamy coarse sand, gravelly ashy loamy coarse sand, very gravelly ashy coarse sand, gravelly ashy coarse sand

Clay content—0 to 3 percent

Rock fragments—5 to 45 percent fine gravel, 0 to 25 percent medium and coarse gravel, 5 to 60 percent total gravel, 0 to 5 percent cobbles, 0 to 5 percent stones, 0 to 5 percent boulders, 5 to 60 percent total rock fragments

Organic matter—0 to 0.5 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.2 to 0.3

P retention—10 to 25 percent

Glass content—30 to 35 percent

NaF pH—9.8 to 11.2

Soil reaction—slightly acid or neutral

2Ab horizon:

Color (dry)—10YR 6/2

Color (moist)—10YR 3/1, 3/2

Texture—very gravelly ashy fine sandy loam, gravelly ashy coarse sandy loam, gravelly ashy loam

Clay content—3 to 12 percent

Rock fragments—5 to 25 percent fine gravel, 5 to 20 percent medium and coarse gravel, 15 to 40 percent total gravel

Organic matter—3 to 6 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1 to 1.5

P retention—60 to 90 percent

Glass content—35 to 50 percent

NaF pH—10.0 to 11.2

Soil reaction—slightly acid or neutral



Figure 120.—Typical profile of Vitrandic Xerorthents. Depth is marked in centimeters.

Vitrandic Xerorthents

Vitrandic Xerorthents consist of very deep, somewhat excessively drained soils that formed in ash over colluvium over residuum from volcanic rocks. These soils are on cinder cone volcanoes. Slopes range from 15 to 60 percent. The mean annual precipitation is about 57 inches (1,448 millimeters), and the mean annual air temperature is about 42 degrees F (6 degrees C).

Taxonomic Classification

Frigid Vitrandic Xerorthents

Typical Pedon

Vitrandic Xerorthents very gravelly ashy loamy sand (fig. 120) on a south-southwest-facing (210 degrees) slope of 48 percent under a cover of greenleaf manzanita, Jeffrey pine, white fir, western white pine, and lodgepole pine at an elevation of 7,421 feet (2,262 meters). When described on 6/12/2007, the soil was dry at a depth of 0 to

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3 centimeters and very slightly moist at a depth of 3 to 156 centimeters. (Colors are for dry soil unless otherwise noted.)

Oi—0 to 1 inch (0 to 3 centimeters); slightly decomposed needles; abrupt smooth boundary.

A—1 to 5 inches (3 to 12 centimeters); pale brown (10YR 6/3) very gravelly ashy loamy sand, dark grayish brown (10YR 4/2) moist; 3 percent clay; weak medium subangular blocky structure parting to weak very fine and fine granular; loose, nonsticky, nonplastic; many very fine and few fine and medium roots; many very fine and fine interstitial pores; 20 percent subangular fine gravel, 18 percent subangular medium and coarse gravel, and 2 percent subangular cobbles; moderately acid, pH 6.1 by Hellige-Truog; NaF 11.0; abrupt smooth boundary.

2Bw1—5 to 10 inches (12 to 26 centimeters); light yellowish brown (10YR 6/4) extremely gravelly ashy loamy sand, brown (10YR 4/3) moist; 3 percent clay; single grain; loose, nonsticky, nonplastic; many very fine and fine and common medium and coarse roots; many very fine to medium interstitial pores; 11 percent subangular fine gravel, 56 percent subangular medium and coarse gravel, and 10 percent subangular cobbles; slightly acid, pH 6.3 by Hellige-Truog; NaF pH 11.0; clear smooth boundary.

2Bw2—10 to 26 inches (26 to 67 centimeters); light yellowish brown (10YR 6/4) extremely cobbly ashy loamy sand, brown (10YR 4/3) moist; 2 percent clay; single grain; loose, nonsticky, nonplastic; many very fine to medium and few coarse and very coarse roots; many very fine to medium interstitial pores; 5 percent subangular fine gravel, 51 percent subangular medium and coarse gravel, 20 percent subangular cobbles, and 10 percent subangular stones; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 11.5; clear smooth boundary.

3Bw3—26 to 34 inches (67 to 87 centimeters); pale brown (10YR 6/3) extremely gravelly ashy coarse sand, brown (10YR 4/3) moist; 1 percent clay; single grain and massive; soft, very friable, nonsticky, nonplastic; common very fine and fine and few medium roots; many very fine to medium interstitial pores; 11 percent subangular fine gravel, 72 percent subangular medium and coarse gravel, and 5 percent subangular cobbles; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 11.4; abrupt smooth boundary.

3C1—34 to 46 inches (87 to 117 centimeters); pale brown (10YR 6/3) gravel, brown (10YR 4/3) moist; 1 percent clay; single grain; loose, nonsticky, nonplastic; few very fine and common fine and medium roots; many very fine to medium interstitial pores; 6 percent subangular fine gravel, 64 percent subangular medium and coarse gravel, 15 percent subangular cobbles, and 5 percent subangular stones; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 11.4; clear smooth boundary.

3C2—46 to 61 inches (117 to 156 centimeters); pale brown (10YR 6/3) stones, very dark grayish brown (10YR 3/2) moist; single grain; loose, nonsticky, nonplastic; few very fine and fine roots; many very fine to medium interstitial pores; 3 percent subangular fine gravel, 57 percent subangular medium and coarse gravel, 15 percent subangular cobbles, and 15 percent subangular stones; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 10.5.

Type Location

Shasta County, California; about 0.82 mile northeast of the Summit Lake Ranger Station, approximately 0 feet east and 800 feet south of the northwest corner of sec. 34, T. 31 N., R. 5 E.; 40 degrees 30 minutes 20 seconds north latitude and 121 degrees 25 minutes 1 second west longitude, NAD83; USGS Quad: West Prospect Peak, California.

Range in Characteristics

Depth to restrictive feature: More than 60 inches (152 centimeters) to bedrock

Mean annual soil temperature: 42 to 44 degrees F (5.5 to 7 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (weighted average): 1 to 3 percent clay and 40 to 88 percent rock fragments

Surface fragments: 10 to 20 percent gravel, 5 to 15 percent cobbles, and 0 to 5 percent stones

A horizon:

Color (dry)—10YR 5/3, 6/3

Color (moist)—10YR 3/2, 4/2

Texture—very gravelly ashy loamy sand, very gravelly ashy sandy loam

Clay content—1 to 3 percent

Rock fragments—15 to 25 percent fine gravel, 15 to 20 percent medium and coarse gravel, 35 to 45 percent total gravel, 0 to 5 percent cobbles, 35 to 50 percent total rock fragments

Organic matter—3 to 5 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.95 to 1.3

P retention—30 to 45 percent

Glass content—6 to 10 percent

NaF pH—11.0 to 11.3

Soil reaction—slightly acid

2Bw horizon:

Color (dry)—10YR 6/3, 6/4

Color (moist)—10YR 4/2, 4/3, 4/4

Texture—extremely gravelly ashy loamy sand, extremely cobbly ashy loamy sand

Clay content—2 to 4 percent

Rock fragments—5 to 15 percent fine gravel, 45 to 60 percent medium and coarse gravel, 50 to 70 percent total gravel, 10 to 20 percent cobbles, 0 to 10 percent stones, 60 to 88 percent total rock fragments

Organic matter—2 to 3.5 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.95 to 2.25

P retention—55 to 70 percent

Glass content—6 to 12 percent

NaF pH—11.0 to 11.5

Soil reaction—slightly acid or neutral

3Bw horizon:

Color (dry)—10YR 6/4, 7/4

Color (moist)—10YR 4/3, 4/4

Texture—extremely gravelly ashy coarse sand, extremely gravelly ashy sand

Clay content—0 to 2 percent

Rock fragments—5 to 15 percent fine gravel, 65 to 75 percent medium and coarse gravel, 70 to 85 percent total gravel, 0 to 5 percent cobbles, 70 to 89 percent total rock fragments

Organic matter—1 to 3 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.5 to 2.25

P retention—55 to 70 percent

Glass content—6 to 12 percent

NaF pH—11.2 to 11.4

Soil reaction—slightly acid or neutral

3C horizon:

Color (dry)—10YR 6/3, 7/3

Color (moist)—10YR 3/2, 4/3, 4/4
Texture—gravel, ashy gravel, extremely cobbly ashy sand, extremely gravelly ashy sand, extremely gravelly coarse sand, stones
Clay content—0 to 1 percent
Rock fragments—0 to 10 percent fine gravel, 55 to 65 percent medium and coarse gravel, 55 to 75 percent total gravel, 10 to 20 percent cobbles, 5 to 20 percent stones, 70 to 95 percent total rock fragments
Organic matter—0 to 2 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—3.5 to 4.7
P retention—65 to 90 percent
Glass content—2 to 5 percent
NaF pH—10.5 to 11.4
Soil reaction—slightly acid or neutral

Vitrandic Xerorthents, debris fan

Vitrandic Xerorthents, debris fan consist of moderately deep to very deep, well drained soils that formed in debris flows from volcanic rocks. These soils are on debris flows deposited by eruptions from Lassen Peak. Slopes range from 2 to 30 percent. The mean annual precipitation is about 71 inches (1,803 millimeters), and the mean annual air temperature is about 40 degrees F (4.41 degrees C).

Taxonomic Classification

Frigid Vitrandic Xerorthents

Typical Pedon

Vitrandic Xerorthents, debris fan, very gravelly ashy loamy coarse sand (fig. 121) on a north-facing (340 degrees) slope of 6 percent under a cover of lodgepole pine, California red fir, western white pine, and mountain hemlock at an elevation of 6,402 feet (1,952 meters). When described on 8/8/06, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

C1—0 to 4 inches (0 to 10 centimeters); light brownish gray (10YR 6/2) very gravelly ashy loamy coarse sand, grayish brown (10YR 5/2) moist; 1 percent clay; single grain; loose, nonsticky, nonplastic; common very fine and many fine and medium roots; common very fine interstitial and few fine interstitial pores; 18 percent fine subangular gravel, 18 percent medium subangular gravel, and 10 percent subangular cobbles; slightly acid, pH 6.1 by pH meter 1:1 water; NaF pH 9.7; abrupt smooth boundary.

C2—4 to 14 inches (10 to 35 centimeters); light brownish gray (10YR 6/2) extremely gravelly ashy loamy coarse sand, grayish brown (10YR 5/2) moist; 1 percent clay; weak fine platy structure parting to single grain; slightly hard, very friable, nonsticky, nonplastic; many fine and medium and few coarse roots; few fine tubular and common very fine and fine irregular pores; 15 percent subangular fine gravel, 35 percent subangular medium and coarse gravel, and 25 percent subangular cobbles; slightly acid, pH 6.4 by pH meter 1:1 water; NaF pH 9.6; abrupt smooth boundary.

C3—14 to 31 inches (35 to 79 centimeters); light brownish gray (10YR 6/2) extremely gravelly ashy loamy coarse sand, grayish brown (10YR 5/2) moist; 2 percent clay; massive parting to single grain; moderately hard, very friable, nonsticky, nonplastic; few very fine and fine roots; few medium vesicular pores; 14 percent subangular fine gravel, 30 percent subangular medium and coarse gravel, and 25 percent subangular cobbles; neutral, pH 6.9 by pH meter 1:1 water; NaF pH 9.5; abrupt smooth boundary.



Figure 121.—Typical profile of Vitrandic Xerorthents, debris fan. Depth is marked in centimeters.

- Cd1—31 to 42 inches (79 to 107 centimeters); light brownish gray (10YR 6/2) extremely gravelly ashy loamy coarse sand, light brownish gray (10YR 6/2) moist; 2 percent clay; massive parting to single grain; moderately hard, very friable, nonsticky, nonplastic; common very fine and fine interstitial pores; 15 percent subangular fine gravel, 35 percent subangular medium and coarse gravel, and 20 percent subangular cobbles; neutral, pH 7.1 by pH meter 1:1 water; NaF pH 9.6; clear smooth boundary.
- Cd2—42 to 60 inches (107 to 153 centimeters); light brownish gray (10YR 6/2) extremely cobbly ashy loamy coarse sand, grayish brown (10YR 5/2) moist; 2 percent clay; massive parting to single grain; moderately hard, very friable, nonsticky, nonplastic; common very fine and fine interstitial pores; 12 percent subangular fine gravel, 20 percent subangular medium and coarse gravel, 30

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percent subangular cobbles, and 20 percent subangular stones; neutral, pH 7.0 by pH meter 1:1 water; NaF pH 9.5.

Type Location

Shasta County, California; about 0.75 mile north-northwest of Hat Lake, approximately 2,700 feet west and 1,500 feet north of the southeast corner of sec. 24, T. 31 N., R. 4 E.; 40 degrees 31 minutes 5 seconds north latitude and 121 degrees 28 minutes 23 seconds west longitude, NAD83; USGS Quad: West Prospect Peak, California.

Range in Characteristics

Depth to restrictive feature: 20 to more than 60 inches (51 to more than 152 centimeters) to densic contact

Mean annual soil temperature: 43 to 46 degrees F (6 to 8 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section: Ashy-skeletal part—1 percent clay and 75 percent rock fragments; sandy or sandy-skeletal part—2 percent clay and 69 percent rock fragments

Surface fragments: 5 to 75 percent gravel, 3 to 25 percent cobbles, 0 to 15 percent stones, and 0 to 10 percent boulders

Other characteristics: Some pedons have Oi and A or AC horizons at the surface

C horizon:

Color (dry)—10YR 5/1, 6/1, 6/2, 5/1; 2.5Y 6/2, 7/1, 7/2

Color (moist)—10YR 4/2, 5/2; 2.5Y 3/1, 3/2, 4/1, 4/2

Texture—very gravelly ashy loamy coarse sand, extremely gravelly ashy loamy coarse sand, gravelly ashy coarse sand, cobbly ashy loamy fine sand, cobbly ashy loamy sand

Clay content—0 to 3 percent

Rock fragments—2 to 25 percent fine gravel, 0 to 45 percent medium and coarse gravel, 2 to 60 percent total gravel, 0 to 40 percent cobbles, 0 to 50 percent stones, 0 to 10 percent boulders, 15 to 75 percent total rock fragments

Organic matter—0 to 0.2 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.12 to 0.30

P retention—8 to 15 percent

Glass content—25 to 45 percent

NaF pH—9.5 to 10.2

Soil reaction—moderately acid or neutral

Cd horizon:

Color (dry)—10YR 6/1, 6/2; 2.5Y 6/2

Color (moist)—10YR 4/2, 5/2, 6/2

Texture—extremely gravelly ashy loamy coarse sand, extremely stony ashy loamy coarse sand, very cobbly ashy coarse sand, extremely cobbly ashy loamy coarse sand

Clay content—1 to 3 percent

Rock fragments—8 to 18 percent fine gravel, 10 to 45 percent medium and coarse gravel, 15 to 55 percent total gravel, 15 to 40 percent cobbles, 0 to 25 percent stones, 0 to 10 percent boulders, 65 to 85 percent total rock fragments

Organic matter—0 to 0.1 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.15 to 0.25

P retention—2 to 14 percent

Glass content—10 to 20 percent

NaF pH—9.5 to 10.6

Soil reaction—neutral

Vitrantic Xerorthents, moraine

Vitrantic Xerorthents, moraine consist of moderately deep and deep, well drained soils that formed in debris flows, rockfall avalanche deposits, and pyroclastic flow deposits over glacial till from volcanic rocks. These soils are on moraines. Slopes range from 3 to 60 percent. The mean annual precipitation is about 77 inches (1,956 millimeters), and the mean annual air temperature is about 40 degrees F (4.4 degrees C).

Taxonomic Classification

Frigid Vitrantic Xerorthents

Typical Pedon

Vitrantic Xerorthents, moraine, gravelly ashy sandy loam on an east-facing (80 degrees) slope of 18 percent under a cover of mountain monardella, rubber rabbitbrush, lupine, buckwheat, and grasses at an elevation of 6,893 feet (2,101 meters). When described on 6/28/07, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

- A1—0 to 3 inches (0 to 8 centimeters); light brownish gray (10YR 6/2) gravelly ashy sandy loam, dark grayish brown (10YR 4/2) moist; 1 percent clay; weak medium platy structure parting to single grain; loose, nonsticky, nonplastic; few fine and common very fine roots; many very fine and fine interstitial pores; 14 percent subangular medium and coarse gravel and 16 percent subangular fine gravel; strongly acid, pH 5.6 by Hellige-Truog; NaF pH 10.1; abrupt wavy boundary.
- A2—3 to 9 inches (8 to 22 centimeters); light brownish gray (10YR 6/2) gravelly ashy sandy loam, dark grayish brown (10YR 4/2) moist; 2 percent clay; weak fine and medium subangular blocky structure; loose, nonsticky, nonplastic; common fine and many very fine roots; many very fine and fine interstitial pores; 5 percent subangular medium and coarse gravel and 20 percent subangular fine gravel; moderately acid, pH 5.8 by Hellige-Truog; NaF pH 9.9; abrupt wavy boundary.
- C—9 to 16 inches (22 to 41 centimeters); light gray (10YR 7/2) gravelly ashy coarse sandy loam, brown (10YR 4/3) moist; 3 percent clay; single grain; loose, nonsticky, nonplastic; common very fine to medium roots; many very fine and fine interstitial pores; 6 percent subangular medium and coarse gravel and 16 percent subangular fine gravel; slightly acid, pH 6.2 by Hellige-Truog; NaF pH 10.3; clear smooth boundary.
- 2Bwb—16 to 23 inches (41 to 58 centimeters); very pale brown (10YR 7/3) very gravelly ashy sandy loam, brown (10YR 4/3) moist; 5 percent clay; weak fine and medium subangular blocky structure; loose, nonsticky, nonplastic; common fine, few medium, and few very fine roots; few fine vesicular and many very fine and fine interstitial pores; 5 percent subangular cobbles, 10 percent subangular medium and coarse gravel, and 20 percent subangular fine gravel; slightly acid, pH 6.3 by Hellige-Truog; NaF pH 11.2; abrupt smooth boundary.
- 2Cdq—23 to 37 inches (58 to 93 centimeters); white (10YR 8/1) extremely gravelly ashy loamy sand, grayish brown (10YR 5/2) moist; 4 percent clay; massive; very hard, very firm, nonsticky, nonplastic; few fine and common very fine roots; many very fine to medium vesicular pores; 5 percent threadlike silica masses lining pores; 5 percent subangular cobbles, 20 percent subangular medium and coarse gravel, and 35 percent subangular fine gravel; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 11.5.

Type Location

Shasta County, California; about 0.63 mile northwest of Hat Lake, approximately 1,700 feet east and 500 feet south of the northwest corner of sec. 25, T. 31 N., R. 4 E.; 40

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degrees 30 minutes 49 seconds north latitude and 121 degrees 28 minutes 36 seconds west longitude, NAD83; USGS Quad: West Prospect Peak, California.

Range in Characteristics

Depth to restrictive feature: 20 to 60 inches (51 to 152 centimeters) to densic contact

Mean annual soil temperature: 43 to 44 degrees F (6 to 6.7 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (thickest part): 5 percent clay and 35 percent rock fragments

Surface fragments: 50 to 80 percent gravel, 0 to 20 percent cobbles, 0 to 10 percent stones, and 0 to 5 percent boulders

Other characteristics: Debris and pyroclastic and avalanche deposits range from 9 to 22 inches (24 to 56 centimeters) in thickness

A horizon:

Color (dry)—10YR 6/2

Color (moist)—10YR 4/2

Texture—gravelly ashy sandy loam, very gravelly ashy sandy loam

Clay content—1 to 3 percent

Rock fragments—15 to 25 percent fine gravel, 5 to 20 percent medium and coarse gravel, 20 to 35 percent total gravel, 0 to 5 percent cobbles, 0 to 5 percent stones, 0 to 5 percent boulders, 20 to 50 percent total rock fragments

Organic matter—0.1 to 0.3 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.12 to 0.3

P retention—8 to 15 percent

Glass content—30 to 45 percent

NaF pH—9.5 to 10.7

Soil reaction—moderately acid

C horizon:

Color (dry)—10YR 7/2

Color (moist)—10YR 4/3

Texture—gravelly ashy coarse sandy loam, very gravelly ashy coarse sandy loam

Clay content—1 to 3 percent

Rock fragments—15 to 25 percent fine gravel, 5 to 20 percent medium and coarse gravel, 20 to 35 percent total gravel, 0 to 5 percent cobbles, 0 to 5 percent stones, 0 to 5 percent boulders, 20 to 50 percent total rock fragments

Organic matter—0 to 0.2 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.12 to 0.3

P retention—8 to 15 percent

Glass content—25 to 35 percent

NaF pH—10.0 to 11.0

Soil reaction—slightly acid

2Bwb horizon:

Color (dry)—10YR 7/3

Color (moist)—10YR 4/3

Texture—very gravelly ashy sandy loam

Clay content—0 to 5 percent

Rock fragments—15 to 25 percent fine gravel, 5 to 15 percent medium and coarse gravel, 25 to 35 percent total gravel, 0 to 10 percent cobbles, 0 to 5 percent stones, 0 to 5 percent boulders, 35 to 50 percent total rock fragments

Organic matter—0.5 to 1.5 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.0 to 1.5

P retention—45 to 55 percent

Glass content—20 to 30 percent



Figure 122.—Profile of Vitrikerands. Depth is marked in centimeters.

NaF pH—11.0 to 11.5
Soil reaction—slightly acid or neutral

2Cdq horizon:

Color (dry)—10YR 8/1
Color (moist)—10YR 5/2
Texture—very gravelly ashy loamy sand, very gravelly ashy loamy coarse sand, extremely gravelly ashy loamy sand
Clay content—1 to 5 percent
Rock fragments—30 to 40 percent fine gravel, 15 to 25 percent medium and coarse gravel, 40 to 60 percent total gravel, 0 to 10 percent cobbles, 0 to 5 percent stones, 0 to 5 percent boulders, 50 to 70 percent total rock fragments
Organic matter—0 to 0.3 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.5 to 0.8
P retention—25 to 35 percent
Glass content—15 to 30 percent
NaF pH—11.0 to 11.5
Soil reaction—slightly acid or neutral

Vitrikerands

Vitrikerands consist of moderately deep and deep, well drained soils that formed in glaciolacustrine deposits or tephra over outwash from volcanic rocks (fig. 122). These soils are on outwash terraces. Slopes range from 1 to 15 percent. The mean annual precipitation is about 57 inches (1,499 millimeters), and the mean annual air temperature is about 41 degrees F (4.8 degrees C).

Taxonomic Classification

Vitrikerands

Typical Pedon

Vitrikerands gravelly ashy loamy coarse sand on a southwest-facing (230 degrees) slope of 3 percent under a cover of lodgepole pine and California red fir at an elevation of 6,690 feet (2,039 meters). When described on 6/4/07, the soil was slightly moist throughout. (Colors are for dry soil unless otherwise noted.)

- Oi—0 to 0.8 inch (0 to 2 centimeters); slightly decomposed needles and twigs; abrupt smooth boundary.
- A1—0.8 inch to 4 inches (2 to 11 centimeters); grayish brown (2.5Y 5/2) gravelly ashy loamy coarse sand, very dark grayish brown (10YR 3/2) moist; 3 percent clay; weak thick platy structure parting to weak very fine and fine subangular blocky; soft, very friable, nonsticky, nonplastic; few fine and common very fine roots; many very fine to medium tubular and irregular pores; 10 percent subangular medium and coarse gravel and 15 percent subangular fine gravel; strongly acid, pH 5.4 by pH meter 1:1 water; NaF pH 10.9; abrupt smooth boundary.
- A2—4 to 8 inches (11 to 20 centimeters); light yellowish brown (2.5Y 6/3) gravelly ashy loamy coarse sand, dark grayish brown (10YR 4/2) moist; 2 percent clay; weak very fine to medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; few coarse and common very fine to medium roots; common very fine and fine irregular and very fine to medium tubular pores; 10 percent subangular medium and coarse gravel and 10 percent subangular fine gravel; moderately acid, pH 5.6 by pH meter 1:1 water; NaF pH 8.3; clear smooth boundary.
- A3—8 to 12 inches (20 to 30 centimeters); light brownish gray (2.5Y 6/2) gravelly ashy loamy coarse sand, very dark grayish brown (10YR 3/2) moist; 2 percent clay; weak very fine to medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; few coarse and common very fine to medium roots; common very fine and fine irregular and common very fine to medium tubular pores; 5 percent subangular medium and coarse gravel and 10 percent subangular fine gravel; moderately acid, pH 5.7 by pH meter 1:1 water; NaF pH 11.1; clear wavy boundary.
- 2Ab—12 to 21 inches (30 to 53 centimeters); grayish brown (2.5Y 5/2) gravelly ashy loamy sand, very dark grayish brown (10YR 3/2) moist; 2 percent clay; weak very fine to coarse subangular blocky structure; soft, very friable, nonsticky, nonplastic; few coarse and very coarse and common very fine to medium roots; common very fine and fine tubular and irregular pores; 5 percent subangular cobbles, 10 percent subangular medium and coarse gravel, and 10 percent subangular fine gravel; moderately acid, pH 5.8 by pH meter 1:1 water; NaF pH 11.3; clear wavy boundary.
- 2Bwb—21 to 37 inches (53 to 93 centimeters); light yellowish brown (2.5Y 6/3) very stony medial loamy sand, brown (10YR 4/3) moist; 1 percent clay; weak very fine to medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; few coarse and very coarse and common very fine to medium roots; common very fine and fine irregular and tubular pores; 10 percent subangular stones, 10 percent subangular cobbles, 14 percent subangular medium and coarse gravel, and 14 percent subangular fine gravel; moderately acid, pH 6.0 by pH meter 1:1 water; NaF pH 11.2; abrupt smooth boundary.
- 2Bqmb—37 to 46 inches (93 to 117 centimeters); white (5Y 8/1) cemented very cobbly ashy sandy loam, gray (2.5Y 6/1) moist; 2 percent clay; massive; extremely hard, slightly rigid, strongly cemented, nonsticky, nonplastic; common very fine to medium tubular and interstitial pores; 25 percent threadlike silica masses lining pores and in cracks; 10 percent subangular stones, 12 percent subangular medium and coarse gravel, 12 percent subangular fine gravel, and 20 percent subangular cobbles; slightly acid, pH 6.0 by pH meter 1:1 water; NaF pH 10.9.

Type Location

Shasta County, California; about 0.47 mile north-northwest of Summit Lake, approximately 900 feet north and 2,700 feet east of the southwest corner of sec. 33, T. 31 N., R. 5 E.; 40 degrees 30 minutes 1 second north latitude and 121 degrees 25 minutes 39 seconds west longitude, NAD83; USGS Quad: West Prospect Peak, California.

Range in Characteristics

Depth to restrictive feature: 20 to 60 inches (51 to 152 centimeters) to duripan

Mean annual soil temperature: 41 to 43 degrees F (5 to 6 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section: Ashy part—2 to 3 percent clay and 15 to 25 percent rock fragments; ashy-skeletal part—1 percent clay and 48 percent rock fragments

Surface fragments: 10 to 50 percent gravel, 0 to 2 percent cobbles, 0 to 2 percent stones, and 0 to 1 percent boulders

A horizon:

Color (dry)—2.5Y 5/2, 6/3; 10YR 5/2, 6/2

Color (moist)—2.5Y 3/2, 4/2; 10YR 3/2, 4/2

Texture—gravelly ashy loamy coarse sand, gravelly ashy sandy loam

Clay content—1 to 3 percent

Rock fragments—10 to 20 percent fine gravel, 5 to 20 percent medium and coarse gravel, 15 to 35 percent total gravel

Organic matter—4 to 6 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.5 to 1

P retention—45 to 70 percent

Glass content—35 to 50 percent

NaF pH—8.3 to 11.6

Soil reaction—strongly acid to slightly acid

2Ab horizon:

Color (dry)—2.5Y 5/2, 5/3; 10YR 6/3

Color (moist)—2.5Y 3/2; 10YR 3/2, 3/3

Texture—gravelly ashy loamy sand, gravelly ashy sandy loam

Clay content—1 to 5 percent

Rock fragments—10 to 20 percent fine gravel, 10 to 20 percent medium and coarse gravel, 20 to 35 percent total gravel, 0 to 5 percent cobbles, 20 to 35 percent total rock fragments

Organic matter—5 to 6 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1 to 2

P retention—80 to 90 percent

Glass content—40 to 50 percent

NaF pH—10.5 to 11.5

Soil reaction—moderately acid or slightly acid

2Bwb horizon:

Color (dry)—2.5Y 6/3, 7/3; 10YR 7/3, 7/4

Color (moist)—2.5Y 4/3; 10YR 4/3, 5/3

Texture—very gravelly medial loamy sand, extremely cobbly medial sandy loam, extremely cobbly medial loamy sand, very stony medial loamy sand

Clay content—1 to 3 percent

Rock fragments—8 to 15 percent fine gravel, 10 to 40 percent medium and coarse gravel, 20 to 45 percent total gravel, 8 to 25 percent cobbles, 0 to 10 percent stones, 45 to 65 percent total rock fragments

Organic matter—2.5 to 3.5 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.5 to 2.5

P retention—85 to 95 percent

Glass content—40 to 50 percent

NaF pH—10.5 to 11.5

Soil reaction—moderately acid to neutral

2Bqmb horizon:

Color (dry)—5Y 8/1; 2.5Y 7/1; 10YR 7/1

Color (moist)—2.5Y 6/1; 10YR 4/2

Texture—cemented very cobbly ashy coarse sandy loam, cemented very gravelly ashy loamy sand, cemented extremely gravelly ashy loamy sand, cemented very gravelly ashy sandy loam

Clay content—1 to 3 percent

Rock fragments—5 to 20 percent fine gravel, 5 to 65 percent medium and coarse gravel, 24 to 70 percent total gravel, 8 to 20 percent cobbles, 0 to 10 percent stones, 40 to 90 percent total rock fragments

Organic matter—0.5 to 1.5 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1 to 1.5

P retention—50 to 70 percent

Glass content—25 to 35 percent

NaF pH—9.8 to 11.5

Rupture resistance—weakly cemented to strongly cemented

Soil reaction—moderately acid to neutral

Xeric Vitricryands

Xeric Vitricryands consist of deep and very deep, well drained soils that formed in ash mixed with till from rhyodacite. These soils are on moraines on Loomis Peak. Slopes range from 10 to 45 percent. The mean annual precipitation is about 91 inches (2,311 millimeters), and the mean annual air temperature is about 40 degrees F (5 degrees C).

Taxonomic Classification

Xeric Vitricryands

Typical Pedon

Xeric Vitricryands stony ashy loamy sand (fig. 123) on a west-facing (274 degrees) slope of 10 percent under a cover of small shrubs and scattered stunted Jeffrey pine and western white pine at an elevation of 8,434 feet (2,571 meters). When described on 8/14/2007, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

A1—0 to 3 inches (0 to 7 centimeters); pale brown (10YR 6/3) stony ashy loamy sand, dark grayish brown (10YR 4/2) moist; 2 percent clay; single grain; loose, nonsticky, nonplastic; many very fine and fine and few medium roots; many very fine interstitial pores; 8 percent subangular fine gravel, 8 percent subangular medium and coarse gravel, 5 percent nonflat subangular cobbles, and 5 percent subangular stones; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 11.0; clear smooth boundary.

A2—3 to 9 inches (7 to 22 centimeters); pale brown (10YR 6/3) gravelly ashy loamy sand, brown (10YR 4/3) moist; 2 percent clay; weak very fine and fine subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; common very fine to medium roots; many very fine interstitial pores; 11 percent subangular fine gravel, 7 percent subangular medium and coarse gravel, and 10 percent



Figure 123.—Typical profile of Xeric Vitricryands. Depth is marked in centimeters.

subangular cobbles; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 11.5; clear smooth boundary.

A3—9 to 17 inches (22 to 44 centimeters); light yellowish brown (10YR 6/4) very gravelly ashy fine sandy loam, brown (7.5YR 4/3) moist; 2 percent clay; weak very fine and fine subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; common very fine to medium and few coarse roots; many very fine interstitial pores; 18 percent subangular fine gravel, 14 percent subangular medium and coarse gravel, and 10 percent subangular cobbles; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 11.5; clear smooth boundary.

AB—17 to 23 inches (44 to 58 centimeters); pink (7.5YR 7/3) gravelly ashy loamy sand, brown (7.5YR 5/4) moist; 2 percent clay; weak fine and medium subangular

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- blocky structure parting to single grain; loose, nonsticky, nonplastic; few very fine and fine roots; many very fine interstitial pores; 11 percent angular fine gravel, 6 percent angular medium and coarse gravel, and 10 percent angular cobbles; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 11.5; clear smooth boundary.
- 2Bw1—23 to 37 inches (58 to 94 centimeters); pink (7.5YR 7/3) very paragravelly ashy loamy sand, brown (7.5YR 5/4) moist; 2 percent clay; moderate fine and medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; few very fine and fine roots; many very fine irregular and tubular pores; 25 percent subangular fine paragravel, 15 percent subangular medium and coarse paragravel, and 5 percent subangular cobbles; slightly alkaline, pH 7.5 by Hellige-Truog; NaF pH 9.8; abrupt smooth boundary.
- 2Bw2—37 to 48 inches (94 to 122 centimeters); pinkish gray (7.5YR 7/2) very paragravelly ashy loamy sand, brown (7.5YR 5/4) moist; 2 percent clay; weak fine and medium subangular blocky structure parting to single grain; soft, very friable, nonsticky, nonplastic; few very fine and fine roots; many very fine interstitial and irregular pores; 15 percent subangular fine paragravel, 20 percent subangular medium and coarse paragravel, and 5 percent subangular cobbles; slightly alkaline, pH 7.5 by Hellige-Truog; NaF pH 9.8; abrupt smooth boundary.
- 2Cd—48 to 59 inches (122 to 150 centimeters); reddish gray (5YR 5/2) very stony ashy loamy sand, brown (7.5YR 5/4) moist; 2 percent clay; moderate fine and medium subangular blocky structure; moderately hard, firm, nonsticky, nonplastic; many very fine irregular pores; 25 percent prominent silt coats; 16 percent subrounded fine paragravel, 20 percent subrounded medium and coarse paragravel, 10 percent subrounded cobbles, and 10 percent subrounded stones; slightly alkaline, pH 7.5 by Hellige-Truog; NaF pH 9.5.

Type Location

Shasta County, California; about 0.3 mile northwest from the highest point of Loomis Peak, approximately 2,150 feet east and 1,300 feet north of the southwest corner of sec. 32, T. 31 N., R. 4 E.; 40 degrees 29 minutes 21 seconds north latitude and 121 degrees 32 minutes 57 seconds west longitude, NAD83; USGS Quad: Lassen Peak, California.

Range in Characteristics

Depth to restrictive feature: 40 to 80 inches (102 to 203 centimeters) to densic contact

Mean annual soil temperature: 42 to 45 degrees F (5.5 to 7 degrees C)

Mean summer soil temperature: 43 to 46 degrees F (6 to 8 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (thickest part): 1 to 3 percent clay and 35 to 50 percent rock fragments

Surface fragments: 15 to 60 percent gravel, 3 to 15 percent cobbles, 10 to 20 percent stones, and 5 to 25 percent boulders

A horizon:

Color (dry)—10YR 5/2, 6/2, 6/3, 6/4

Color (moist)—10YR 2/2, 3/2, 4/2, 4/3

Texture—ashy sand, ashy coarse sandy loam, gravelly ashy loamy coarse sand, gravelly ashy loamy sand, gravelly ashy loamy fine sand, very gravelly ashy loamy sand, very gravelly ashy loamy fine sand, stony ashy loamy sand, very gravelly ashy fine sandy loam

Clay content—0 to 4 percent

Rock fragments—5 to 18 percent fine gravel, 3 to 17 percent medium and coarse gravel, 10 to 32 percent total gravel, 0 to 10 percent cobbles, 0 to 10 percent stones, 10 to 43 percent total rock fragments

Organic matter—1 to 4 percent

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Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.40 to 0.50

P retention—35 to 100 percent

Glass content—30 to 50 percent

NaF pH—9.2 to 11.5

Soil reaction—slightly acid or neutral

AB horizon:

Color (dry)—10YR 5/4, 6/3, 6/4; 2.5Y 6/3

Color (moist)—7.5YR 4/3; 10YR 3/3, 4/3; 2.5Y 4/2

Texture—very gravelly ashy sand, very gravelly ashy loamy sand, very gravelly ashy loamy fine sand, cobbly ashy loamy sand, very cobbly ashy sandy loam, gravelly ashy loamy sand

Clay content—0 to 7 percent

Rock fragments—10 to 12 percent fine gravel, 6 to 35 percent medium and coarse gravel, 17 to 45 percent total gravel, 5 to 10 percent cobbles, 0 to 10 percent stones, 27 to 58 percent total rock fragments

Organic matter—1 to 3 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.3 to 1.10

P retention—25 to 80 percent

Glass content—30 to 50 percent

NaF pH—10.0 to 11.5

Soil reaction—slightly acid or neutral

2Bw horizon:

Color (dry)—7.5YR 7/2, 7/3; 10YR 6/3, 7/3; 2.5Y 6/2, 6/3, 7/3

Color (moist)—7.5YR 5/4; 10YR 3/3, 3/4, 4/3; 2.5Y 4/2, 4/3, 4/4

Texture—gravelly ashy sand, gravelly ashy fine sandy loam, very gravelly ashy loamy sand, extremely gravelly ashy fine sandy loam, cobbly ashy very fine sandy loam, very stony ashy loamy sand, very paragravelly ashy loamy sand

Clay content—0 to 12 percent

Rock fragments—7 to 25 percent fine gravel, 7 to 42 percent medium and coarse gravel, 15 to 50 percent total gravel, 5 to 15 cobbles, 0 to 15 percent stones, 0 to 10 percent boulders, 20 to 65 percent total rock fragments

Organic matter—0 to 0.8 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.8 to 1.5

P retention—45 to 65 percent

Glass content—15 to 30 percent

NaF pH—9.0 to 11.5

Soil reaction—slightly acid to slightly alkaline

Cd horizon:

Color (dry)—5YR 5/2; 10YR 7/2, 8/1

Color (moist)—7.5YR 5/4; 2.5Y 4/3, 5/2

Texture—very gravelly ashy sand, very gravelly ashy loamy sand, very stony ashy loamy sand

Clay content—1 to 2 percent

Rock fragments—5 to 16 percent fine gravel, 16 to 45 percent medium and coarse gravel, 32 to 50 percent total gravel, 5 to 10 percent cobbles, 0 to 10 percent stones, 0 to 10 percent boulders, 45 to 60 percent total rock fragments

Organic matter—0 to 0.5 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0 to 0.8

P retention—25 to 55 percent

Glass content—15 to 30 percent

NaF pH—9.0 to 11.0

Rupture resistance—soft to moderately hard

Soil reaction—slightly acid to slightly alkaline

Xeric Vitricryands, ash over cinders

Xeric Vitricryands, ash over cinders consist of very deep, well drained soils that formed in ash over colluvium from volcanic rocks. These soils are on cinder cones and nunataks. Slopes range from 10 to 80 percent. The mean annual precipitation is about 49 inches (1,245 millimeters), and the mean annual air temperature is about 41 degrees F (5 degrees C).

Taxonomic Classification

Xeric Vitricryands

Typical Pedon

Xeric Vitricryands, ash over cinders, ashy sandy loam on a north-facing (10 degrees) slope of 22 percent under a cover of California red fir, western white pine, and mountain hemlock at an elevation of 7,587 feet (2,313 meters). When described on 8/15/06, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

- Oi—0 to 1 inch (0 to 2 centimeters); twigs, cones, and needle litter; abrupt smooth boundary.
- A—1 to 2 inches (2 to 4 centimeters); very dark gray (10YR 3/1) ashy sandy loam, grayish brown (10YR 5/2) moist; 5 percent clay; single grain; loose, nonsticky, nonplastic; few very fine to coarse roots; many very fine and fine interstitial pores; 5 percent subangular fine gravel and 2 percent subangular medium and coarse gravel; moderately acid, pH 5.8 by Hellige-Truog; NaF pH 9.5; abrupt smooth boundary.
- AC—2 to 6 inches (4 to 14 centimeters); very pale brown (10YR 7/3) gravelly ashy sandy loam, brown (10YR 4/3) moist; 5 percent clay; single grain; loose, nonsticky, nonplastic; few very fine and fine, common medium, and many coarse roots; many very fine to medium interstitial pores; 8 percent subangular fine gravel and 12 percent subangular medium and coarse gravel; moderately acid, pH 6.0 by Hellige-Truog; NaF pH 10.2; clear smooth boundary.
- 2Bwb1—6 to 16 inches (14 to 41 centimeters); light yellowish brown (10YR 6/4) very gravelly ashy sandy loam, brown (10YR 4/3) moist; 8 percent clay; single grain; loose, nonsticky, nonplastic; few very fine and fine, many medium and coarse, and common very coarse roots; many very fine and fine interstitial and common medium irregular pores; 14 percent subangular fine gravel, 33 percent subangular medium and coarse gravel, and 5 percent subangular cobbles; strongly acid, pH 5.5 by Hellige-Truog; NaF pH 10.6; clear smooth boundary.
- 2Bwb2—16 to 24 inches (41 to 61 centimeters); pale brown (10YR 6/3) very gravelly ashy sandy loam, brown (10YR 4/3) moist; 6 percent clay; single grain; loose, nonsticky, nonplastic; many very fine to very coarse roots; many very fine and fine and few medium interstitial pores; 14 percent subangular fine gravel, 33 percent subangular medium and coarse gravel, and 5 percent subangular cobbles; slightly acid, pH 6.2 by Hellige-Truog; NaF pH 10.5; gradual smooth boundary.
- 2C—24 to 30 inches (61 to 77 centimeters); light brownish gray (10YR 6/2) very gravelly ashy loamy sand, dark grayish brown (10YR 4/2) moist; 4 percent clay; single grain; loose, nonsticky, nonplastic; common very fine and fine, many medium and coarse, and common very coarse roots; many very fine and fine and few medium interstitial pores; 13 percent subangular fine gravel, 32 percent subangular medium and coarse gravel, 2 percent subangular cobbles, and 8 percent subangular stones; slightly acid, pH 6.2 by Hellige-Truog; NaF pH 10.7; abrupt smooth boundary.
- 2Cq1—30 to 45 inches (77 to 114 centimeters); gray (10YR 6/1) very gravelly sand, very dark grayish brown (10YR 3/2) moist; 0 percent clay; massive; few very fine to medium roots; few medium and many very fine interstitial pores; 15 percent

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subangular fine gravel, 35 percent subangular medium and coarse gravel, and 7 percent subangular cobbles; neutral, pH 6.8 by Hellige-Truog; NaF pH 11.0; gradual smooth boundary.

2Cq2—45 to 60 inches (114 to 152 centimeters); dark gray (10YR 4/1) gravel, black (2.5Y 2.5/1) moist; 0 percent clay; massive; few very fine to medium roots; few medium and many very fine interstitial pores; 15 percent threadlike yellow (10YR 7/6) silica masses around rock fragments; 98 percent rock fragments; 15 percent threadlike yellow (10YR 7/6) silica masses around rock fragments; neutral, pH 6.8 by Hellige-Truog; NaF pH 10.2.

Type Location

Plumas County, California; about 0.34 mile northeast of the Mount Harkness fire lookout, approximately 2,450 feet west and 1,350 feet south of the northeast corner of sec. 27, T. 30 N., R. 6 E.; 40 degrees 26 minutes 5 seconds north latitude and 121 degrees 17 minutes 51 seconds west longitude, NAD83; USGS Quad: Mount Harkness, California.

Range in Characteristics

Depth to restrictive feature: More than 60 inches (152 centimeters) to bedrock

Mean annual soil temperature: 38 to 42 degrees F (3 to 6 degrees C)

Mean summer soil temperature: 43 to 46 degrees F (6 to 8 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (thickest part): 0 to 8 percent clay and 35 to 60 percent rock fragments

Surface fragments: 3 to 25 percent gravel, 5 to 15 percent cobbles, 5 to 20 percent stones, and 5 to 20 percent boulders

A horizon:

Color (dry)—7.5YR 4/2; 10YR 3/2, 4/2, 5/2

Color (moist)—7.5YR 3/2; 10YR 2/2, 3/1

Texture—ashy sandy loam, ashy loamy sand, gravelly ashy sandy loam, very gravelly ashy loamy sand

Clay content—1 to 6 percent

Rock fragments—5 to 16 percent fine gravel, 2 to 15 percent medium and coarse gravel, 7 to 30 percent total gravel, 0 to 10 percent cobbles, 0 to 3 percent stones, 7 to 45 percent total rock fragments

Organic matter—4.0 to 5.0 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.95 to 1.3

P retention—30 to 45 percent

Glass content—6 to 10 percent

NaF pH—9.5 to 10.6

Soil reaction—moderately acid or slightly acid

AC horizon:

Color (dry)—7.5YR 5/3, 6/3; 10YR 5/3, 6/3, 7/3

Color (moist)—5YR 3/2, 3/3; 10YR 3/3, 4/2, 4/3

Texture—gravelly ashy loamy coarse sand, gravelly ashy loamy sand, gravelly ashy sandy loam

Clay content—1 to 6 percent

Rock fragments—8 to 20 percent fine gravel, 8 to 12 percent medium and coarse gravel, 16 to 32 percent total gravel, 0 to 2 percent cobbles, 16 to 34 percent total rock fragments

Organic matter—1.0 to 3 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.95 to 1.3

P retention—30 to 45 percent

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Glass content—6 to 10 percent
NaF pH—10.0 to 10.4
Soil reaction—moderately acid or slightly acid

2Bwb horizon:

Color (dry)—7.5YR 5/3, 5/4, 6/4; 10YR 5/3, 5/4, 6/3, 6/4
Color (moist)—5YR 3/2, 3/3, 3/4, 4/4, 5/6; 7.5YR 3/3, 3/4; 10YR 4/3
Texture—very gravelly ashy sandy loam, extremely gravelly ashy coarse sandy loam, extremely gravelly ashy sandy loam, extremely gravelly ashy loamy sand, very cobbly ashy sandy loam, very cobbly ashy loamy coarse sand, extremely cobbly ashy loamy sand, extremely cobbly ashy loamy coarse sand
Clay content—2 to 11 percent
Rock fragments—4 to 20 percent fine gravel, 15 to 42 percent medium and coarse gravel, 30 to 60 percent total gravel, 5 to 35 percent cobbles, 0 to 15 percent stones, 45 to 73 percent total rock fragments
Organic matter—0.9 to 2.3 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.6 to 2.25
P retention—55 to 70 percent
Glass content—12 to 15 percent
NaF pH—10.0 to 11.0
Soil reaction—strongly acid to neutral

2C horizon:

Color (dry)—10YR 6/2, 6/3
Color (moist)—5YR 3/3, 3/4; 10YR 4/2
Texture—very gravelly ashy loamy sand, extremely gravelly ashy sandy loam, extremely gravelly ashy loamy sand, extremely cobbly ashy loamy sand
Clay content—1 to 4 percent
Rock fragments—4 to 45 percent fine gravel, 20 to 45 percent medium and coarse gravel, 25 to 75 percent total gravel, 2 to 20 percent total cobbles, 5 to 8 percent stones, 0 to 10 percent boulders, 55 to 90 percent total rock fragments (mostly cinders)
Organic matter—0.7 to 1.5 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—2.21 to 4.6
P retention—75 to 85 percent
Glass content—5 to 8 percent
NaF pH—10.5 to 11.0
Soil reaction—slightly acid or neutral

2Cq horizon:

Color (dry)—10YR 6/1, 6/2
Color (moist)—10YR 3/2; 2.5Y 2.5/1
Texture—very gravelly sand, very gravelly ashy sand, extremely gravelly sand, extremely gravelly ashy sand, gravel
Clay content—0 to 1 percent
Rock fragments—10 to 40 percent fine gravel, 30 to 40 percent medium and coarse gravel, 35 to 80 percent total gravel, 5 to 10 percent cobbles, 40 to 98 percent total rock fragments (mostly cinders)
Organic matter—0.1 to 0.3 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—2.15 to 4.7
P retention—75 to 85 percent
Glass content—5 to 8 percent
NaF pH—10.0 to 11.0
Soil reaction—slightly acid or neutral

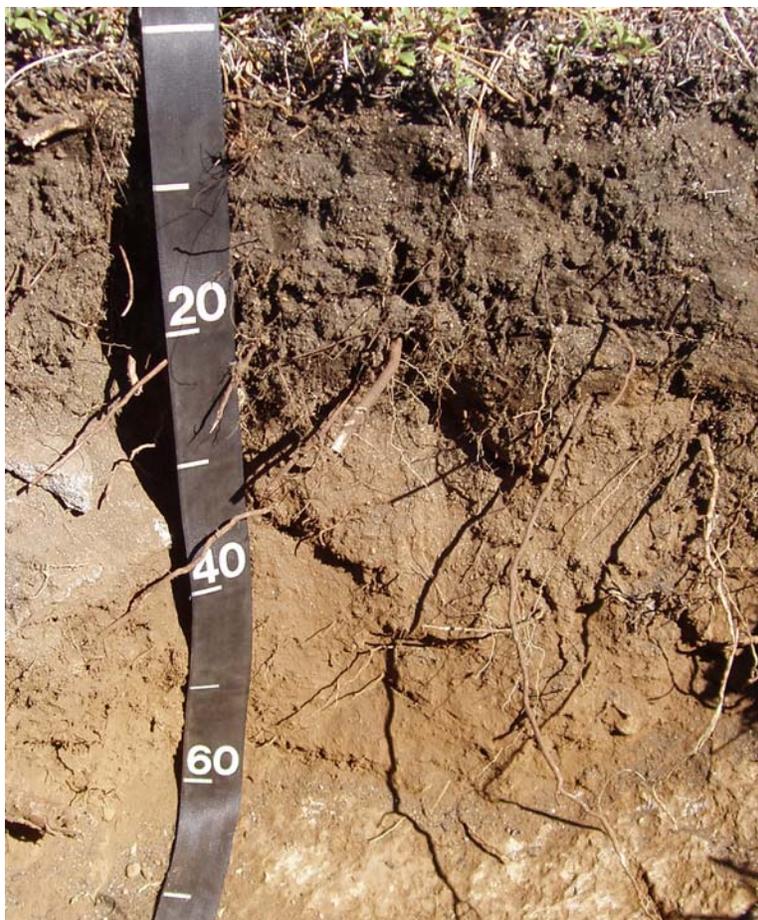


Figure 124.—Typical profile of Xeric Vitricryands, bedrock. Depth is marked in centimeters.

Xeric Vitricryands, bedrock

Xeric Vitricryands, bedrock consist of shallow to moderately deep, well drained soils that formed in tephra over residuum from volcanic rocks. These soils are on cinder cones and nunataks. Slopes range from 10 to 80 percent. The mean annual precipitation is about 51 inches (1,295 millimeters), and the mean annual air temperature is about 41 degrees F (5 degrees C).

Taxonomic Classification

Xeric Vitricryands

Typical Pedon

Xeric Vitricryands, bedrock, stony ashy loamy sand (fig. 124) on a southwest-facing (220 degrees) slope of 13 percent under a cover of prostrate ceanothus, bitter cherry, buckwheat, bush chinquapin, greenleaf manzanita, snowbrush ceanothus, and scattered Jeffrey pine, California red fir, western white pine, and lodgepole pine at an elevation of 7,769 feet (2,369 meters). When described on 8/16/06, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

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- Oi—0 to 1 inch (0 to 2 centimeters); twigs, needles, and leaf litter; abrupt smooth boundary.
- A1—1 to 4 inches (2 to 9 centimeters); very dark gray (10YR 3/1) stony ashy loamy sand, black (10YR 2/1) moist; 1 percent clay; single grain; loose, nonsticky, nonplastic; common very fine and few fine and medium roots; many very fine and fine interstitial pores; 4 percent subangular fine gravel, 1 percent subangular medium gravel, 5 percent subangular cobbles, and 5 percent subangular stones; slightly acid, pH 6.6 by Hellige-Truog; NaF pH 9.7; abrupt smooth boundary.
- A2—4 to 9 inches (9 to 23 centimeters); very dark brown (10YR 2/2) stony ashy loamy sand, very dark grayish brown (10YR 3/2) moist; 2 percent clay; weak medium and coarse subangular blocky structure parting to single grain; soft, very friable, nonsticky, nonplastic; few coarse and very coarse and common very fine to medium roots; many very fine and fine interstitial pores; 4 percent subangular fine gravel, 4 percent subangular medium and coarse gravel, 10 percent subangular cobbles, and 10 percent subangular stones; neutral, pH 7.0 by Hellige-Truog; NaF pH 10.6; abrupt smooth boundary.
- 2Ab—9 to 16 inches (23 to 40 centimeters); dark brown (10YR 3/3) extremely stony ashy sandy loam, very dark brown (10YR 2/2) moist; 8 percent clay; weak medium and coarse subangular blocky structure parting to single grain; soft, very friable, nonsticky, nonplastic; common very fine and fine and few medium, coarse, and very coarse roots; common very fine and fine tubular and irregular pores; 3 percent subangular fine gravel, 13 percent subangular medium and coarse gravel, 25 percent subangular cobbles, and 20 percent subangular stones; slightly acid, pH 6.6 by Hellige-Truog; NaF pH 10.8; clear smooth boundary.
- 2Bwb—16 to 21 inches (40 to 53 centimeters); brown (10YR 4/3) very stony medial very fine sandy loam, very dark grayish brown (10YR 3/2) moist; 13 percent clay; weak medium and coarse subangular blocky structure; soft, very friable, nonsticky, nonplastic; common very fine and fine and few medium, coarse, and very coarse roots; common very fine and fine tubular and irregular pores; 7 percent subangular fine gravel, 7 percent subangular medium and coarse gravel, 10 percent subangular cobbles, and 20 percent subangular stones; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 11.0; abrupt smooth boundary.
- 2R—21 inches (53 centimeters); indurated bedrock.

Type Location

Lassen County, California; about 3.5 miles north-northeast of the new Juniper Lake Ranger Station, approximately 1,700 feet west and 1,300 feet south of the northeast corner of sec. 1, T. 30 N., R. 6 E.; 40 degrees 29 minutes 39 seconds north latitude and 121 degrees 15 minutes 27 seconds west longitude, NAD83; USGS Quad: Mount Harkness, California.

Range in Characteristics

Depth to restrictive feature: 10 to 40 inches (25 to 102 centimeters) to lithic contact

Mean annual soil temperature: 43 to 45 degrees F (6 to 7 degrees C)

Mean summer soil temperature: 43 to 46 degrees F (6 to 8 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (thickest part): 8 to 13 percent clay and 44 to 61 percent rock fragments

Surface fragments: 5 to 20 percent gravel, 0 to 5 percent cobbles, 10 to 20 percent stones, and 15 to 25 percent boulders

Upper A horizon:

Color (dry)—7.5YR 3/1; 10YR 3/1, 3/2

Color (moist)—7.5YR 2.5/1; 10YR 2/1, 2/2

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Texture—stony ashy loamy sand, cobbly ashy loamy sand, gravelly ashy loamy sand
Clay content—1 to 2 percent
Rock fragments—4 to 20 percent fine gravel, 1 to 15 percent medium and coarse gravel, 10 to 30 percent total gravel, 0 to 10 percent cobbles, 0 to 10 percent stones, 15 to 32 percent total rock fragments
Organic matter—1 to 4 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.05 to 0.25
P retention—2 to 10 percent
Glass content—5 to 18 percent
NaF pH—9.0 to 10.6
Soil reaction—slightly acid or neutral

Lower A horizon:

Color (dry)—7.5YR 3/1; 10YR 3/1, 3/2
Color (moist)—7.5YR 2.5/1; 10YR 2/1, 2/2
Texture—stony ashy loamy sand, cobbly ashy loamy sand, gravelly ashy loamy sand
Clay content—1 to 2 percent
Rock fragments—4 to 20 percent fine gravel, 1 to 15 percent medium and coarse gravel, 10 to 30 percent total gravel, 0 to 10 percent cobbles, 0 to 10 percent stones, 15 to 32 percent total rock fragments
Organic matter—1 to 4 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.6 to 2.25
P retention—55 to 70 percent
Glass content—12 to 15 percent
NaF pH—9.0 to 10.6
Soil reaction—slightly acid or neutral

2Ab horizon:

Color (dry)—7.5YR 5/2, 5/3, 6/3; 10YR 3/3, 4/3, 5/3
Color (moist)—5YR 3/2, 3/3; 10YR 2/2, 3/2
Texture—extremely cobbly ashy sandy loam, extremely cobbly ashy loamy sand, very gravelly ashy loamy sand, very gravelly ashy sandy loam, extremely gravelly ashy sandy loam, very stony ashy sandy loam, extremely stony ashy sandy loam
Clay content—3 to 8 percent
Rock fragments—3 to 20 percent fine gravel, 12 to 20 percent medium and coarse gravel, 15 to 38 percent total gravel, 5 to 25 percent cobbles, 5 to 20 percent stones, 35 to 65 percent total rock fragments
Organic matter—5.7 to 10.5 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.6 to 2.25
P retention—55 to 70 percent
Glass content—12 to 15 percent
NaF pH—10.1 to 10.8
Soil reaction—slightly acid or neutral

2Bwb horizon:

Color (dry)—7.5YR 4/3, 5/4; 10YR 4/3, 4/4, 5/3, 5/4
Color (moist)—2.5YR 3/3; 5YR 3/3; 10YR 3/2, 3/3
Texture—very stony medial very fine sandy loam, extremely cobbly medial loamy fine sand, extremely stony medial loamy fine sand
Clay content—4 to 13 percent
Rock fragments—3 to 10 percent fine gravel, 5 to 20 percent medium and coarse gravel, 10 to 50 percent cobbles, 15 to 35 percent stones, 35 to 68 percent total rock fragments



Figure 125.—Profile of Xeric Vitricryands, cirque floor. Depth is marked in centimeters.

Organic matter—4.5 to 7.5 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—4.10 to 5.50
P retention—85 to 100 percent
Glass content—9 to 21 percent
NaF pH—10.6 to 11.0
Soil reaction—slightly acid

Xeric Vitricryands, cirque floor

Xeric Vitricryands, cirque floor consist of moderately deep, well drained soils that formed in subglacial till from volcanic rocks (fig. 125). These soils are on ground

moraines on cirque floors. Slopes range from 1 to 35 percent. The mean annual precipitation is about 115 inches (2,921 millimeters), and the mean annual air temperature is about 39 degrees F (4 degrees C).

Taxonomic Classification

Xeric Vitricryands

Typical Pedon

Xeric Vitricryands, cirque floor, gravelly ashy sandy loam on a west-northwest-facing (295 degrees) slope of 6 percent under a cover of lupine at an elevation of 8,232 feet (2,509 meters). When described on 8/30/2007, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

- A—0 to 2 inches (0 to 5 centimeters); light gray (10YR 7/2) gravelly ashy sandy loam, brown (7.5YR 4/2) moist; 5 percent clay; single grain; loose, nonsticky, nonplastic; common very fine roots; many very fine interstitial pores; 20 percent subangular fine gravel and 10 percent subangular medium and coarse gravel; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 11.5; abrupt smooth boundary.
- Bw1—2 to 5 inches (5 to 12 centimeters); light gray (10YR 7/2) very gravelly ashy sandy loam, brown (7.5YR 4/3) moist; 7 percent clay; moderate thin and medium platy structure; very hard, very firm, nonsticky, nonplastic; many very fine and fine roots around fragments; many very fine and fine interstitial pores; 25 percent subangular fine gravel and 20 percent subangular medium and coarse gravel; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 11.5; abrupt smooth boundary.
- Bw2—5 to 13 inches (12 to 34 centimeters); pinkish gray (7.5YR 7/2) gravelly ashy sandy loam, brown (7.5YR 4/3) moist; 9 percent clay; strong medium to very thick platy structure; extremely hard, very firm, nonsticky, nonplastic; few very fine to medium roots around fragments; few very fine vesicular and interstitial pores; 15 percent subangular fine gravel and 8 percent subangular medium and coarse gravel; moderately acid, pH 6.0 by Hellige-Truog; NaF pH 11.5; abrupt smooth boundary.
- C1—13 to 26 inches (34 to 65 centimeters); pinkish gray (7.5YR 6/2) gravelly ashy sandy loam, reddish brown (5YR 4/3) moist; 11 percent clay; massive parting to weak thick and very thick platy structure; extremely hard, very firm, nonsticky, nonplastic; few very fine to medium roots; few very fine interstitial and vesicular pores; 20 percent subangular fine gravel, 5 percent subangular medium and coarse gravel, and 5 percent subangular cobbles; moderately acid, pH 6.0 by Hellige-Truog; NaF pH 10.0; abrupt smooth boundary.
- C2—26 to 36 inches (65 to 91 centimeters); pinkish gray (7.5YR 7/2) gravelly ashy sandy loam, dark reddish gray (5YR 4/2) moist; 15 percent clay; massive parting to weak thick and very thick platy structure; extremely hard, very firm, nonsticky, nonplastic; few very fine to medium roots; few very fine interstitial and vesicular pores; 20 percent subangular fine gravel and 5 percent subangular medium and coarse gravel; moderately acid, pH 6.0 by Hellige-Truog; NaF pH 9.0; abrupt smooth boundary.
- Cd—36 inches (91 centimeters); pinkish gray (7.5YR 7/2) gravelly ashy sandy loam, dark reddish gray (5YR 4/2) moist; 15 percent clay; massive parting to weak thick and very thick platy structure; extremely hard, very firm, nonsticky, nonplastic; few very fine interstitial and vesicular pores; 20 percent subangular fine gravel and 5 percent subangular medium and coarse gravel; moderately acid, pH 6.0 by Hellige-Truog; NaF pH 9.0.

Type Location

Shasta County, California; about 0.17 mile north of the Bumpass Hell parking lot, approximately 200 feet north and 25 feet east of the SW 1/4 of sec. 11, T. 30 N., R. 4

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E.; 40 degrees 28 minutes 51 seconds north latitude and 121 degrees 30 minutes 55 seconds west longitude, NAD83; USGS Quad: Lassen Peak, California.

Range in Characteristics

Depth to restrictive feature: 20 to 40 inches (51 to 102 centimeters) to densic contact

Mean annual soil temperature: 40 to 42 degrees F (4 to 6 degrees C)

Mean summer soil temperature: 43 to 46 degrees F (6 to 8 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (thickest part): 5 to 15 percent clay and 20 to 30 percent rock fragments

Surface fragments: 20 to 80 percent gravel, 5 to 15 percent cobbles, 3 to 10 percent stones, and 3 to 10 percent boulders

A horizon:

Color (dry)—7.5YR 6/2, 6/3, 7/2; 10YR 7/2

Color (moist)—7.5YR 4/2, 4/3, 5/3; 10YR 4/2, 4/3

Texture—gravelly ashy sandy loam, very gravelly ashy sandy loam

Clay content—2 to 6 percent

Rock fragments—10 to 25 percent fine gravel, 3 to 15 percent medium and coarse gravel, 15 to 45 percent total gravel

Organic matter—0 to 0.8 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.4 to 0.5

P retention—25 to 40 percent

Glass content—15 to 25 percent

NaF pH—11.0 to 11.5

Soil reaction—slightly acid or neutral

Bw horizon:

Color (dry)—7.5YR 6/2, 6/3, 7/1, 7/2; 10YR 6/3, 7/1, 7/2

Color (moist)—7.5YR 4/2, 4/3; 10YR 4/2, 4/3

Texture—gravelly ashy sandy loam, very gravelly ashy sandy loam

Clay content—4 to 9 percent

Rock fragments—15 to 25 percent fine gravel, 8 to 20 percent medium and coarse gravel, 20 to 45 percent total gravel, 0 to 5 percent cobbles, 25 to 50 percent total rock fragments

Organic matter—0 to 0.5 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.6 to 1.7

P retention—25 to 50 percent

Glass content—15 to 30 percent

NaF pH—11.0 to 11.5

Soil reaction—moderately acid to neutral

C horizon:

Color (dry)—7.5YR 6/2, 7/2; 10YR 7/3; 2.5Y 8/1

Color (moist)—5YR 4/2, 4/3; 10YR 5/3; 2.5Y 5/2, 5/3, 6/3

Texture—gravelly ashy sandy loam, very gravelly ashy sandy loam, gravelly ashy loamy fine sand, gravelly ashy loamy sand, very gravelly ashy loamy sand

Clay content—11 to 15 percent

Rock fragments—5 to 25 percent fine gravel, 5 to 20 percent medium and coarse gravel, 15 to 40 percent total gravel, 0 to 5 percent cobbles, 15 to 45 percent total rock fragments

Organic matter—0 to 0.5 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.8 to 2.4

P retention—80 to 90 percent

Glass content—15 to 30 percent

NaF pH—9.0 to 11.0

Soil reaction—moderately acid to neutral

Cd horizon:

Color (dry)—7.5YR 7/2; 10YR 8/1; 2.5Y 8/1

Color (moist)—5YR 4/2; 10YR 6/2; 2.5Y 5/2, 6/3

Texture—gravelly sandy loam, gravelly ashy loamy fine sand, very gravelly ashy loamy sand, extremely stony ashy coarse sand, extremely bouldery ashy coarse sand

Clay content—0 to 15 percent

Rock fragments—10 to 20 percent fine gravel, 5 to 30 percent medium and coarse gravel, 15 to 35 percent total gravel, 0 to 20 percent cobbles, 0 to 25 percent stones, 0 to 20 percent boulders, 20 to 80 percent total rock fragments

Organic matter—0 to 0.5 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.15 to 2.0

P retention—15 to 60 percent

Glass content—15 to 30 percent

NaF pH—9.0 to 11.2

Soil reaction—moderately acid to neutral

Xeric Vitricryands, colluvium

Xeric Vitricryands, colluvium consist of very deep, well drained soils that formed in colluvium from volcanic rocks. These soils are on cinder cones and nunataks. Slopes range from 10 to 80 percent. The mean annual precipitation is about 47 inches (1,194 millimeters), and the mean annual air temperature is about 41 degrees F (5 degrees C).

Taxonomic Classification

Xeric Vitricryands

Typical Pedon

Xeric Vitricryands, colluvium, very gravelly ashy fine sandy loam on a north-northeast-facing (23 degrees) slope of 63 percent under a cover of lupine, grass, scattered mountain hemlock, western white pine, California red fir, mountain monardella, rubber rabbitbrush, and sedge at an elevation of 7,868 feet (2,399 meters). When described on 8/15/06, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

A—0 to 3 inches (0 to 7 centimeters); yellowish brown (10YR 5/4) very gravelly ashy fine sandy loam, dark grayish brown (10YR 4/2) moist; 6 percent clay; single grain; loose, nonsticky, nonplastic; many fine and common very fine roots; common fine and medium and few very fine interstitial pores; 24 percent fine gravel and 26 percent medium and coarse gravel; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 10.0; abrupt smooth boundary.

Ab—3 to 7 inches (7 to 18 centimeters); yellowish brown (10YR 5/4) very gravelly ashy fine sandy loam, dark brown (7.5YR 3/2) moist; 6 percent clay; single grain; loose, nonsticky, nonplastic; many fine and medium and common very fine roots; common very fine to medium interstitial pores; 26 percent fine gravel and 26 percent medium and coarse gravel; slightly acid, pH 6.6 by Hellige-Truog; NaF pH 10.4; abrupt wavy boundary.

Bwb1—7 to 11 inches (18 to 29 centimeters); light yellowish brown (10YR 6/4) very gravelly ashy fine sandy loam, dark brown (7.5YR 3/4) moist; 6 percent clay; single grain; loose, nonsticky, nonplastic; common very fine to medium roots; common very fine and fine and few medium interstitial pores; 18 percent fine

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- gravel and 22 percent medium gravel; neutral, pH 6.7 by Hellige-Truog; NaF pH 10.8; clear smooth boundary.
- Bwb2—11 to 24 inches (29 to 60 centimeters); light yellowish brown (10YR 6/4) very gravelly ashy fine sandy loam, dark yellowish brown (10YR 3/4) and brown (7.5YR 4/3) moist; 6 percent clay; single grain; loose, nonsticky, nonplastic; many very fine and fine, common medium and coarse, and many very coarse roots; many very fine and fine and few medium interstitial pores; 18 percent fine gravel and 22 percent medium gravel; neutral, pH 6.7 by Hellige-Truog; NaF pH 10.5; abrupt wavy boundary.
- Bwb3—24 to 33 inches (60 to 85 centimeters); light yellowish brown (10YR 6/4) extremely gravelly ashy fine sandy loam, brown (7.5YR 4/3) moist; 7 percent clay; single grain; loose, nonsticky, nonplastic; few very fine, few very coarse, common fine and medium, and many coarse roots; common very fine and fine and many medium interstitial pores; 25 percent fine gravel and 35 percent medium gravel; neutral, pH 6.7 by Hellige-Truog; NaF pH 10.8; abrupt smooth boundary.
- Bwb4—33 to 39 inches (85 to 98 centimeters); light yellowish brown (10YR 6/4) extremely gravelly ashy loamy sand, dark brown (7.5YR 3/4) moist; 4 percent clay; single grain; loose, nonsticky, nonplastic; few very fine and fine and common medium roots; many very fine and fine interstitial pores; 35 percent fine gravel and 25 percent medium gravel; neutral, pH 6.8 by Hellige-Truog; NaF pH 10.7; clear smooth boundary.
- BC—39 to 42 inches (98 to 106 centimeters); light yellowish brown (10YR 6/4) extremely gravelly ashy loamy coarse sand, brown (7.5YR 4/4) moist; 2 percent clay; single grain; loose, nonsticky, nonplastic; few very fine and fine and common medium roots; many very fine and fine interstitial pores; 24 percent fine gravel and 38 percent medium gravel; neutral, pH 6.8 by Hellige-Truog; NaF pH 10.7; clear smooth boundary.
- C—42 to 60 inches (106 to 152 centimeters); light brown (7.5YR 6/4) extremely gravelly ashy loamy coarse sand, reddish brown (5YR 4/4) moist; 2 percent clay; single grain; loose, nonsticky, nonplastic; common medium roots; many very fine to medium interstitial pores; 23 percent fine gravel and 60 percent medium and coarse gravel; neutral, pH 6.8 by Hellige-Truog; NaF pH 10.7.

Type Location

Plumas County, California; about 0.16 mile north of the Mount Harkness fire lookout, approximately 1,850 feet south and 1,800 feet east of the northwest corner of sec. 27, T. 30 N., R. 6 E.; 40 degrees 26 minutes 1 second north latitude and 121 degrees 18 minutes 8 seconds west longitude, NAD83; USGS Quad: Mount Harkness, California.

Range in Characteristics

Depth to restrictive feature: More than 60 inches (152 centimeters) to bedrock

Mean annual soil temperature: 40 to 43 degrees F (4 to 6 degrees C)

Mean summer soil temperature: 43 to 46 degrees F (6 to 8 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (thickest part): 5 to 7 percent clay and 40 to 60 percent rock fragments

Surface fragments: 55 to 65 percent gravel, 5 to 10 percent cobbles, and 0 to 5 percent stones

A horizon:

Color (dry)—7.5YR 5/3, 5/4, 6/4; 10YR 4/4, 5/3, 5/4, 6/4

Color (moist)—7.5YR 4/2, 4/3; 10YR 4/2, 4/3

Texture—very gravelly ashy fine sandy loam, very gravelly ashy sandy loam, very gravelly ashy loamy sand, extremely gravelly ashy sandy loam, extremely gravelly ashy loamy sand

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Clay content—2 to 6 percent
Rock fragments—18 to 32 percent fine gravel, 18 to 32 percent medium and coarse gravel, 35 to 60 percent total gravel
Organic matter—0.7 to 3.0 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.95 to 1.3
P retention—20 to 30 percent
Glass content—6 to 10 percent
NaF pH—10.0 to 10.6
Soil reaction—slightly acid or neutral

Ab horizon:

Color (dry)—7.5YR 5/3, 5/4, 6/4; 10YR 4/4, 5/3, 5/4, 6/4
Color (moist)—7.5YR 3/2, 3/3, 4/2, 4/3; 10YR 3/3, 4/2, 4/3
Texture—very gravelly ashy fine sandy loam, very gravelly ashy sandy loam, very gravelly ashy loamy sand, extremely gravelly ashy sandy loam, extremely gravelly ashy loamy sand
Clay content—2 to 6 percent
Rock fragments—18 to 32 percent fine gravel, 18 to 32 percent medium and coarse gravel, 35 to 62 percent total gravel
Organic matter—0.7 to 4.0 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.95 to 1.3
P retention—25 to 50 percent
Glass content—6 to 10 percent
NaF pH—10.0 to 10.8
Soil reaction—slightly acid or neutral

Upper Bwb horizon:

Color (dry)—10YR 5/3, 5/4, 6/3, 6/4
Color (moist)—7.5YR 3/4, 4/3, 4/4; 10YR 3/4, 4/3, 4/4
Texture—gravelly ashy sandy loam, very gravelly ashy fine sandy loam, very gravelly ashy sandy loam, extremely gravelly ashy sandy loam, very gravelly ashy loamy sand
Clay content—2 to 6 percent
Rock fragments—16 to 35 percent fine gravel, 16 to 35 percent medium and coarse gravel, 32 to 70 percent total gravel
Organic matter—1.2 to 2.0 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.6 to 2.25
P retention—55 to 70 percent
Glass content—12 to 15 percent
NaF pH—10.3 to 11.0
Soil reaction—neutral

Lower Bwb horizon:

Color (dry)—10YR 5/4, 6/3, 6/4
Color (moist)—7.5YR 3/4, 4/3, 4/4; 10YR 3/4, 4/3, 4/4
Texture—very gravelly ashy fine sandy loam, very gravelly ashy sandy loam, extremely gravelly ashy fine sandy loam, extremely gravelly ashy loamy sand
Clay content—2 to 7 percent
Rock fragments—20 to 40 percent fine gravel, 20 to 40 percent medium and coarse gravel, 40 to 65 percent total gravel
Organic matter—0.7 to 1.5 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—2.25 to 3.75
P retention—70 to 95 percent
Glass content—12 to 15 percent
NaF pH—10.5 to 10.9
Soil reaction—neutral

BC horizon:

Color (dry)—7.5YR 6/4; 10YR 5/4, 6/4

Color (moist)—7.5YR 4/3, 4/4

Texture—very gravelly ashy loamy coarse sand, very gravelly ashy loamy sand, extremely gravelly ashy loamy coarse sand, extremely gravelly ashy loamy sand

Clay content—1 to 4 percent

Rock fragments—20 to 28 percent fine gravel, 32 to 40 percent medium and coarse gravel, 52 to 65 percent total gravel

Organic matter—0.5 to 1.3 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—2.25 to 3.75

P retention—70 to 95 percent

Glass content—5 to 18 percent

NaF pH—10.5 to 10.9

Soil reaction—neutral

C horizon:

Color (dry)—7.5YR 6/4; 10YR 4/4, 5/4, 5/6, 6/4

Color (moist)—5YR 4/4; 7.5YR 3/4, 4/3, 4/4; 10YR 3/3, 3/4

Texture—extremely gravelly ashy loamy coarse sand, extremely gravelly ashy loamy sand, extremely cobbly ashy loamy sand, ashy gravel

Clay content—1 to 4 percent

Rock fragments—5 to 25 percent fine gravel, 35 to 65 percent medium and coarse gravel, 42 to 80 percent total gravel, 0 to 30 percent cobbles, 60 to 90 percent total rock fragments

Organic matter—0.1 to 1.0 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—3.5 to 4.7

P retention—65 to 90 percent

Glass content—5 to 8 percent

NaF pH—10.7 to 11.5

Soil reaction—neutral

Xeric Vitricryands, pyroclastic surge

Xeric Vitricryands, pyroclastic surge consist of deep and very deep, well drained soils that formed in pyroclastic surge over till from volcanic rocks (fig. 126). These soils are on medial moraines. Slopes range from 8 to 50 percent. The mean annual precipitation is about 92 inches (2,337 millimeters), and the mean annual air temperature is about 40 degrees F (4 degrees C).

Taxonomic Classification

Xeric Vitricryands

Typical Pedon

Xeric Vitricryands, pyroclastic surge, very gravelly ashy loamy coarse sand on an east-facing (120 degrees) slope of 51 percent under a cover of pinemat manzanita, California red fir, western white pine, and bush chinquapin at an elevation of 7,189 feet (2,191 meters). When described on 7/25/07, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

Oi—0 to 1 inch (0 to 2 centimeters); slightly decomposed needles and leaf litter; abrupt smooth boundary.

Oe—1 to 3 inches (2 to 7 centimeters); moderately decomposed needles, roots, and leaf litter; common very fine roots; abrupt wavy boundary.

A—3 to 6 inches (7 to 14 centimeters); light gray (10YR 7/2) very gravelly ashy loamy



Figure 126.—Profile of Xeric Vitricryands, pyroclastic surge. Depth is marked in centimeters.

coarse sand, grayish brown (10YR 5/2) moist; 2 percent clay; single grain; loose, nonsticky, nonplastic; many very fine and fine, common medium, and few coarse roots; many very fine and fine tubular and interstitial pores; 25 percent angular fine gravel and 25 percent angular medium and coarse gravel; slightly acid, pH 6.5 by Hellige-Truog; NaF pH 9.0; abrupt wavy boundary.

2Ab—6 to 10 inches (14 to 26 centimeters); light gray (10YR 7/2) very gravelly medial loamy coarse sand, brown (10YR 4/3) moist; 3 percent clay; weak very fine and fine granular structure parting to single grain; loose, nonsticky, nonplastic;

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- common very fine and fine and few medium and coarse roots; many very fine and fine interstitial and tubular pores; 15 percent subangular fine gravel, 10 percent subangular medium and coarse gravel, and 10 percent subangular cobbles; neutral, pH 6.7 by Hellige-Truog; NaF pH 11.5; clear smooth boundary.
- 2Bwb1—10 to 15 inches (26 to 39 centimeters); light yellowish brown (10YR 6/4) very gravelly medial sandy loam, brown (10YR 4/3) moist; 5 percent clay; weak very fine and fine subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; common very fine to medium and few coarse roots; many very fine and fine interstitial and tubular pores; 20 percent subangular fine gravel, 12 percent subangular medium and coarse gravel, and 15 percent subangular cobbles; slightly acid, pH 6.6 by Hellige-Truog; NaF pH 11.5; clear smooth boundary.
- 2Bwb2—15 to 27 inches (39 to 68 centimeters); light yellowish brown (10YR 6/4) very cobbly medial sandy loam, brown (10YR 4/3) moist; 4 percent clay; weak very fine and fine subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; many very fine, common fine, and few medium and coarse roots; many very fine and fine interstitial and tubular pores; 16 percent subangular fine gravel, 16 percent subangular medium and coarse gravel, 15 percent subangular cobbles, and 5 percent subangular stones; slightly acid, pH 6.6 by Hellige-Truog; NaF pH 11.0; clear smooth boundary.
- 2Bwb3—27 to 39 inches (68 to 98 centimeters); very pale brown (10YR 7/4) extremely gravelly medial sandy loam, yellowish brown (10YR 5/4) moist; 3 percent clay; weak very fine subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; many very fine, common fine, and few medium and coarse roots; many very fine and fine interstitial and tubular pores; 15 percent subangular fine gravel, 30 percent subangular medium and coarse gravel, and 20 percent subangular cobbles; neutral, pH 6.7 by Hellige-Truog; NaF pH 10.4; clear smooth boundary.
- 2Bwb4—39 to 48 inches (98 to 123 centimeters); very pale brown (10YR 7/4) extremely gravelly medial sandy loam, dark yellowish brown (10YR 4/4) moist; 3 percent clay; weak very fine and fine subangular blocky structure parting to single grain; loose, nonsticky, nonplastic; common very fine and fine and few medium and coarse roots; common very fine irregular and tubular pores; 18 percent subangular fine gravel, 22 percent subangular medium and coarse gravel, and 20 percent subangular cobbles; neutral, pH 6.7 by Hellige-Truog; NaF pH 10.4; abrupt wavy boundary.
- 2Cdq—48 to 60 inches (123 to 152 centimeters); pink (7.5YR 7/3) very gravelly loamy coarse sand, brown (7.5YR 5/4) moist; 2 percent clay; massive; very hard, extremely firm, nonsticky, nonplastic; many very fine and fine interstitial and tubular pores; 15 percent silica masses around rock fragments; 22 percent subangular fine gravel, 18 percent subangular medium and coarse gravel, and 5 percent subangular cobbles; neutral, pH 6.8 by Hellige-Truog.

Type Location

Shasta County, California; about 0.75 mile northwest of Paradise Meadows, approximately 1,600 feet east and 900 feet south of the northwest corner of sec. 36, T. 31 N., R. 24 E.; 40 degrees 29 minutes 52 seconds north latitude and 121 degrees 28 minutes 36 seconds west longitude, NAD83; USGS Quad: Reading Peak, California.

Range in Characteristics

Depth to restrictive feature: 40 to more than 60 inches (102 to more than 152 centimeters) to densic contact

Mean annual soil temperature: 41 to 43 degrees F (5 to 6 degrees C)

Mean summer soil temperature: 43 to 46 degrees F (6 to 8 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

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Particle-size control section (thickest part): 3 to 5 percent clay and 35 to 65 percent rock fragments

Surface fragments: 15 to 25 percent gravel, 0 to 5 percent cobbles, 0 to 5 percent stones, and 0 to 5 percent boulders

A horizon:

Color (dry)—10YR 7/1, 7/2; 2.5Y 6/2

Color (moist)—10YR 5/2; 2.5Y 4/2, 5/2

Texture—very gravelly ashy loamy coarse sand, extremely ashy loamy coarse sand, very gravelly ashy loamy coarse sand, ashy very fine sandy loam

Clay content—1 to 3 percent

Rock fragments—5 to 35 percent fine gravel, 0 to 30 percent medium and coarse gravel, 5 to 65 percent total gravel

Organic matter—0.1 to 0.3 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.15 to 0.30

P retention—8 to 15 percent

Glass content—30 to 35 percent

NaF pH—9.0 to 9.1

Soil reaction—moderately acid or slightly acid

2Ab horizon:

Color (dry)—10YR 7/2; 2.5Y 6/2

Color (moist)—10YR 4/3; 2.5Y 4/2

Texture—gravelly medial loamy coarse sand, very gravelly medial loamy coarse sand

Clay content—2 to 3 percent

Rock fragments—15 to 20 percent fine gravel, 10 to 15 percent medium and coarse gravel, 25 to 35 percent total gravel, 0 to 15 percent cobbles, 25 to 40 percent total rock fragments

Organic matter—0.5 to 4 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.4 to 1.5

P retention—25 to 70 percent

Glass content—30 to 45 percent

NaF pH—9.9 to 11.5

Soil reaction—moderately acid to neutral

Upper 2Bwb horizon:

Color (dry)—10YR 6/3, 6/4

Color (moist)—10YR 4/3

Texture—very gravelly medial sandy loam, extremely gravelly medial sandy loam, very cobbly medial sandy loam

Clay content—3 to 5 percent

Rock fragments—10 to 25 percent fine gravel, 10 to 40 percent medium and coarse gravel, 25 to 55 percent total gravel, 10 to 15 percent cobbles, 0 to 10 percent stones, 35 to 70 percent total rock fragments

Organic matter—2 to 3 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.2 to 1.5

P retention—60 to 75 percent

Glass content—18 to 30 percent

NaF pH—10.4 to 11.0

Soil reaction—slightly acid or neutral

Lower 2Bwb horizon:

Color (dry)—10YR 7/3, 7/4

Color (moist)—10YR 4/4, 5/4

Texture—extremely gravelly medial sandy loam, extremely cobbly medial sandy loam, extremely stony medial sand
Clay content—1 to 3 percent
Rock fragments—5 to 20 percent fine gravel, 15 to 35 percent medium and coarse gravel, 20 to 55 percent total rock fragments, 20 to 25 percent cobbles, 0 to 30 percent stones, 60 to 70 percent total rock fragments
Organic matter—0.5 to 3 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—1.2 to 1.5
P retention—45 to 75 percent
Glass content—18 to 30 percent
NaF pH—10.4 to 11.2
Soil reaction—slightly acid

2Cdq horizon:

Color (dry)—7.5YR 7/3; 10YR 7/3
Color (moist)—7.5YR 5/4; 10YR 5/3
Texture—very gravelly loamy coarse sand, extremely stony coarse sand
Clay content—1 to 2 percent
Rock fragments—5 to 25 percent fine gravel, 10 to 20 percent medium and coarse gravel, 20 to 45 percent total gravel, 5 to 30 percent cobbles, 0 to 30 percent stones, 40 to 85 percent total rock fragments
Organic matter—0 to 0.3 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.5 to 0.7
P retention—25 to 35 percent
Glass content—15 to 30 percent
NaF pH—11.2 to 11.5
Rupture resistance—very hard
Soil reaction—slightly acid or neutral

Xeric Vitricryands, tephra over till

Xeric Vitricryands, tephra over till consist of moderately deep to very deep, well drained soils that formed in tephra over till from volcanic rocks. These soils are on moraines on lava flows. Slopes range from 5 to 35 percent. The mean annual precipitation is about 103 inches (2,616 millimeters), and the mean annual air temperature is about 44 degrees F (7 degrees C).

Taxonomic Classification

Xeric Vitricryands

Typical Pedon

Xeric Vitricryands, tephra over till, stony medial loamy sand on a north-facing (10 degrees) slope of 22 percent, under a cover of mountain hemlock and lupine at an elevation of 7,989 feet (2,436 meters). When described on 9/18/2006, the soil was dry throughout. (Colors are for dry soil unless otherwise noted.)

Oi—0 to 0.4 inch (0 to 1 centimeter); slightly decomposed needles, twigs, and bark litter; abrupt smooth boundary.

Oe—0.4 inch to 2 inches (1 to 5 centimeters); moderately decomposed needles and bark litter; few very fine roots; abrupt smooth boundary.

A1—2 to 3 inches (5 to 8 centimeters); very dark grayish brown (10YR 3/2) stony medial loamy sand, black (10YR 2/1) moist; 4 percent clay; weak very fine subangular blocky structure parting to single grain; slightly hard, friable, nonsticky, nonplastic; common very fine and fine roots; many very fine interstitial pores; 1 percent subangular fine gravel, 1 percent subangular medium and coarse gravel,

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- 10 percent subangular cobbles, and 10 percent subangular stones; very strongly acid, pH 4.6 by pH meter 1:1 water; NaF pH 7.5; abrupt smooth boundary.
- A2—3 to 4 inches (8 to 10 centimeters); black (10YR 2/1) stony ashy loamy sand, black (10YR 2/1) moist; 4 percent clay; single grain; loose, nonsticky, nonplastic; few very fine, common fine and medium, and few coarse roots; many very fine interstitial pores; 1 percent subangular fine gravel, 1 percent subangular medium and coarse gravel, 10 percent subangular cobbles, and 10 percent subangular stones; extremely acid, pH 4.3 by Hellige-Truog; NaF pH 6.9; abrupt smooth boundary.
- C1—4 to 5 inches (10 to 13 centimeters); light brownish gray (10YR 6/2) stony ashy coarse sand, dark grayish brown (10YR 4/2) moist; 2 percent clay; single grain; loose, nonsticky, nonplastic; few very fine, common fine and medium, and few coarse roots; many very fine interstitial pores; 5 percent subangular fine gravel, 5 percent subangular medium gravel, 10 percent subangular cobbles, and 10 percent subangular stones; very strongly acid, pH 4.5 by Hellige-Truog; NaF pH 7.9; abrupt smooth boundary.
- C2—5 to 8 inches (13 to 20 centimeters); brown (10YR 5/3) very stony ashy coarse sand, dark brown (10YR 3/3) moist; 1 percent clay; weak very fine subangular blocky structure parting to single grain; soft, very friable, nonsticky, nonplastic; few very fine and common fine and medium roots; many very fine interstitial pores; 14 percent subangular fine gravel, 14 percent subangular medium and coarse gravel, 10 percent subangular cobbles, and 10 percent subangular stones; very strongly acid, pH 5.2 by pH meter 1:1 water; NaF pH 9.6; abrupt smooth boundary.
- 2Ab—8 to 10 inches (20 to 26 centimeters); grayish brown (10YR 5/2) stony ashy loamy sand, very dark grayish brown (10YR 3/2) moist; 3 percent clay; weak very fine subangular blocky structure parting to single grain; soft, very friable, nonsticky, nonplastic; common fine and few medium and coarse roots; many very fine interstitial pores; 9 percent subangular fine gravel, 3 percent subangular medium gravel, 10 percent subangular cobbles, and 10 percent subangular stones; very strongly acid, pH 4.5 by Hellige-Truog; NaF pH 9.9; abrupt smooth boundary.
- 2Bwb1—10 to 16 inches (26 to 40 centimeters); yellowish brown (10YR 5/6) very stony ashy loamy coarse sand, dark yellowish brown (10YR 3/4) moist; 3 percent clay; weak fine subangular blocky structure parting to single grain; soft, very friable, nonsticky, nonplastic; common fine and few medium to very coarse roots; many very fine interstitial pores; 10 percent subangular fine gravel, 14 percent subangular medium and coarse gravel, 10 percent subangular cobbles, and 10 percent subangular stones; strongly acid, pH 5.5 by pH meter 1:1 water; NaF pH 10.9; clear smooth boundary.
- 2Bwb2—16 to 19 inches (40 to 49 centimeters); yellowish brown (10YR 5/6) very gravelly ashy coarse sand, dark brown (7.5YR 3/4) moist; 1 percent clay; weak fine subangular blocky structure parting to single grain; soft, very friable, nonsticky, nonplastic; few fine and medium roots; many very fine interstitial pores; 7 percent subangular fine gravel, 29 percent subangular medium and coarse gravel, and 10 percent subangular cobbles; moderately acid, pH 5.7 by Hellige-Truog; NaF pH 10.5; clear smooth boundary.
- 2Bwb3—19 to 39 inches (49 to 99 centimeters); light yellowish brown (10YR 6/4) very gravelly ashy loamy coarse sand, strong brown (7.5YR 4/6) moist; 0 percent clay; weak very fine subangular blocky structure parting to single grain; soft, very friable, nonsticky, nonplastic; few fine and medium roots; many very fine interstitial pores; 10 percent subangular fine gravel, 20 percent subangular medium and coarse gravel, and 10 percent subangular cobbles; moderately acid, pH 5.9 by pH meter 1:1 water; NaF pH 9.6; clear smooth boundary.
- 2C—39 to 60 inches (99 to 152 centimeters); very pale brown (10YR 7/3) extremely stony ashy coarse sand, dark yellowish brown (10YR 4/4) moist; 0 percent clay;

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single grain; loose, nonsticky, nonplastic; few fine and medium roots; many very fine interstitial pores; 7 percent subangular fine gravel, 30 percent subangular medium and coarse gravel, 10 percent subangular cobbles, and 15 percent subangular stones; moderately acid, pH 6.0 by Hellige-Truog; NaF pH 10.6.

Type Location

Shasta County, California; about 0.34 mile west-southwest of Terrace Lake, approximately 1,600 feet south and 300 feet west of the northeast corner of sec. 12, T. 30 N., R. 4 E.; 40 degrees 28 minutes 40 seconds north latitude and 121 degrees 28 minutes 47 seconds west longitude, NAD83; USGS Quad: Reading Peak, California.

Range in Characteristics

Depth to restrictive feature: 20 to more than 60 inches (51 to more than 152 centimeters) to densic contact

Mean annual soil temperature: 38 to 42 degrees F (3 to 6 degrees C)

Mean summer soil temperature: 43 to 46 degrees (6 to 8 degrees C)

Period that soil moisture control section is dry: July to October (about 90 days)

Particle-size control section (thickest part): 2 to 7 percent clay and 40 to 65 percent rock fragments

Surface fragments: 0 to 50 percent gravel, 5 to 25 percent cobbles, 5 to 15 percent stones, and 5 to 10 percent boulders

A horizon:

Color (dry)—10YR 2/1, 3/2, 3/3, 4/2, 4/3, 5/3, 6/2, 6/3

Color (moist)—10YR 2/1, 2/2, 3/2, 4/2, 4/3

Texture—gravelly ashy sandy loam, very gravelly ashy loamy sand, cobbly ashy sandy loam, very cobbly ashy sandy loam, stony medial sandy loam, stony ashy loamy sand, stony medial loamy sand

Clay content—0 to 6 percent

Rock fragments—1 to 16 percent fine gravel, 1 to 24 percent medium and coarse gravel, 2 to 40 percent total gravel, 10 to 15 percent cobbles, 0 to 10 percent stones, 22 to 40 percent total rock fragments

Organic matter—13 to 35 percent

Base saturation by ammonium acetate—8 to 20 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.30 to 0.75

P retention—40 to 100 percent

Glass content—55 to 65 percent

NaF pH—7.0 to 11.2

Soil reaction—extremely acid to strongly acid

C horizon:

Color (dry)—10YR 5/3, 6/2, 6/3

Color (moist)—10YR 3/3, 4/2, 4/3

Texture—gravelly ashy sandy loam, very gravelly ashy coarse sandy loam, gravelly ashy coarse sand, very gravelly ashy coarse sand, cobbly ashy loamy coarse sand, stony ashy coarse sand, very stony ashy coarse sand

Clay content—1 to 6 percent

Rock fragments—5 to 18 percent fine gravel, 5 to 18 percent medium and coarse gravel, 10 to 35 percent total gravel, 5 to 15 percent cobbles, 0 to 15 percent stones, 15 to 58 percent total rock fragments

Organic matter—2 to 4 percent

Base saturation by ammonium acetate—5 to 15 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.18 to 0.30

P retention—10 to 20 percent

Glass content—55 to 65 percent

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NaF pH—8.0 to 10.2
Soil reaction—very strongly acid or strongly acid

2Ab horizon:

Color (dry)—10YR 4/2, 4/3, 5/2, 5/3, 6/2
Color (moist)—10YR 3/2, 3/3, 4/2
Texture—stony ashy sandy loam, stony ashy coarse sandy loam, stony ashy loamy sand, cobbly ashy sandy loam, gravelly ashy sandy loam, gravelly ashy loamy coarse sand, very gravelly ashy sandy loam
Clay content—1 to 5 percent
Rock fragments—5 to 18 percent fine gravel, 0 to 15 percent medium and coarse gravel, 8 to 30 percent total gravel, 5 to 20 percent cobbles, 0 to 15 percent stones, 15 to 55 total rock fragments
Organic matter—2.0 to 3.0 percent
Base saturation by ammonium acetate—5 to 10 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.30 to 0.50
P retention—15 to 25 percent
Glass content—55 to 65 percent
NaF pH—9.0 to 10.5
Soil reaction—very strongly acid or strongly acid

Upper 2Bwb horizon:

Color (dry)—10YR 5/4, 5/6, 7/4
Color (moist)—7.5YR 3/4; 10YR 3/4, 4/3, 4/4, 5/4
Texture—very gravelly ashy loamy coarse sand, very gravelly ashy coarse sand, very cobbly ashy fine sandy loam, gravelly ashy loamy coarse sand, ashy loamy coarse sand, very stony ashy loamy coarse sand
Clay content—1 to 5 percent
Rock fragments—5 to 15 percent fine gravel, 3 to 30 percent medium and coarse gravel, 10 to 40 percent total gravel, 0 to 10 percent cobbles, 0 to 10 percent stones, 0 to 5 percent boulders, 10 to 58 percent total rock fragments
Organic matter—3.5 to 4.5 percent
Base saturation by ammonium acetate—2 to 15 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.75 to 1.10
P retention—57 to 64 percent
Glass content—55 to 70 percent
NaF pH—10.0 to 11.0
Soil reaction—strongly acid or moderately acid

Lower 2Bwb horizon:

Color (dry)—10YR 6/4, 7/4, 8/1
Color (moist)—7.5YR 4/6; 10YR 5/2, 5/3, 5/4
Texture—gravelly ashy loamy coarse sand, very gravelly ashy loamy coarse sand, very stony ashy fine sandy loam, bouldery ashy fine sandy loam, bouldery ashy sandy loam, ashy loamy sand, extremely cobbly ashy sandy loam
Clay content—0 to 5 percent
Rock fragments—0 to 10 percent fine gravel, 0 to 35 percent medium and coarse gravel, 5 to 40 percent total gravel, 0 to 35 percent cobbles, 0 to 15 percent stones, 0 to 5 percent boulders, 5 to 85 percent total rock fragments
Organic matter—1.2 to 2.5 percent
Base saturation by ammonium acetate—3 to 10 percent
Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.82 to 0.93
P retention—45 to 55 percent
Glass content—65 to 75 percent
NaF pH—9.5 to 11.2
Soil reaction—moderately acid or slightly acid

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2C horizon:

Color (dry)—10YR 7/3, 8/1, 8/2, 8/3

Color (moist)—10YR 4/4, 5/3, 5/4, 6/3, 6/4; 2.5Y 5/4

Texture—extremely gravelly ashy coarse sand, very stony ashy very fine sandy loam, extremely cobbly ashy loamy sand, ashy loamy sand, extremely gravelly ashy loamy coarse sand, extremely stony ashy loamy coarse sand, very gravelly ashy loamy coarse sand, extremely stony ashy coarse sand

Clay content—0 to 5 percent

Rock fragments—1 to 15 percent fine gravel, 1 to 45 percent medium and coarse gravel, 2 to 50 percent total gravel, 0 to 40 percent cobbles, 0 to 30 percent stones, 0 to 10 percent boulders, 10 to 89 percent total rock fragments

Organic matter—1.0 to 2.0 percent

Base saturation by ammonium acetate—2 to 8 percent

Acid oxalate extractable Al plus $\frac{1}{2}$ Fe—0.35 to 0.45

P retention—90 to 100 percent

Glass content—62 to 73 percent

NaF pH—9.5 to 11.5

Soil reaction—moderately acid to neutral

Formation of the Soils

The landscape of Lassen Volcanic National Park is the product of powerful volcanic and glacial activity that created and destroyed landforms. Many of the landforms that were created by volcanoes were reshaped by glaciers. More recent postglacial volcanic events have destroyed, reshaped, or buried preexisting volcanic and glacial landforms. The cycle of volcanism and glaciations has produced a diverse array of soils in the context of age and parent material in the park, and many of the soils contain this diversity in a single soil profile.

Factors of Soil Formation

The five soil-forming factors are topography, climate, living organisms, parent material, and time (Jenny, 1941). The patterns of soils reflect the multiple interactions between factors, such as the extent and age of volcanic and glacial landforms in relation to the climatic gradient of Lassen Volcanic National Park.

Topography

Lassen Volcanic National Park is located in the Southern Cascade Mountains. The west side of the park is situated on the crest of the Cascades. The high-elevation, high-relief hub of closely spaced volcanoes in the southwest part of park is made up of Lassen Peak (fig. 127), Reading Peak, Mount Conard, Brokeoff Mountain, Mount Diller, Loomis Peak, and other high-elevation peaks in close proximity. The east side of the park transitions to the lower and flatter terrain of the Modoc Plateau and has more widely spaced volcanoes, including Prospect Peak, Sifford Mountain, Mount Harkness, and several cinder cones.

Three glaciations of late Pleistocene age occurred contemporaneously with much of the volcanic activity in the park (Christiansen and others, 2002). Glaciers covered most of the park, collecting tephra from volcanic eruptions and eroding and depositing glacial drift on the volcanic landscape. The difference in relief and elevation between the east side and the west side of the park influenced the thickness of ice, glacial processes, and the kinds of glacial landforms that formed. Due to colder temperatures and higher precipitation at the higher elevations in the west, thicker glaciers originated there and eroded deeper glacial valleys. Thinner sheet-like glaciers formed on the lower terrain in the east, scouring lava flows and forming moraines in the broader valleys.

At the higher elevations in the west, thick glaciers flowed radially down off of the steeper volcanic terrain. The main courses of glacial movement concentrated into valley glaciers at the bases of the peaks where they were confined in the valleys. Today, streams flow in these valleys. The thick, confined ice that was concentrated in the steeper reaches of these drainages had the power to cut into the bedrock and sculpt U-shaped valleys (fig. 128). Multiple ice levels from different glacial episodes produced a range of glacial extents that fluxed between overriding drainage divides and confinement in glacial valleys.

Much bedrock was exposed by glacial erosion in the upper reaches of the drainages that originated at higher elevations. Thin sheets of till were deposited on



Figure 127.—The view from Ash Butte on the east side of the park, looking toward Lassen Peak on the west side of the park.



Figure 128.—A U-shaped valley in the upper Manzanita Creek drainage. The view from Lassen Peak towards Loomis Peak.



Figure 129.—A glacial valley on the east side of the park. The view from Mount Harkness towards Bonte Peak. (Bonte Peak is the nunatak on the right edge of the photo.)

some linear and concave slopes in these upper reaches. Most of the material that was eroded in the upper reaches was deposited as thicker deposits of till. These deposits formed moraines where the ice was less confined by more widely spaced volcanoes and the flatter gradient allowed more deposition.

Outwash was deposited by meltwater streams in the lower, flatter reaches of glacial drainages. Around the southwest part of the park, these deposits of outwash occurred outside of the park. Inside the park, parts of the valley bottoms along Manzanita, Lost, and Hat Creeks were flat enough for outwash to be deposited. Examples of soils that formed in deposits of outwash in these drainages are Cragwash, Virixerands, low elevation, and Virixerands.

The lower elevations and the associated climate of the flatter terrain on the east side of the park produced thinner less-confined glaciers that took a more sheet-like form. In the east, a subtle, higher volcanic hub around Red Cinder Cone caused this sheet-like ice to move radially and form broad scoured glacial headlands of exposed bedrock. The unconfined ice became more concentrated in the broader valleys of the east-side drainages, where the deposition of till formed moraines. The flatter drainages that originate on the east side of the park (fig. 129) did not allow the ice to develop the concentrated power needed to form deep U-shaped valleys.

The flatter reaches of the drainages in the northeast part of the park, influenced by the higher local base level of the Modoc Plateau to the northeast, allowed for the deposition of the largest amounts of outwash in the park. Buttewash soils are an example of soils that formed in outwash in this area. The drainages in the north-central part of the park were partially obstructed by Badger Mountain, West Prospect Peak, Prospect Peak, and lava flows. These drainages deposited significant amounts of outwash before they cut a gorge through the lava and formed Box Canyon north of the park. Badgerwash soils are an example of soils that formed in outwash in this area.

Climate

The mean annual precipitation ranges from 584 millimeters (23 inches) in the northeast corner of the park to 3,175 millimeters (125 inches) on Lassen Peak. Most of the precipitation falls as snow. The precipitation gradient occurs over 10 miles and reflects the orographic pattern and rain shadow of the higher elevation peaks on the west side trending to the lower elevation plateau in the northeast.

Due to the Mediterranean climate of the region, the majority of the park is in the xeric moisture regime, characterized by moist cool winters and warm dry summers. Wet soils in meadows, seeps, and flood plains are in the Aquic moisture regime, characterized by periods of saturation of ground water. Aquandic Cryaquents are an example of soils that have an Aquic moisture regime.

The mean annual air temperature in the park ranges from 3.6 to 6.8 degrees C (38 to 44.6 degrees F).

Two soil temperature regimes occur in the park. In general, soils in the frigid temperature regime, such as Summertown soils, occur below 2,286 meters (7,500 feet) and soils in the cryic temperature regime, such as Readingpeak soils, occur above 2,286 meters (7,500 feet). Both of these soil temperature regimes have a mean annual soil temperature lower than 8 degrees C (46.4 degrees F) at a depth of 50 centimeters (19.7 inches), but in the frigid temperature regime the difference between summer and winter temperatures is more than 6 degrees C.

The soil temperature in the park is typically near freezing from December to June. Once the snow melts and moistens the soil profile, the soil temperature increases, allowing biologic activity and mineral weathering. The soils quickly dry out due to evapotranspiration. The overlap of periods of warmer soil temperatures with periods of excess soil moisture is extremely short, a month or two, and limits the total amount of soil formation over time.

Living Organisms

The interactions of organisms with each other and with the soil produce a complex web of biological, chemical, mineralogical, and physical functions that play important roles in soil formation. The occurrence and types of organisms are strongly influenced by climate.

The initial colonization of plants on newly exposed parent material initiates a wide range of processes. Nitrogen fixation is commonly one of the first processes initiated by pioneering plant species and microorganisms. The accumulation of organic matter and CO₂ production also begin to transform freshly exposed parent material. They provide nutrients and make water available to plants and microorganisms, thus affecting pH and weathering minerals. Over time, as these organisms eat, grow, and move through the soil they transform the soil into a more vibrant biologic substrate. The soil's A horizon is where most of this activity is concentrated. The B horizon below most of this activity is influenced by the leaching of acids and other products from above.

Plants stabilize the soil surface by physically buffering raindrop impact and impeding surface runoff with living and dead material. Within the soil, plants, animals, and microbes bind the soil together, producing aggregates with roots, hyphae, fecal pellets, and decomposed organic matter. The microstructure formed by this combination increases soil stability, porosity, water infiltration, and the water-holding capacity.

Trees and burrowing animals produce larger pores and mix soil at a greater scale. Ants and gophers transport soil material and deposit subsoil on the surface as they build tunnels and nests. In the park, ant and gopher tailings often reveal buried soil material underlying a surface layer of tephra that would not be visible without



Figure 130.—Lassen Peak and Chaos Crags are on the horizon, and Cinder Cone is in the middle ground.

excavating a soil pit. Some areas of Buttewash soils exhibit much evidence of gopher activity. Dead tree roots produce macropores that often accumulate surface material and incorporate organic matter deeper in the profile. Trees uprooted by wind mix large amounts of surface and subsurface soils. They also reveal the older buried soils that are more strongly developed than the newer tephra deposits on the surface.

The combination of biologic activities transforms parent material into soil by adding to, mixing, and breaking apart the material. It generally holds the soil in place, allowing soil formation to progress over time.

Parent Material and Time

The evolution of the volcanic landscape of the park is a complex sequence of events that is well described in the “Geologic Map of Lassen Volcanic National Park and Vicinity, California” by Michael A. Clynne and L.J. Muffler.

Most of the park is underlain by middle to late Pleistocene volcanic rocks (Clynne and Muffler, 2005). Recent volcanic activity includes the eruption of Chaos Crags about 1,100 years ago, the eruption of Cinder Cone about 270 years ago, and the 1914-1917 series of eruptions of Lassen Peak (Clynne and Muffler, 2005) (fig. 130).

Most of the bedrock in the park is andesite, but areas of dacite and rhyodacite form the domes and lava flows in the vicinity of Lassen Peak. Basalt and basaltic andesite occur on some of the volcanoes and lava flows in the eastern part of the park. The associated tephra deposits from these volcanic sources generally follow this relationship, although the extent of the deposits can overlap from one source area to another. Buttelake soils (fig. 131) formed in till from tephra and rock derived from andesite, basaltic andesite, and basalt from the east side. In places, these soils were



Figure 131.—Typical profile of Buttelake soil. Depth is marked in centimeters.

covered with rhyodacitic pumice from Chaos Crags and then received basaltic andesite tephra deposits from Cinder Cone.

Formation of noncrystalline materials (active Al and Fe compounds) and accumulation of organic matter are the dominant pedogenic processes occurring in most soils formed in volcanic materials (Shoji and others, 1993). The influence of the mineralogy of the types of bedrock and associated tephra deposits is reflected in the degree of soil weathering between the more felsic parent material in the western part of the park and the more mafic parent material in the east side of the park. Sueredo



Figure 132.—Typical profile of Sueredo soil. Depth is marked in centimeters.

soils (fig. 132) in the northwestern part of the park formed in till and tephra derived from andesite, dacite, rhyodacite, and rhyolite with a surface mantle of rhyodacitic pumice. The soil characteristics associated with the weathering of these parent materials indicate a weak degree of soil formation in the weathering sequence of volcanic glass. Juniperlake soils (fig. 133) in the southeastern and southern portions



Figure 133.—Typical profile of Juniperlake soil. Depth is marked in centimeters.



Figure 134.—Typical profile of Diamondpeak soil. Depth is marked in centimeters.



Figure 135.—Typical profile of Dittmar soil. Depth is marked in centimeters.

of the park formed in till and tephra from dacite, andesite, basaltic andesite, and basalt. Soil characteristics in Juniperlake soils indicate relatively more weathering due a higher proportion of less resistant minerals and glass. Sueredo and Juniperlake soils are similar in age and occur in similar climates. Juniperlake soils, however, have lower bulk densities, higher water-holding capacities, higher Al and Fe contents, and higher amounts of organic matter, which are the result of pedogenic processes that reflect the different types of parent material.

The hydrothermally altered bedrock of the Brokeoff Volcano is a significant example of the influence of parent material on soil characteristics. Acidic steam and water of various temperatures and pH altered the mineralogy of the rock and produced clay minerals in the rock that weathered to form soils that have significantly higher amounts of clay and lower pH's than soils in the rest of the park. Diamondpeak soils (fig. 134); Brokeoff soils; Endoaquepts; Aquic Dystoxerepts, debris flows; Typic Dystoxerepts; and Typic Dystoxerepts, landslides, which occur in the hydrothermally altered area, have higher amounts of clay than most other soils in the park.

The different processes that emplaced the parent material had a strong influence on such soil characteristics as soil depth and amount of rock fragments. Major types



Figure 136.—Typical profile of Talved soil. Depth is marked in centimeters.

of parent material in the park are residuum, colluvium (including rockfall avalanches), tephra and ash falls, debris flows, pyroclastic flows, till, outwash, glaciolacustrine deposits, and alluvium.

Residual soils occur on gently sloping lava flows and shield volcanoes that were not glaciated and on glacial landforms that were scoured down to bedrock by ice. They typically have some amount of ash or tephra on the surface and may also have local contribution of colluvium formed from spires and irregularities in the bedrock surface. The lower part of the soil profile forms in place from the underlying bedrock. The hardness, porosity, and continuity of the bedrock affect the rate of weathering and the depth of the soil that forms. Prospectpeak soils, Bearubble soils, and Typic Vitrixerands, unglaciated are examples of unglaciated soils derived predominantly from residuum. Residual soils that formed mostly from scoured bedrock are Acroph, Terracelake, Cenplat, Scoured, and Dittmar soils (fig. 135).

Colluvial soils form on steeper glaciated and unglaciated slopes and footslopes

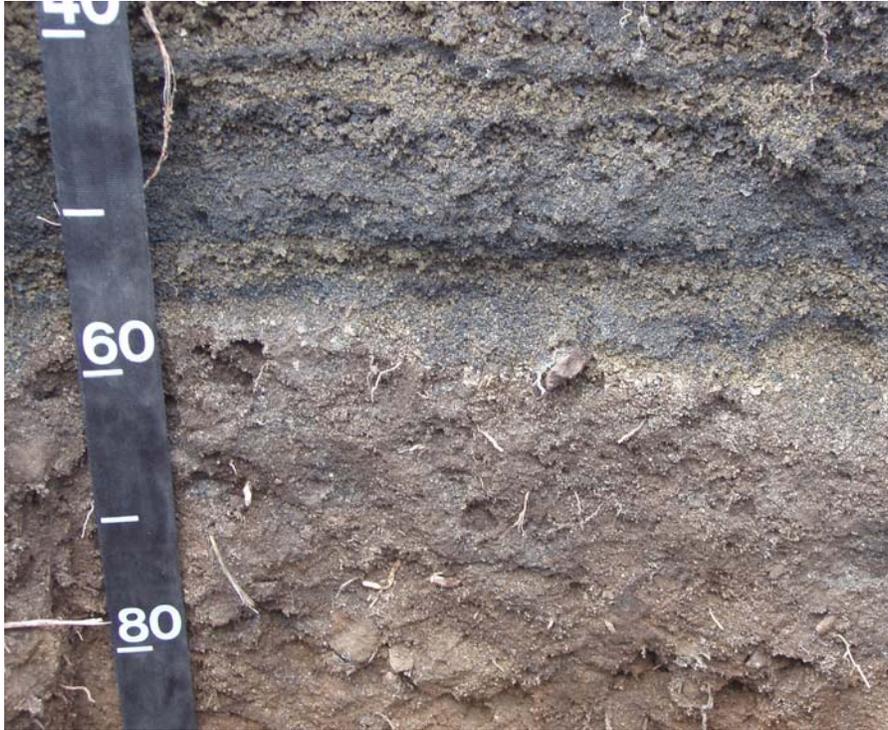


Figure 137.—A closeup of a distinct boundary between tephra from Cinder Cone and a buried soil profile. Depth is marked in centimeters.

below active colluvial slopes. These soils also have some amount of ash or tephra on the surface. The steep slopes on the higher peaks and ridges and the steeper glacial-valley walls were glaciated. Because of their instability, however, gravity has replaced glacial deposits and features with rock fragments that have moved downslope and weathered to soils with a high amount of rock fragments. Steeper parts of unglaciated shield and dome volcanoes have eroded to produce colluvial veneers of soil as well. Emeraldlake soils, Kingsiron soils, Humic Haploxerands, Typic Haploxerands, and Talved soils (fig. 136) formed predominantly in colluvium. The volcanic domes in particular erupt as steep-sided semisolid protrusions that break up and cover the slopes with rock fragments of various sizes and form extensive areas of colluvial soils. Larger parts of the domes can give way and produce rockfall avalanches. This dynamic can change a broad rounded dome to a more conical shape. Chaos soils are an example of soils formed by catastrophic rockfall avalanches from domes.

Another area of extensive landslide deposits is within Brokeoff Volcano. Typic Dystrochrepts, landslides developed in landslide deposits of hydrothermally altered rocks. These soils have higher amounts of clay and lower pH's due to the characteristics of the hydrothermally altered bedrock parent material.

Tephra deposits are common in the park. Many soils have a few inches of tephra, and in some cases the whole soil profile to a depth of 60 inches formed in tephra. The more recent deposits show a distinct boundary at the buried soil profile, and the initial depositional beds are clearly visible (fig. 137). Older tephra deposits have been mixed with the underlying soil profile by living organisms, such as ants and burrowing animals, and by tree throws and are not as obvious. Different volcanic vents have produced different characteristics, such as the mineralogy and size, thickness, and variability of the ejecta. The size, thickness, and variability within the deposit are also influenced by the proximity to the vent and the direction from the vent.

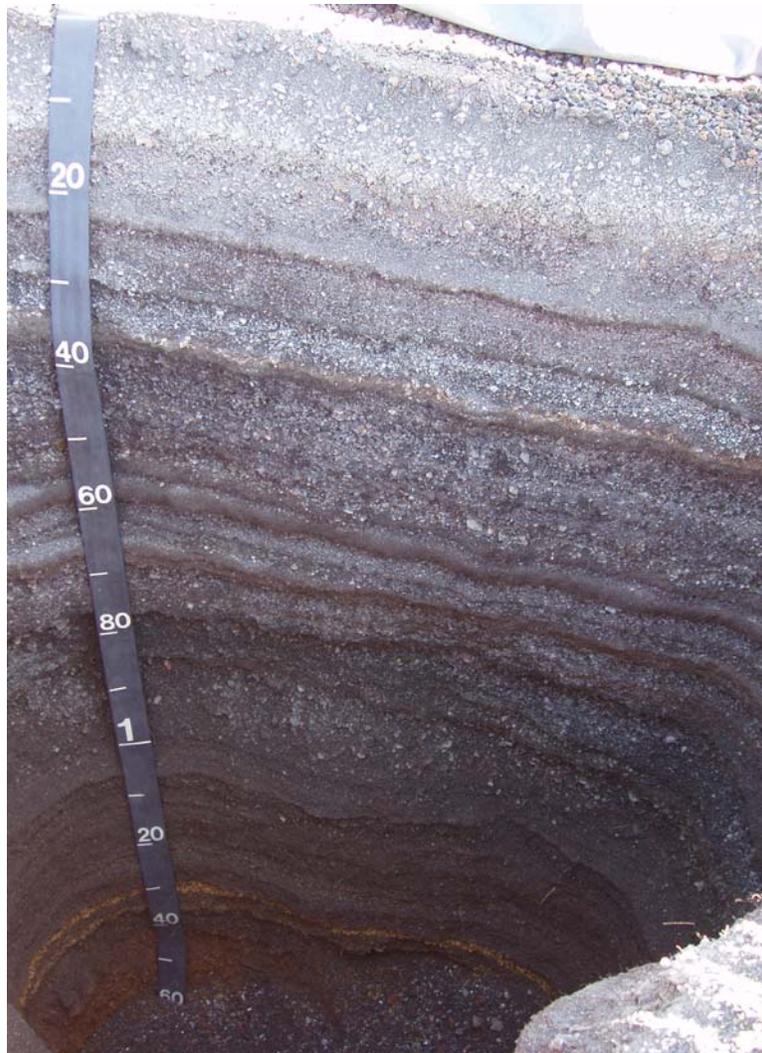


Figure 138.—Typical profile of Typic Xerorthents, tephra. Depth is marked in centimeters.

Major sources of recent tephra are Chaos Crags, Lassen Peak, and Cinder Cone. Tephra from Chaos Crags is pumicious and contains more volcanic glass than the basaltic andesite scoria from Cinder Cone. This difference in mineralogy can affect the rate of weathering. The weathering stage of a soil influences physical, chemical, and mineralogical characteristics that impact soil behavior. Soils that formed from some of the thicker deposits of tephra from Cinder Cone are Typic Xerorthents, Typic Xerorthents, tephra (fig. 138), and Typic Xerorthents, welded. Soils that formed from thick deposits of tephra from Chaos Crags are Vitrandic Cryorthents.

Debris flows were generated when eruptions of Lassen Peak melted snow and caused the mixture of water, rocks, soil, and trees to flow downslope and concentrate in valley bottoms at the base of the peak (fig. 139). These debris flows occurred at different times and were comprised of various amounts of water, which produced a range of viscosity. They were associated with pyroclastic flows, avalanches, and flood deposits that when combined left a complex pattern of devastation. Most of this activity occurred during the 1914-1917 series of eruptions of Lassen Peak. The soils that formed from the array of deposits are therefore very young and thought of as at time



Figure 139.—Debris flows from the 1914-1917 series of eruptions of Lassen Peak.

zero for soil formation. The thicker deposits in the center of the path of movement buried preexisting landforms and replaced them with the new deposits. Vegetation has colonized these new soils, but very little soil formation has occurred, such as the accumulation of organic matter to form an A horizon. Vitrandic Xerorthents, debris flows is an example of soils that lack an A horizon. Landforms outside the central path of the eruptions were only partially buried by new material from debris flows, avalanches, and pyroclastic flows. Where the vegetation was erased in these areas, recolonization was often accelerated because the buried soil profile provided a more favorable condition for plant growth, having more organic matter and a higher water-holding capacity than a soil profile made of entirely new material.

Soils that formed entirely from debris flow deposits are Vitrandic Xerorthents, debris fan. Soils that formed entirely from debris flows and pyroclastic flows are Vitrandic Cyroorthents, debris flows, high elevation. Soils that formed from debris flows over buried soils are Vitrandic Xerofluvents and Vitrandic Xerofluvents, debris flows. Soils that formed from debris flows, avalanche deposits, and pyroclastic material over buried soils are Vitrandic Cryroorthents, debris flows; Typic Vitrixerands; Vitrandic Xerorthents, moraine; and Xeric Vitricryands, pyroclastic surge.

Debris flows also occur in Brokeoff Volcano. Due to the instability caused by geothermal springs and the head cutting of the upper tributaries of Mill Creek, soil calves away and collects in drainage bottoms as debris flows where it can become semistable until more material erodes from above and/or the down-cutting of a stream channel remobilizes it from below. Aquic Dystroxerepts, debris flows formed in this debris, and Typic Dystroxerepts are on the eroding slopes above the debris flows that produce the debris.

The soils that formed in till are a sequence of ablation till over basal till. As the glaciers were active, they accumulated material in and on top of the ice from colluvium



Figure 140.—Typical profile of Cascadesprings soil. Depth is marked in centimeters.

from adjacent slopes, alluvium from streams from adjacent slopes and within the ice, and tephra from volcanic eruptions. All of this material combined into a mixture that accumulated on the land surface that became exposed after the ice melted. This friable deposit became the substrate for plant colonization and soil formation. The material that was under the ice was ground and compressed by the movement and the weight of the ice. This dense root-restrictive deposit, which typically still retains the characteristics of unweathered mineral material, was covered with the friable ablation till from above, and a consistent sequence in the till soils within the park was produced.

Soils that formed predominantly from till are Buttelake soils; Badgerflat soils; Cascadesprings soils (fig. 140); Juniperlake soils; Sueredo soils; Summertown soils; Shadowlake soils; Xeric Vitricryands; Humic Xeric Vitricryands; Sunhoff soils; Xeric Vitricryands, tephra over till; and Xeric Vitricryands, cirque floor.

Outwash was deposited by meltwater streams flowing seasonally during glaciations and as the ice receded. These streams carried and deposited large volumes of sediment generated by glacial erosion. The excessive amount of sediment on the flat gradients prevented the streams from forming a single stable channel and caused them to meander as braided channels carving their way through the unstable sediment load. The migration of the channels and the resulting fluctuation of velocity produced a pattern where the high-velocity channel deposits were buried by the lower-velocity



Figure 141.—Typical profile of Cragwash soil. Depth is marked in centimeters.

overbank deposits as the channel migrated to a new course. Over time this dynamic produced a continuous sequence of coarser channel deposits having high amounts of gravel and cobbles overlain by finer overbank deposits having less gravel and cobbles.

The outwash contains a mixture of the tephra and other material that collected on and in the ice and material eroded from till. Once deposited, more tephra accumulated on the surface. Older depositions were mixed into the soil profile, and newer deposits remained intact. In some cases fresh unstabilized tephra deposits were redeposited



Figure 142.—Typical profile of Histic Humaquepts, lake sediments. Depth is marked in centimeters.

as alluvium eroded from upslope and accumulated on the flatter outwash plains. Cragwash soils (fig. 141) are an example of tephra redeposited as alluvium over the outwash. The surface is composed of rhyolitic pumice from Chaos Crags that lacks the layering of the original depositional deposits that occur on adjacent slopes.

Duripans are common in outwash soils, such as Badgerwash soils. Typically, silica has accumulated in the lower channel deposits and cemented them to form a root-restrictive layer termed a duripan. Other examples of soils that formed predominantly from outwash are Buttewash soils; Vitrixerands; Vitrixerands, low elevation; Andic Durixerepts; Aquic Haploxerands; Humic Haploxerands, outwash terrace; Duric Vitraquands; and Humic Haploxerands, outwash.

Glaciolacustrine deposits typically occur in meadows and on adjacent terraces. These former lakes are in low areas that occur on moraines and outwash plains. These were meltwater lakes that slowed meltwater to the rate that it carried a



Figure 143.—Typical profile of Aquandic Humaquepts. Depth is marked in centimeters.

suspended load of mostly clay and silt. The deposits typically have coarser beds intermixed in the finer beds that could be due to the meandering of the channels that entered the lakes, wave action, and/or differences in meltwater velocities over time. They commonly have coarser sediments above finer buried profiles that represent the different depositional environments that occurred as the lakes filled in. Histic Humaquepts, lake sediments (fig. 142); Histic Humaquepts, frequently flooded; Vitrandic Cryofluvents; and Aquandic Cryaquepts formed in glaciolacustrine deposits.

The alluvium that is mapped in the park is along stream corridors at the lower elevations where, as the gradient flattens and deposition occurs at the local base level, stream terraces and flood plains form. These areas were formed by Holocene-age stream processes. Typically, these alluvial deposits are confined in valley bottoms that restrict channel migration to the valley floors. As the channels migrate in the confined corridors, former channels are buried with overbank deposits from subsequent channel courses and soil profiles with coarser channel deposits typically form under finer overbank deposits.

As down-cutting occurred (likely due to uplift), the streams cut down into the original flood-plain surfaces, transformed them into stream terraces, and formed new flood plains at the lower channel level. Map units 125 and 160 are examples of stream terrace and flood plain complexes. Humic Haploxerands, stream terraces are the stream terrace component in these map units. Aquandic Humaquepts, flood plains (fig. 143) are the flood plain component in map unit 125, mainly along Hot Springs Creek and the North Fork of Bailey Creek. Aerice Endoaquepts (fig. 144) are the flood plain component in map unit 160 along Kings Creek, which has higher flows due to a larger watershed. They differ due to Kings Creek's higher competence to transport larger sized material and capacity to transport a higher volume of sediment in the upper depositional reach.

Typic Endoaquepts occur on the flood plains of Lost Creek and Hat Creek. These recent alluvial soils occur adjacent to the stream channels and are typically redeposited debris from the Lassen Peak eruptions.

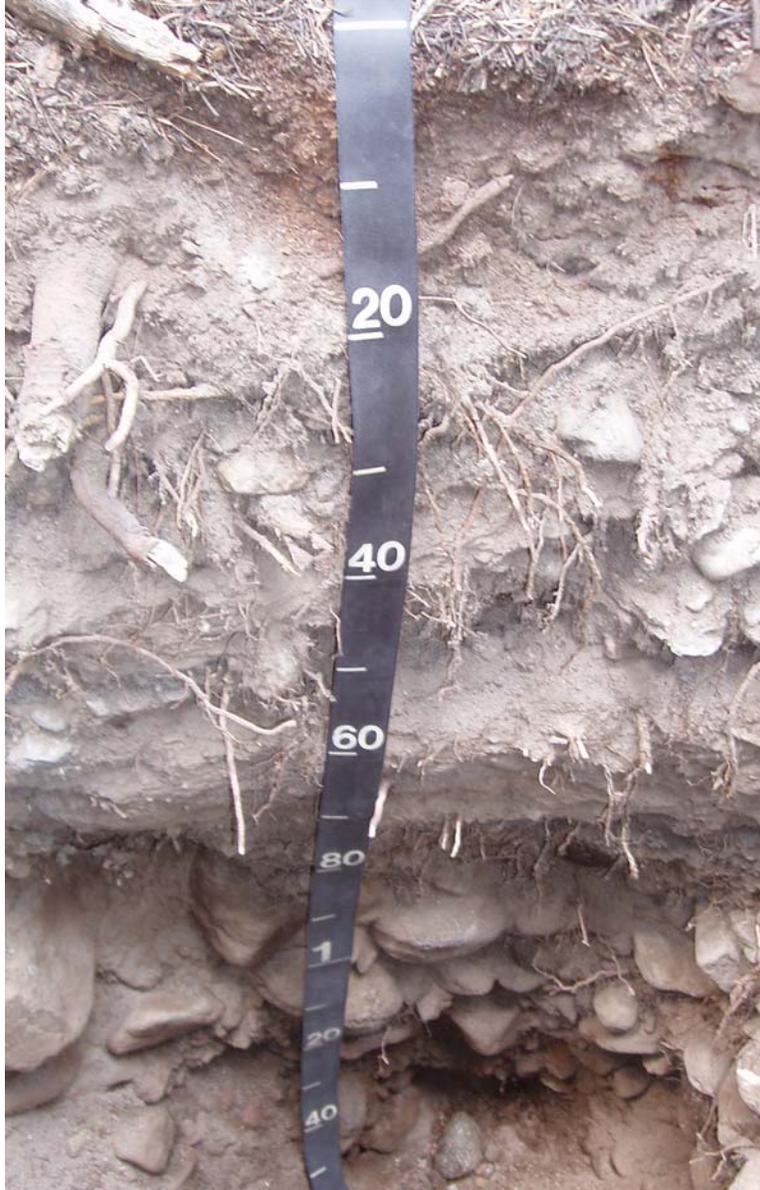


Figure 144.—Typical profile of Aeris Endoaquents. Depth is marked in centimeters.

All of the soils in this soil survey, including the 26 new soil series, were established in the park. It is possible that more areas of these soils occur in similar settings in other portions of the Southern Cascade Mountains. The soils, however, have not yet been mapped elsewhere and are therefore currently unique to Lassen Volcanic National Park.

References

- Adams, F. 1984. Soil acidity and liming. American Society of Agronomy, Agronomy Monograph 12, 2nd edition.
- Alexander, Robert R. 1966. Site indexes for lodgepole pine, with corrections for stand density: Instructions for field use. U.S. Department of Agriculture, Forest Service. Rocky Mountain Forest and Range Experiment Station Research Paper RM-24. (NASIS ID 520)
- American Association of State Highway and Transportation Officials (AASHTO). 2000. Standard specifications for transportation materials and methods of sampling and testing. 20th edition, 2 volumes.
- American Society for Testing and Materials (ASTM). 2001. Standard classification of soils for engineering purposes. ASTM Standard D 2487-00.
- Baker, F.S. 1925. Aspen in the Central Rocky Mountain Region. U.S. Department of Agriculture Bulletin 1291. (NASIS ID 730)
- Barnes, George H. 1962. Yield of even-aged stands of western hemlock. U.S. Department of Agriculture, Forest Service. Pacific Northwest Forest and Range Experiment Station Technical Bulletin 1273. (NASIS ID 990)
- Bekker, Mathew F., and Alan H. Tayler. 2001. Gradient analysis of fire regimes in montane forest of the Southern Cascade Range, Thousand Lakes Wilderness, California. U.S.A. Plant Ecology 155: 15-23.
- Birkeland, Peter W. 1974. Pedology, weathering, and geomorphological research.
- Birkeland, Peter W. 1984. Soils and geomorphology. 2nd edition.
- Black, C.A. 1968. Soil-plant relationships. 2nd edition.
- Buol, S.W., F.D. Hole, and R.J. McCracken. 1980. Soil genesis and classification. 3rd edition.
- Burns, Russell M., and Barbara H. Honkala, technical coordinators. 1990. Silvics of North America: Volume 1. Conifers. U.S. Department of Agriculture, Forest Service, Agriculture Handbook 54.
- Christiansen, Robert L., Michael A. Clynne, and L.J. Patrick Muffler. 2002. Geologic map of the Lassen Peak, Chaos Crags, and Upper Hat Creek Area, California. U.S. Department of the Interior, U.S. Geologic Survey.

Soil Survey of Lassen Volcanic National Park, California

- Clyne, Michael A., and L.J. Muffler. April 4, 2005. Geologic map of Lassen Volcanic National Park and Vicinity, California. U.S. Department of the Interior, U.S. Geologic Survey.
- Coleman, Steven M. 1981. Rock-weathering rates as functions of time. *Quaternary Research* 15: 250-264.
- Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.
- Dahlgren, R.A., M. Saigusa, and F.C. Ugolini. 2004. The nature, properties, and management of volcanic soils. *Advances in Agronomy*, Volume 82.
- Diaz, Francisco J., Anthony T. O'Geen, Craig Rasmussen, and Randy A. Dahlgren. 2009. Pedogenesis along a thermal gradient in a geothermal region of the southern Cascades, California. *Geoderma*.
- Dolph, Leroy K. 1983. Site index curves for young-growth incense-cedar of the Sierra Nevada. U.S. Department of Agriculture, Forest Service. Pacific Southwest Forest and Range Experiment Station Research Note PSW-363. (NASIS ID 300)
- Dunning, Duncan. 1942. A site classification for the mixed-conifer selection forest of the Sierra Nevada. U.S. Department of Agriculture, Forest Service, California Forest and Range Experiment Station Research Note 28. (NASIS ID 605)
- Eyre, F.H., editor. 1980. Forest cover types of the United States and Canada. Society of American Forestry.
- Federal Register. July 13, 1994. Changes in hydric soils of the United States.
- Federal Register. February 24, 1995. Hydric soils of the United States.
- Haig, Irvine T. 1932. Western white pine. U.S. Department of Agriculture Technical Bulletin 323. (NASIS ID 570)
- Heath, James P. 1967. Primary conifer succession, Lassen Volcanic National Park. *Ecology*, Volume 48, No. 2, pp. 270-275.
- Hickman, James C. 1993. The Jepson manual, higher plants of California.
- Hurt, G.W., P.M. Whited, and R.F. Pringle, editors. 1998. Field indicators of hydric soils in the United States. Version 4.0.
- Jenny, Hans. 1941. Factors of soil formation.
- Jenny, Hans. 1980. The soil resource—Origin and behavior. *Ecological Studies* 37.
- Khasawneh, F.E., E.C. Sample, and E.J. Kamprath, editors. 1980. The role of phosphorus in agriculture. American Society of Agronomy.

Soil Survey of Lassen Volcanic National Park, California

- Kroh, Glenn C., Joseph D. White, Shelly K. Heath, and John E. Pinder, III. January 2000. Colonization of a volcanic mudflow by an upper montane coniferous forest at Lassen Volcanic National Park, California. *American Midland Naturalist*, Volume 143, No. 1, pp. 126-140.
- Meyer, W.H. 1961. Yield of even-aged stands of ponderosa pine. U.S. Department of Agriculture Technical Bulletin 630.
- National Park Service. History notes, Lassen Volcanic National Park and surrounding area. (Available at http://www.nps.gov/lavo/forteachers/upload/history_notes.pdf)
- National Research Council. 1995. Wetlands: Characteristics and boundaries.
- Portland Cement Association. 1973. PCA soil primer.
- Rasmussen, C., N. Matsuyama, R. Dahlgren, R. Southard, and N. Brauer. 2007. Soil genesis and mineral transformation across an environmental gradient on andesite. *Soil Science Society of America Journal* 77, pp. 225-237.
- Rosgen, Dave. 1996. Applied river morphology. *Wildlife Hydrology*.
- Royce, E.B., and M.G. Barbour. 2001. Mediterranean climate effects, Volume I. Conifer water use across a Sierra Nevada ecotone. *American Journal of Botany* 88(5): 911–918.
- Royce, E.B., and M.G. Barbour. 2001. Mediterranean climate effects, Volume II. Conifer growth phenology across a Sierra Nevada ecotone. *American Journal of Botany* 88(5): 919–932.
- Ruhe, Robert V. 1956. Geomorphic surfaces and the nature of soils. *Soil Science* 82: 441-455.
- Schultz, Paul E. 1988. *Indians of Lassen*.
- Schumacher, Francis X. 1926. Yield, stand, and volume tables for white fir in the California pine region. University of California Agricultural Experiment Station Bulletin 407. (NASIS ID 030)
- Schumacher, Francis X. 1928. Yield, stand and volume tables for red fir in California. University of California Agricultural Experiment Station Bulletin 456. (NASIS ID 050)
- Shoji, S., M. Nanzyo, and R.A. Dahlgren. 1993. Volcanic ash soils—Genesis, properties and utilization.
- Simonson, Roy W. 1959. Outline of a generalized theory of soil genesis. *Soil Science Society of America Proceedings* 23: 152-156.
- Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.

Soil Survey of Lassen Volcanic National Park, California

- Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. United States Department of Agriculture Handbook 436.
- Soil Survey Staff. 2006. Keys to soil taxonomy. 10th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.
- Southard, S.B., and R.J. Southard. 1989. Mineralogy and classification of Andic soils in northeastern California. Soil Science Society of America Journal.
- Stevenson, F.J. 1982. Humus chemistry: Genesis, composition, reactions.
- Taylor, A.H. 2000. Fire regimes and forest changes in mid and upper montane forest of the Southern Cascades, Lassen Volcanic National Park, California. U.S.A. Journal of Biogeography, Volume 27, pp. 87-104.
- Taylor, Alan H., and Michael N. Solem. 2001. Fire regimes and stand dynamics in an upper montane forest landscape in the Southern Cascades, Caribou Wilderness. California Journal of the Torrey Botanical Society, Volume 128, No. 4, pp. 350-361.
- Thornbury, William D. 1969. Principles of geomorphology. 2nd edition.
- Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.
- Turrin, Brent D., Robert L. Christiansen, Michael A. Clynne, Duane E. Champion, Wendy J. Gerstel, L.J. Patrick Muffler, and Deborah A. Trimble. 1998. Age of Lassen Peak, California and implications for the ages of late Pleistocene glaciations in the southern Cascade Range.
- United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.
- United States Department of Agriculture, Forest Service. Data from Rocky Mountain Research Station, Fire Sciences Laboratory. (Available online at <http://www.fs.fed.us/database/feis/>)
- United States Department of Agriculture, Natural Resources Conservation Service. National engineering handbook. (Available online at <http://public.nrcs.usda.gov/scripts/lpsiis.dll/H/H.htm>)
- United States Department of Agriculture, Natural Resources Conservation Service. National forestry handbook. (Available online at <http://soils.usda.gov/technical/nfhandbook/>)
- United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. (Available online at <http://soils.usda.gov/technical/nfmanual/>)

Soil Survey of Lassen Volcanic National Park, California

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. (Available online at <http://www.glti.nrcs.usda.gov/technical/publications/nrph.html>)

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. (Available online at <http://soils.usda.gov/technical/handbook/>)

United States Department of Agriculture, Natural Resources Conservation Service. The PLANTS Database. National Plant Data Center. (Available online at <http://plants.usda.gov>).

United States Department of Agriculture, Natural Resources Conservation Service. 1996a. Soil biology primer.

United States Department of Agriculture, Natural Resources Conservation Service. 1996b. Soil survey laboratory methods manual. Soil Survey Investigations Report 42.

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296.

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210.

United States Department of Agriculture, Soil Conservation Service. 1987. Basic statistics, 1982 national resources inventory. Statistical Bulletin 756.

Glossary

- AASHTO classification.** A system for classifying soils specifically for geotechnical engineering purposes that is related to highway and airfield construction. It is based on particle-size distribution and Atterberg limits.
- AASHTO group index (GI).** An empirical index number used to evaluate clayey and silty clay material.
- ABC soil.** A soil having an A, a B, and a C horizon.
- Ablation till.** A general term for loose, relatively permeable material deposited during the downwasting of nearly static glacial ice. The material is either contained within the glacier or accumulated on the surface of the glacier.
- AC soil.** A soil having only an A and a C horizon. Commonly, such soil formed in recent alluvium or on steep, rocky slopes.
- Aeration, soil.** The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.
- Aggregate, soil.** Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.
- Alkali (sodic) soil.** A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.
- Alluvial fan.** A low, outspread mass of loose material and/or rock material washed down the sides of mountains and hills. It commonly has gentle slopes and is shaped like an open fan or a segment of a cone. It is deposited by a stream at the place where the stream issues from a narrow mountain valley or where a tributary stream is near or at its junction with the main stream. An alluvial fan is steepest near its apex that points upstream, and it slopes gently and convexly outward with a gradual decrease in gradient.
- Alluvium.** Material, such as sand, silt, or clay, deposited on land by streams.
- Alpha,alpha-dipyridyl.** A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redoximorphic feature.
- Animal unit month (AUM).** The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.
- Aquic conditions.** Current soil wetness characterized by saturation, reduction, and redoximorphic features.
- Argillic horizon.** A subsoil horizon characterized by an accumulation of illuvial clay.
- Aridic moisture regime.** Soils that have an aridic moisture regime are dry for at least one-half of the year. They commonly occur in areas that have an aridic climate. A few are in areas that have a semiarid climate, but they either have physical properties that keep them dry, such as a crusty surface that virtually precludes the infiltration of water, or have steep slopes with a high rate of runoff. Little, if any, leaching occurs in the soils in this moisture regime, and soluble salts accumulate in the soils if there is a source of salts.
- Aspect.** The direction in which a slope faces.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (AWC) (available moisture capacity). The volume of water that should be available to plants if the soil, inclusive of fragments, were at field capacity. It is commonly estimated as the difference between the amount of water at field capacity and the amount at wilting point with adjustments for salinity, fragments, and rooting depth. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 2.5
Low	2.5 to 5.0
Moderate	5.0 to 7.5
High	7.5 to 10.0
Very high	more than 10.0

AWC. See Available water capacity.

Backslope. The hillslope profile position that forms the steepest and generally linear, middle portion of the slope. In profile, backslopes commonly are bounded by a convex shoulder above and a concave footslope below. They may or may not include cliff segments or free faces. Backslopes are commonly erosional forms produced by mass movement, colluvial action, and running water.

Badland. A landscape that is intricately dissected and is characterized by a very fine drainage network with high drainage density and short, steep slopes with narrow interfluves. Badland develops on surfaces that have little, if any, vegetative cover, are underlain by unconsolidated or poorly cemented material (clay, silt, or sand), and in some areas have soluble minerals such as gypsum and halite.

Bar (streams). A general term for a ridgelike accumulation of sand, gravel, or other alluvial material in the channel, along the banks, or at the mouth of a stream where a decrease in velocity induces deposition. Examples are channel bars and meander bars.

Bar (microfeature). A small, sinuous or arcuate, ridgelike lineation separated from others similar to it by small channels. It is caused by fluvial processes and is common on flood plains and young alluvial terraces. It is a constituent of bar and channel topography.

Bar and channel topography. A local topography of recurring, small, sinuous or arcuate ridges separated by shallow troughs irregularly spaced across low-relief flood plains (slopes generally are 2 to 6 percent). The effect is a subdued, sinuously undulating surface that is common on active flood plains. Micro-elevational differences generally range from less than 1 meter to less than 2 meters. The elevational differences between the bars and channels are largely controlled by the competency of the stream. The ridgelike bars commonly consist of sediment that is coarser than the finer textured sediment of the low-lying areas.

Basal area. The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

Basal till. Compact glacial till deposited beneath the ice.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Base slope. A geomorphic component of hills consisting of the concave to linear (perpendicular to the contour) slope that, regardless of the lateral shape, forms an apron or wedge at the bottom of a hillside dominated by colluvium and slope-wash sediments (for example, slope alluvium).

Beach. A sandy, gravelly, or cobbly lake shore that is washed and rewashed by waves.

Beach terrace. A landform that consists of a wave-cut scarp and wave-built terrace of well sorted marine and lacustrine sand and gravel. Colloquially, in the western United States, relict shoreline from pluvial lakes, generally restricted to valley sides.

Bedding planes. Fine strata, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

Bedrock. A general term for the solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bedrock-controlled topography. A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Breast height. An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

Brush management. Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Bulk density. A measurement of the oven-dry weight of the soil material that is less than 2 millimeters in diameter per unit volume. Common measurements are taken at $1/3$ -, $1/10$ -, or 15-bar moisture tension. Bulk density influences plant growth and engineering applications. It is used to convert measurements from a weight basis to a volume basis. Within a family particle-size class, bulk density is an indicator of how well plant roots are able to extend into the soil. Bulk density is used to calculate porosity.

Cable yarding. A method of moving felled trees to a nearby central area for transport to a processing facility. Most cable yarding systems involve use of a drum, a pole, and wire cables in an arrangement similar to that of a rod and reel used for fishing. To reduce friction and soil disturbance, felled trees generally are reeled in while one end is lifted or the entire log is suspended.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Calcic horizon. A mineral soil horizon of secondary carbonate enrichment that is more than 15 centimeters thick, has a calcium carbonate equivalent of more than 15 percent, and has a calcium carbonate equivalent at least 5 percent higher than the underlying horizon.

Calcium carbonate equivalent. The amount of calcium carbonate in a soil measured by treating the soil sample with hydrochloric acid (HCL). The evolved carbon dioxide (CO₂) is measured, and the amount of carbonate is then calculated as calcium carbonate (CaCO₃).

California bearing ratio (CBR). The load-supporting capacity of a soil as compared to that of standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

Cambic horizon. A mineral soil horizon that has the texture of loamy very fine sand or finer, has soil structure rather than rock structure, and contains some weatherable minerals. It is characterized by the alteration or removal of mineral material as indicated by mottling or gray color, stronger chroma or redder hue than the underlying horizons, or the removal of carbonates. The cambic horizon lacks

cementation or induration and has too few evidences of illuviation to meet the requirements for an argillic horizon.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

Canyon. A long, deep, narrow, very steep-sided valley with high, precipitous walls in an area of high local relief.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence of soils on a landscape that are about the same age and formed in similar kinds of parent material under similar climatic conditions but have different characteristics as a result of differences in relief and drainage.

Cathodic protection. Control of the electrolytic corrosion of an underground or underwater metallic structure, such as a pipeline, by the application of an electrical current in such a way that the structure acts as the cathode rather than the anode of an electrolytic cell. (See Coatings for pipelines.)

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity (CEC). The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

CEC. See Cation-exchange capacity.

Cement rock. Shaly limestone used in the manufacture of cement.

Chemical treatment. Control of unwanted vegetation through the use of chemicals.

Cinder land. An area composed of loose cinders and other scoriaceous magmatic ejecta.

Cinders. Uncemented vitric, vesicular, pyroclastic material more than 2 millimeters in at least one dimension with apparent specific gravity (including vesicles) of more than 1 and less than 2.

Cirque. A semicircular, concave, bowl-like area that has steep faces primarily resulting from the erosiveness of a mountain glacier.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay depletions. Low-chroma zones having a low content of iron, manganese, and clay because of the chemical reduction of iron and manganese and the removal of iron, manganese, and clay. A type of redoximorphic depletion.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Clayey. Sandy clay, silty clay, and clay soil textures.

Claypan. A dense, compact, slowly permeable layer in the subsoil that has a much higher content of clay than the overlying material. A claypan commonly is hard when dry and plastic or sticky when wet.

Climax plant community. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse fragments. See Rock fragments.

Coarse textured soil. Sand or loamy sand.

Coatings for pipelines. Coatings used as a barrier to the flow of electricity and moisture, thereby preventing the formation of corrosion cells.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in

diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

COLE (coefficient of linear extensibility). See Linear extensibility percent.

Colluvium. Unconsolidated, unsorted earth material transported or deposited on side slopes and/or at the base of slopes by mass movement, or direct gravitational action, and by local unconcentrated runoff.

Compaction. The process by which the soil grains are rearranged to decrease void space and bring them into closer contact with one another, thereby increasing bulk density.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

Congeliturbate. See Cryoturbation.

Conglomerate. A coarse grained, clastic sedimentary rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter, commonly with a matrix of sand and finer textured material. Cementing agents include silica, calcium carbonate, and iron oxide. Conglomerate is the consolidated equivalent of gravel.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Cryoturbation. A collective term used to describe all soil movement as a result of frost action, including the folding, breaking, and dislocating of beds and lenses of unconsolidated material.

Culmination of the mean annual increment (CMAI). The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

Debris flow (mass movement). The process, associated sediment (debris flow deposit), or resultant landform characterized by a very rapid type of flow dominated by sudden downslope movement of a mass of rock, soil, and mud (more than 50 percent particles that are more than 2 millimeters in size) that behaves much like viscous fluid whether it is saturated or relatively dry.

- Decreasers.** The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.
- Deep soil.** See Depth, soil.
- Depth, soil.** Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.
- Depth to bedrock** (in tables). Bedrock is too near the surface for the specified use.
- Dip slope.** A slope of the land surface, roughly determined by and approximately conforming to the dip of the underlying bedded rock (for example, the long, gently inclined surface of a cuesta).
- Drainage class** (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained*. These classes are defined in the “Soil Survey Manual.”
- Drainage, surface.** Runoff, or surface flow of water, from an area.
- Drainageway.** A general term for a course or channel along which water moves in draining an area.
- Draw.** A small stream channel that generally is more open and has a broader floor than a ravine or gulch.
- Drift.** Pulverized and other rock material transported by glacial ice and then deposited. Also, the sorted and unsorted material deposited by streams flowing from glaciers.
- Drumlin.** A low, smooth, elongated oval hill, mound, or ridge of compact glacial till that may or may not have a core of bedrock or stratified drift. The longer axis is parallel to the general direction of the glacial flow. It is the product of the streamline (laminar) flow of glaciers, which molded the subglacial floor through a combination of erosion and deposition.
- Duff.** A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.
- Dune.** A low mound, ridge, bank, or hill of loose, windblown, granular material (generally sand), either barren or covered with vegetation, that is capable of movement from place to place but always retains its characteristic shape.
- Duripan.** A subsurface soil horizon that is cemented with illuvial silica, commonly opal or microcrystalline forms, to the degree that less than 50 percent of the volume of air-dry fragments will slake in water or hydrochloric acid.
- EC.** See Electrical conductivity.
- Ecological site.** An area where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. An ecological site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other ecological sites in kind and/or proportion of species or in total production.
- Electrical conductivity (EC).** The electrolytic conductivity of an extract from saturated soil paste.
- Eluviation.** The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.
- Endosaturation.** A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

- Eolian material.** Material transported and deposited by wind, including earth material such as dune sand, sand sheets, loess, and clay.
- Ephemeral stream.** A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.
- Episaturation.** A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.
- Erosion.** The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.
Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.
Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.
- Erosion pavement.** A concentration of gravel or coarser fragments that remains on the soil surface after finer particles have been removed by running water or wind.
- Escarpment.** A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. The term is most commonly applied to cliffs produced by differential erosion. Synonym: scarp.
- Esker.** A long, narrow, sinuous, steep-sided ridge of irregularly stratified sand and gravel deposited by a subglacial or supraglacial stream flowing between ice walls or in an ice tunnel of a retreating glacier. Eskers are less than 1 kilometer to more than 160 kilometers long and 3 to 30 meters high.
- Extrusive.** Pertaining to igneous rock and sediment derived from deep-seated molten matter (magma) deposited and cooled on the earth's surface, including lava flows and tephra deposits.
- Family, soil.** The most specific hierarchical category in soil taxonomy.
- Fertility, soil.** The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.
- Fibric soil material (peat).** The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.
- Field moisture capacity.** The moisture content of a soil, expressed as a percentage of the oven-dry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity*, *normal moisture capacity*, or *capillary capacity*.
- Fill slope.** A sloping surface consisting of excavated soil material from a road cut. It commonly is on the downhill side of the road.
- Fine textured soil.** Sandy clay, silty clay, or clay.
- Firebreak.** An area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.
- Flaggy soil material.** Material that has, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.
- Flood plain.** The nearly level plain that borders a stream and is subject to inundation under floodstage conditions unless protected artificially. It is commonly a

constructional landform consisting of sediment deposited during overflow and lateral migration of a stream.

Fluvial. Of or pertaining to rivers; produced by river action.

Foothill. A steeply sloping upland that has relief of as much as 1,000 feet (300 meters) and fringes a mountain range or high-plateau escarpment.

Footslope. The position that forms the inner, gently inclined surface at the base of a hillslope. In profile, footslopes are commonly concave. A footslope is a transition zone between upslope sites of erosion and transport (shoulders and backslopes) and downslope sites of deposition (toeslopes).

Forb. Any herbaceous plant not a grass or a sedge.

Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

Forest type. A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

Fragments. Unattached cemented pieces of bedrock, bedrocklike material, durinodes, concretions, and nodules 2 millimeters in diameter or larger in mineral soils; woody material 20 millimeters in diameter or larger in organic soils.

Fumarole. A hole in a volcanic region from which gases and vapors escape at high temperatures.

Fumarolic. Of or pertaining to fumaroles near volcanoes. (See Fumarole.)

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Glacial. Of or pertaining to the presence and activity of ice and glaciers, such as glacial erosion; pertaining to distinctive features and material produced by or derived from glaciers and ice sheets, such as glacial lakes; or pertaining to an ice age or region of glaciation.

Glacial drift. See Drift.

Glacial outwash. See Outwash.

Glacial till. See Till.

Glaciofluvial deposits. Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as outwash plains, valley trains, deltas, kames, eskers, and kame terraces.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated with varves or rhythmites.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Gravel. Rounded or angular fragments of rock as much as 3 inches (7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that has 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A small channel with steep sides cut by the concentrated, but intermittent, flow of water commonly during and immediately following heavy rainfall or following icemelt or snowmelt. A gully generally is an obstacle to wheeled vehicles and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Gypsum content. The percent, by weight, of hydrated calcium sulfates in the fraction of the soil less than 20 millimeters in size.

Halophytic. Pertaining to vegetation that is adapted to salty soils.

- Hard bedrock.** Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.
- Hardpan.** A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.
- Head out.** To form a flower head.
- Hemic soil material (mucky peat).** Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.
- Hill.** A generic term for an area of the land surface that rises as much as 1,000 feet (300 meters) above surrounding lowlands, commonly has restricted summit area relative to surrounding surfaces, and has a well defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and commonly is dependent on local usage.
- Holocene.** The epoch of the Quaternary period of geologic time that extends from the end of the Pleistocene (about 10 to 12 thousand years ago) to the present.
- Horizon, soil.** A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:
- O horizon.*—An organic layer of fresh and decaying plant residue.
- A horizon.*—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.
- E horizon.*—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.
- B horizon.*—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.
- C horizon.*—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.
- Cr horizon.*—Soft, consolidated bedrock beneath the soil.
- R layer.*—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.
- Humus.** The well decomposed, more or less stable part of the organic matter in mineral soils.
- Hydrologic soil groups.** Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.
- Igneous rock.** Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

- Illuviation.** The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.
- Impervious soil.** A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.
- Increasesers.** Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasesers commonly are the shorter plants and the less palatable to livestock.
- Infiltration.** The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.
- Infiltration capacity.** The maximum rate at which water can infiltrate into a soil under a given set of conditions.
- Infiltration rate.** The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.
- Intake rate.** The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:
- | | |
|---------------------|-----------------|
| Less than 0.2 | very low |
| 0.2 to 0.4 | low |
| 0.4 to 0.75 | moderately low |
| 0.75 to 1.25 | moderate |
| 1.25 to 1.75 | moderately high |
| 1.75 to 2.5 | high |
| More than 2.5 | very high |
- Intermittent stream.** A stream, or reach of a stream, that does not flow year-round (commonly is dry for 3 months or more annually), and has a channel that generally is below the local water table. It flows only when it receives baseflow during wet periods or when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.
- Intrusive.** Pertaining to igneous rock derived from molten matter (magma) that invaded pre-existing rock and cooled below the surface of the earth.
- Invaders.** On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.
- Iron depletions.** Low-chroma zones having a low content of iron and manganese oxide because of chemical reduction and removal, but having a clay content similar to that of the adjacent matrix. A type of redoximorphic depletion.
- K factor.** A measurement of potential soil erodibility caused by detachment of soil particles by water.
- Kame.** A low mound, knob, hummock, or short irregular ridge of stratified sand and gravel deposited by a subglacial stream as a fan or delta at the margin of a melting glacier, by a supraglacial stream in a low place or hole on the surface of a glacier, or by a ponded area, which is at the margin of stagnant ice in areas.
- Knoll.** A small, low, rounded hill rising above adjacent landforms.
- Lacustrine deposit.** Clastic sediment and chemical precipitates deposited in lakes.
- Landslide.** The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.
- Lava flows.** Areas covered with lava.

- Leaching.** The removal of soluble material from soil or other material by percolating water.
- LEP.** See Linear extensibility percent.
- Linear extensibility percent (LEP).** The linear expression of the volume difference between the water content of the natural soil fabric at $1/3$ -bar or $1/10$ -bar and oven dryness. The volume change is reported as a percent for the whole soil.
- Liquid limit (LL).** The moisture content at which the soil passes from a plastic to a liquid state.
- LL.** See Liquid limit.
- Loam.** Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.
- Loamy.** Coarse sandy loam, sandy loam, fine sandy loam, very fine sandy loam, loam, silt loam, silt, clay loam, sandy clay loam, and silty clay loam soil textures.
- Low strength.** The soil is not strong enough to support loads.
- Magma.** Molten rock material that originates deep in the earth and solidifies to form igneous rock.
- Major Land Resource Area (MLRA).** A broad geographic area that has a distinct combination of physiography, geology, climate, water, biological resources, and land use.
- Masses.** Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redoximorphic concentration.
- Mechanical treatment.** Use of mechanical equipment for seeding, brush management, and other management practices.
- Medium textured soil.** Very fine sandy loam, loam, silt loam, or silt.
- Metamorphic rock.** Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement in the earth's crust. Nearly all such rocks are crystalline. Examples are schist, gneiss, quartzite, slate, and marble.
- Metavolcanic.** A volcanic rock that shows evidence of metamorphism but has not been fully metamorphosed into metamorphic rock.
- Mineral soil.** Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.
- Miscellaneous area.** An area that has little or no natural soil and supports little or no vegetation.
- Moderately coarse textured soil.** Coarse sandy loam, sandy loam, or fine sandy loam.
- Moderately deep soil.** See Depth, soil.
- Moderately fine textured soil.** Clay loam, sandy clay loam, or silty clay loam.
- Mollic epipedon.** A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.
- Moraine (material).** A mound, ridge, or other distinct accumulation of unsorted, unstratified glacial drift, dominantly till, primarily from glacial ice.
- Moraine (landform).** A general term for a landform composed mainly of till deposited by either an active or extinct glacier. Some types are disintegration, end, lateral, recessional, and terminal.
- Morphology, soil.** The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

- Mottling, soil.** Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few, common, and many*; size—*fine, medium, and coarse*; and contrast—*faint, distinct, and prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).
- Mountain.** A natural elevation of the land surface that rises more than 1,000 feet (300 meters) above surrounding lowlands, commonly has limited summit area relative to surrounding surfaces, and generally has steep sides (slopes of more than 25 percent) with or without considerable bare-rock surface. A mountain can occur as a single, isolated mass or in a group forming a chain or range. Mountains are formed primarily by tectonic and/or volcanic activity and by differential erosion.
- Muck.** Unconsolidated soil material consisting primarily of highly decomposed organic material in which the original plants are not recognizable. It generally contains more mineral material and is darker in color than peat. (See Sapric soil material.)
- Munsell notation.** A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.
- Natric horizon.** A special kind of argillic horizon that contains enough exchangeable sodium to have an adverse effect on the physical condition of the subsoil.
- Neutral soil.** A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)
- Nodules.** Cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations.
- Nose slope.** A geomorphic component of hills consisting of the projecting end (laterally convex area) of a hillside. The overland waterflow is predominantly divergent.
- Nunatak.** An exposed rocky ridge, mountain, or peak not covered with ice or snow within an ice field or glacier.
- Nutrient, plant.** Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.
- Organic matter.** Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:
- | | |
|----------------------|-----------------------|
| Very low | less than 0.5 percent |
| Low | 0.5 to 1.0 percent |
| Moderately low | 1.0 to 2.0 percent |
| Moderate | 2.0 to 4.0 percent |
| High | 4.0 to 8.0 percent |
| Very high | more than 8.0 percent |
- OM.** See Organic matter.
- Outwash.** Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.
- Outwash plain.** An extensive lowland area of coarse textured glaciofluvial material. An outwash plain commonly is smooth; where pitted as a result of meltout of incorporated ice masses, it generally has low relief.
- Paleosol.** A soil that formed in a particular area with distinctive morphological features resulting from a soil-forming environment that no longer exists in the area. The pedogenic process was either altered as a result of external environmental changes or interrupted by burial. A paleosol (or component horizon) is classified as relict if it has persisted without major alteration of morphology by the prevailing

pedogenic environment. An exhumed paleosol is one that was buried and has been re-exposed by erosion of the mantle. Most paleosols have been affected by some subsequent modification of the morphology of diagnostic horizons and truncation of the profile.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan*, *fragipan*, *claypan*, *plowpan*, and *traffic pan*.

Parent material. The unconsolidated and chemically weathered mineral and organic material in which the solum of a soil is formed as a result of pedogenic processes.

Peat. Unconsolidated soil material consisting largely of undecomposed or slightly decomposed organic matter that has accumulated under excessive moisture conditions. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Perched water table. The upper surface of unconfined ground water separated from an underlying main body of ground water by an unsaturated zone.

Percolation. The downward movement of water through the soil.

Permafrost. Soil or rock that has remained at or below 0 degrees C for at least 2 years. It is defined on the basis of temperature and is not necessarily frozen.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity," which is defined in the "Soil Survey Manual." In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as "permeability." Terms describing permeability, measured in inches per hour, are as follows:

Extremely slow	0.0 to 0.01 inch
Very slow	0.01 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

PI. See Plasticity index.

Plasticity index (PI). The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plateau. A comparatively flat area of great extent and elevation. Specifically, an extensive land region considerably elevated (more than 100 meters) above adjacent lower-lying terrain that is commonly limited on at least one side by an abrupt descent and has a flat or nearly level surface. A relatively large part of a plateau surface is near summit level.

Pleistocene. The epoch of the Quaternary period of geologic time following the Pliocene and preceding the Holocene (approximately 2 million to 10 thousand years ago). Also refers to the corresponding (time-stratigraphic) "series" of earth material.

- Plinthite.** The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents. It commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on repeated wetting and drying, especially if it is exposed also to heat from the sun. In a moist soil, plinthite can be cut with a spade. It is a form of laterite.
- Ponding.** Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.
- Poorly graded.** Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.
- Potential native plant community.** See Climax plant community.
- Potential rooting depth (effective rooting depth).** Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.
- Prescribed burning.** Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.
- Productivity, soil.** The capability of a soil for producing a specified plant or sequence of plants under specific management.
- Profile, soil.** A vertical section of the soil extending through all its horizons and into the parent material.
- Pyroclastic.** Pertaining to fragmental material produced by commonly explosive aerial ejection of clastic particles from a volcanic vent. Such material may accumulate on land or under water.
- Range condition.** The present composition of the plant community on a range site in relation to the potential natural plant community for that site. Range condition is expressed as excellent, good, fair, or poor on the basis of how much the present plant community differs from the potential.
- Rangeland.** Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.
- Range site.** An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other range sites in kind, proportion, and total production.
- Reaction, soil.** A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

- Redoximorphic concentrations.** Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.
- Redoximorphic depletions.** Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.
- Redoximorphic features.** Redoximorphic concentrations, redoximorphic depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.
- Reduced matrix.** A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redoximorphic feature.
- Regolith.** All unconsolidated earth material above the solid bedrock. It includes material weathered in place from all kinds of bedrock and alluvial, glacial, eolian, lacustrine, and pyroclastic deposits. Soil scientists regard as soil only that part of the regolith that has been modified by organisms and soil-forming processes. Most engineers describe the entire regolith, even to a great depth, as "soil."
- Relief.** The elevations or inequalities of a land surface, considered collectively.
- Residuum (residual soil material).** Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.
- Rhyolite.** Extrusive igneous rock, generally porphyritic and exhibiting flow texture, with phenocrysts of quartz and alkali feldspar in a glassy cryptocrystalline ground mass. The extrusive equivalent of granite.
- Rill.** A small steep-sided channel resulting from erosion. It is cut by a concentrated, but intermittent, flow of water, usually during and immediately following moderate rains or following icemelt or snowmelt. Generally, a rill is not an obstacle to wheeled vehicles and is shallow enough to be obliterated by ordinary tillage.
- Riverwash.** Unstabilized sandy, gravelly, cobbly, stony, or bouldery sediment that is flooded and reworked frequently by streams.
- Road cut.** A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.
- Roche moutonnée.** An elongated, streamlined hill of bedrock that has been carved and smoothed by an overriding glacier.
- Rock fragments.** Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.
- Rock outcrop.** An area of exposed bedrock with no soil.
- Root zone.** The part of the soil that can be penetrated by plant roots.
- Rubble land.** An area of cobbles, stones, and boulders with little or no soil.
- Runoff.** The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.
- SAR.** See Sodium adsorption ratio.
- Saline soil.** A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium. Salinity is expressed as the electrical conductivity of a saturation extract at 25 degrees C. Salinity classes, expressed in millimhos per centimeter, are as follows:

Nonsaline	0 to 2
Very slightly saline	2 to 4
Slightly saline	4 to 8

Soil Survey of Lassen Volcanic National Park, California

Moderately saline	8 to 16
Strongly saline	more than 16

Saline-sodic soil. A soil that contains sufficient exchangeable sodium to interfere with the growth of most crops and appreciable quantities of soluble salts. The exchangeable sodium ratio is greater than 0.15; the conductivity of the soil solution, when saturated, is greater than 4 decisiemens per meter (at 25 degrees C); and the pH is commonly 8.5 or less when the soil is saturated.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sandy. Sand and loamy sand soil textures.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saprolite. Soft, friable, isovolumetrically weathered bedrock that retains the fabric and structure of the parent rock and exhibits extensive intercrystal and intracrystal weathering. In pedology, saprolite has been used to refer to any unconsolidated residual material that underlies the soil and grades to hard bedrock below.

SAR. See Sodium adsorption ratio.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Scarification. The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

Sedimentary rock. A consolidated deposit of clastic particles, chemical precipitates, or organic matter accumulated at or near the surface of the earth under "normal" low temperature and pressure conditions. Sedimentary rock includes the consolidated equivalents of alluvial, colluvial, drift, eolian, lacustrine, and marine deposits. Examples are sandstone, siltstone, mudstone, claystone, shale, conglomerate, limestone, dolomite, and coal.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shallow soil. See Depth, soil.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shoulder. The position that forms the uppermost inclined surface near the top of a hillslope. It is a transition from backslope to summit. The surface is dominantly convex in profile and erosional in origin.

Side slope. A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silica-sesquioxide ratio. The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a

similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

- Site index.** A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.
- Slickensides.** Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.
- Slope.** The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.
- Sloughed till.** Water-saturated till that has flowed slowly downhill from its original place of deposit by glacial ice. It may rest on other till, on glacial outwash, or on a glaciolacustrine deposit.
- Sodic (alkali) soil.** A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.
- Sodicity.** The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^+ to $\text{Ca}^{++} + \text{Mg}^{++}$.
- Sodium adsorption ratio (SAR).** A measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration.
- Soft bedrock.** Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.
- Soil.** A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.
- Soil erodibility factors.** The Kw and Kf factors quantify the susceptibility of soil to detachment by water. These erodibility factors predict the long-term average soil loss that results from sheet and rill erosion when various cropping systems and conservation techniques are used. The whole soil is considered in the Kw factor, but only the fine-earth fraction, which is the material less than 2 millimeters in diameter, is considered in the Kf factor.
- Soil separates.** Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:
- | | |
|-----------------------|-----------------|
| Very coarse sand..... | 2.0 to 1.0 |
| Coarse sand | 1.0 to 0.5 |
| Medium sand | 0.5 to 0.25 |
| Fine sand | 0.25 to 0.10 |
| Very fine sand | 0.10 to 0.05 |
| Silt | 0.05 to 0.002 |
| Clay | less than 0.002 |
- Solum.** The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

- Stone line.** A sheetlike lag concentration of coarse fragments in surficial sediment. In cross section, the line may be marked only by scattered fragments or it may be a discrete layer of fragments. The fragments are more commonly pebbles or cobbles than stones. A stone line generally overlies material that was subject to weathering, soil formation, and erosion before deposition of the overlying material. Many stone lines appear to be buried erosion pavement originally formed by running water on the land surface and concurrently covered by surficial sediment.
- Stones.** Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.
- Stony.** Refers to a soil containing stones in numbers that interfere with or prevent tillage.
- Stratified.** Referring to geologic deposits that were formed, arranged, or laid down in layers. Layers in soils that are a result of the processes of soil formation are called horizons; those inherited from the parent material are called strata.
- Stream terrace.** One of a series of platforms in a stream valley that flanks and is more or less parallel to the stream channel, originally formed near the level of the stream, and represents the dissected remnants of an abandoned flood plain, streambed, or valley floor produced during an earlier period of erosion or deposition.
- Structure, soil.** The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).
- Subsidence.** The decrease in surface elevation as a result of the drainage of wet soils that have organic layers or semifluid mineral layers.
- Subsoil.** Technically, the B horizon; roughly, the part of the solum below plow depth.
- Substratum.** The part of the soil below the solum.
- Subsurface layer.** Any surface soil horizon (A, E, AB, or EB) below the surface layer.
- Summit.** The topographically highest position of a hillslope. It has a nearly level (planar or only slightly convex) surface.
- Surface layer.** The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the “plow layer,” or the “Ap horizon.”
- Surface soil.** The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.
- T factor.** The soil loss tolerance, which is defined as the maximum amount of erosion at which the quality of a soil as a medium for plant growth can be maintained. Maintaining the quality of the soil includes maintaining the surface soil as a seedbed for plants, maintaining the atmosphere-soil interface to allow the entry of air and water into the soil and still protect the underlying soil from wind and water erosion, and maintaining the total soil volume as a reservoir for water and plant nutrients, which is preserved by minimizing soil loss.
- Talus.** Rock fragments of any size or shape (commonly coarse and angular) at the base of a cliff or very steep rock slope; the accumulated mass of such loose, broken rock formed mainly by falling, rolling, or sliding.
- Taxadjuncts.** Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts only when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.
- Temperature regime, soil.** A system that categorizes for taxonomic purposes

general, long-term soil temperature conditions at the standard depth of 20 inches or at the surface of the bedrock, whichever is at a shallower depth. The various regimes are defined according to the freezing point of water or to the high and low extremes for significant biological activity. The regimes, which are defined in "Keys to Soil Taxonomy," are as follows:

Pergellic.—Soils that have a mean annual temperature of less than 32 degrees F and have permafrost.

Cryic.—Soils that have a mean annual temperature of 32 to 47 degrees F and remain cold in summer.

Frigid.—Soils that have a mean annual temperature similar to that of the cryic regime but have a mean summer temperature at least 9 degrees warmer.

Mesic.—Soils that have a mean annual temperature of 47 to 59 degrees F, and the difference between the mean summer and mean winter temperature is more than 9 degrees.

Thermic.—Soils that have a mean annual temperature of 59 to 72 degrees F, and the difference between the mean summer and mean winter temperature is more than 9 degrees.

Hyperthermic.—Soils that have a mean annual temperature of more than 72 degrees F, and the difference between the mean summer and mean winter temperature is more than 9 degrees.

Terminal moraine. An end moraine that marks the farthest advance of a glacier and commonly has the form of a massive arcuate or concentric ridge, or complex of ridges, underlain by till and other types of drift.

Terrace (geomorphologic). A steplike surface bordering a valley floor or shoreline that represents the former position of a flood plain, lake, or seashore. The term is commonly applied to both the relatively flat summit surface (tread) that has been cut or built up by stream or wave action and the steeper descending slope (scarp or riser) that grades to a lower base level of erosion. Practically, terraces are considered to be generally flat alluvial areas above the 100-year flood stage.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil.

The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thermic temperature regime. See Temperature regime, soil.

Till. Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Till plain. An extensive area of nearly level to undulating soils underlain by glacial till.

Toeslope. The outermost inclined surface at the base of a hill; part of a footslope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Torrific moisture regime. See Aridic moisture regime.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Tuff. A generic term for any consolidated or cemented deposit that is 50 percent volcanic ash (less than 2 millimeters in size). Various types of tuff can be recognized by their composition; acidic tuff is dominantly acidic particles and basic tuff is dominantly basic particles.

Unified soil classification. A system for classifying mineral and organic soils for engineering purposes based on particle-size characteristics, liquid limit, and plasticity index.

- Upland** (geomorphologic). A general term for the higher land of a region in contrast to the low-lying, adjacent land, such as a valley or plain; land at a higher elevation than the flood plain or low stream terrace; or land above the footslope zone of the hillslope continuum.
- Valley fill.** The unconsolidated sediment deposited by any agent (water, wind, ice, or mass wasting) that fills or partly fills a valley.
- Variiegation.** Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.
- Varve.** A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.
- Vegetative cover.** The crown cover of all live plants in relation to the ground surface.
- Very deep soil.** See Depth, soil.
- Very shallow soil.** See Depth, soil.
- Water bars.** Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.
- Water table.** The upper surface of ground water or the level below which the soil is saturated by water. Also, the top of an aquifer.
- Weathering.** All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.
- WEG.** See Wind erodibility group.
- Well graded.** Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.
- Wilting point (or permanent wilting point).** The moisture content of soil, on an oven-dry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.
- Wind erodibility group (WEG).** A grouping of soils that have similar properties affecting their resistance to wind erosion in cultivated areas.
- Windthrow.** The uprooting and tipping over of trees by the wind.
- Xeric moisture regime.** The typical moisture regime in areas of Mediterranean climates, where it is moist and cool in winter and warm and dry in summer. When potential evapotranspiration is at a minimum, the moisture, which falls in winter, is particularly effective in leaching. The mean annual soil temperature is less than 22 degrees C, and the difference between the mean summer and mean winter soil temperature is 6 degrees.
- Xerophytic.** Pertaining to vegetation that is adapted to dry areas.

Tables

Soil Survey of Lassen Volcanic National Park, California

Table 1.—Temperature and Precipitation

(Recorded in the period 1971-2000 at Manzanita Lake, California)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have--		Average number of growing degree days*	Average	2 years in 10 will have--		Average number of days with 0.10 inch or more	Average snow- fall
				Maximum temp. higher than--	Minimum temp. lower than--			Less than--	More than--		
<u>°F</u>	<u>°F</u>	<u>°F</u>	<u>°F</u>	<u>°F</u>	<u>Units</u>	<u>In</u>	<u>In</u>	<u>In</u>	<u>In</u>	<u>In</u>	
January--	42.5	21.1	31.8	62	1	0	5.84	2.04	9.52	9	33.0
February-	43.4	21.4	32.4	63	1	0	5.59	2.60	8.53	9	35.0
March----	46.0	23.9	35.0	64	4	0	5.87	3.16	8.00	10	32.8
April----	51.8	27.7	39.7	73	10	9	3.30	1.76	4.79	7	18.4
May-----	60.8	34.0	47.4	83	19	69	2.84	1.10	4.21	6	7.0
June-----	69.8	40.4	55.1	88	25	191	1.60	0.35	2.76	3	1.3
July-----	77.8	44.7	61.2	92	32	353	0.48	0.00	0.76	1	0.1
August---	77.2	43.7	60.5	92	32	330	0.69	0.00	1.15	1	0.0
September	71.4	39.7	55.5	88	26	201	1.57	0.05	3.13	2	0.5
October--	60.7	33.3	47.0	82	19	63	3.07	0.94	5.19	4	3.7
November-	46.9	25.8	36.4	69	8	2	5.32	2.07	7.60	8	17.7
December-	42.4	21.7	32.0	61	1	0	5.08	1.82	8.16	8	29.1
Yearly: Average	57.6	31.4	44.5	---	---	---	---	---	---	---	---
Extreme	96	-13	---	94	-3	---	---	---	---	---	---
Total--	---	---	---	---	---	1,218	41.24	31.48	49.41	68	178.6

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 degrees F).

Soil Survey of Lassen Volcanic National Park, California

Table 2.—Freeze Dates in Spring and Fall

(Recorded in the period 1971-2000 at Manzanita Lake,
California)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	May 31	June 19	July 17
2 years in 10 later than--	May 23	June 13	July 10
5 years in 10 later than--	May 9	May 31	June 26
First freezing temperature in fall:			
1 year in 10 earlier than--	Sept. 30	Sept. 14	Aug. 21
2 years in 10 earlier than--	Oct. 8	Sept. 22	Aug. 29
5 years in 10 earlier than--	Oct. 23	Oct. 8	Sept. 14

Table 3.—Growing Season

(Recorded in the period 1971-2000 at Manzanita Lake,
California)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	<u>Days</u>	<u>Days</u>	<u>Days</u>
9 years in 10	130	98	49
8 years in 10	142	109	60
5 years in 10	166	129	80
2 years in 10	189	149	100
1 year in 10	202	159	111

Soil Survey of Lassen Volcanic National Park, California

Table 4.—Component, Map Unit Symbol, and Ecosite ID

(This report displays components and their associated map units and ecosite ids. All components are major components)

Component name	Map unit symbol	Local phase	Component kind	Ecosite ID
Acroph	150	none noted	series	R022BI204CA
	151	none noted	series	R022BI204CA
	152	none noted	series	R022BI204CA
Aeric Endoaquepts	160	none noted	taxon above family	R022BI215CA
Andic Durixercepts	143	none noted	taxon above family	F022BI115CA
Aquandic Cryaquepts	139	none noted	taxon above family	R022BI206CA
	163	none noted	taxon above family	R022BI206CA
Aquandic Endoaquepts	165	none noted	taxon above family	R022BI202CA
Aquandic Humaquepts	165	none noted	taxon above family	R022BI202CA
Aquandic Humaquepts, flood plains	125	none noted	taxon above family	R022BI210CA
Aquepts	127	none noted	taxon above family	R022BI211CA
	164	none noted	taxon above family	R022BI211CA
	171	none noted	taxon above family	R022BI211CA
Aquic Dystroxerepts, debris flows	119	none noted	taxon above family	R022BI216CA
Aquic Haploxerands	164	none noted	taxon above family	F022BI120CA
	166	none noted	taxon above family	F022BI120CA
Ashbutte	102	none noted	series	F022BI109CA
Badgerflat	107	none noted	series	F022BI107CA
	172	none noted	series	F022BI126CA
Badgerwash	173	none noted	series	F022BI125CA
Beaches	205	none noted	miscellaneous area	
Bearthrubble	110	none noted	series	F022BI114CA
	141	none noted	series	F022BI103CA
Brokeoff	119	none noted	series	R022BI203CA
Buttelake	100	none noted	series	F022BI100CA
	120	none noted	series	F022BI119CA
Buttewash	101	none noted	series	F022BI100CA
Cascadesprings	112	none noted	series	F022BI115CA
Cenplat	106	ashy loamy sand	series	F022BI115CA
	107	none noted	series	F022BI107CA
Chaos	134	none noted	series	F022BI122CA
Cinder land	200	none noted	miscellaneous area	
Cragwash	142	none noted	series	F022BI103CA
Diamondpeak	119	none noted	series	F022BI113CA

Soil Survey of Lassen Volcanic National Park, California

Table 4.—Component, Map Unit Symbol, and Ecosite ID—Continued

Component name	Map unit symbol	Local phase	Component kind	Ecosite ID
Dittmar	126	none noted	series	F022BI121CA
Duric Vitraquands	139	none noted	taxon above family	F022BI117CA
Emeraldlake	113	none noted	series	F022BI115CA
	114	none noted	series	R022BI207CA
	149	none noted	series	R022BI207CA
	167	none noted	series	R022BI207CA
	170	none noted	series	R022BI207CA
Endoaquepts	119	none noted	taxon above family	R022BI209CA
Histic Humaquepts	165	none noted	taxon above family	R022BI202CA
Histic Humaquepts, frequently flooded	130	none noted	taxon above family	R022BI217CA
Histic Humaquepts, lake sediments	130	none noted	taxon above family	R022BI217CA
Humic Haploxerands	141	none noted	taxon above family	F022BI103CA
Humic Haploxerands, colluvium	129	none noted	taxon above family	F022BI110CA
Humic Haploxerands, lake terrace	148	none noted	taxon above family	F022BI112CA
Humic Haploxerands, moist lake terrace	117	none noted	taxon above family	F022BI125CA
Humic Haploxerands, outwash	162	none noted	taxon above family	F022BI103CA
Humic Haploxerands, outwash terrace	166	none noted	taxon above family	F022BI110CA
Humic Haploxerands, strath terrace	127	none noted	taxon above family	F022BI110CA
Humic Haploxerands, stream terrace	125	none noted	taxon above family	F022BI120CA
	160	none noted	taxon above family	F022BI110CA
Humic Xeric Vitricryands	144	none noted	taxon above family	F022BI104CA
Juniperlake	104	none noted	series	F022BI112CA
	105	none noted	series	F022BI112CA
	176	bouldery	series	F022BI110CA
Kingsiron	126	none noted	series	F022BI110CA
Lava flows	201	none noted	miscellaneous area	
Prospectpeak	109	none noted	series	F022BI109CA
Readingpeak	113	none noted	series	F022BI115CA
	114	none noted	series	F022BI124CA
	167	none noted	series	F022BI124CA
	170	none noted	series	R022BI207CA
	174	none noted	series	F022BI124CA

Soil Survey of Lassen Volcanic National Park, California

Table 4.—Component, Map Unit Symbol, and Ecosite ID—Continued

Component name	Map unit symbol	Local phase	Component kind	Ecosite ID
Riverwash	160	none noted	miscellaneous area	
Rock outcrop	104	none noted	miscellaneous area	
	113	none noted	miscellaneous area	
	114	none noted	miscellaneous area	
	116	none noted	miscellaneous area	
	126	none noted	miscellaneous area	
	136	none noted	miscellaneous area	
	137	rhyodacite	miscellaneous area	
	149	cliffs	miscellaneous area	
	150	none noted	miscellaneous area	
	151	none noted	miscellaneous area	
	152	none noted	miscellaneous area	
	158	rhyodacite	miscellaneous area	
	167	dacite	miscellaneous area	
	169	cliffs	miscellaneous area	
170	rhyodacite	miscellaneous area		
174	none noted	miscellaneous area		
Rubble land	110	none noted	miscellaneous area	
	114	none noted	miscellaneous area	
	141	none noted	miscellaneous area	
	149	none noted	miscellaneous area	
	159	none noted	miscellaneous area	
170	none noted	miscellaneous area		
Scoured	103	none noted	series	F022BI102CA
	104	none noted	series	F022BI102CA
	169	none noted	series	F022BI121CA
Shadowlake	115	none noted	series	F022BI111CA
	150	none noted	series	F022BI115CA
	151	none noted	series	F022BI115CA
	152	none noted	series	F022BI115CA
	175	none noted	series	F022BI111CA
Sueredo	145	none noted	series	F022BI103CA
	146	none noted	series	F022BI103CA
	169	none noted	series	F022BI103CA
Summertown	147	none noted	series	F022BI103CA
Sunhoff	120	none noted	series	F022BI107CA
Talved	120	none noted	series	R022BI200CA
Terracelake	113	none noted	series	R022BI204CA
	114	none noted	series	R022BI207CA
	116	none noted	series	F022BI104CA
	136	none noted	series	F022BI111CA
	150	none noted	series	F022BI115CA
	151	none noted	series	F022BI115CA
	152	none noted	series	F022BI115CA
167	none noted	series	R022BI207CA	
Terric Haplohemists	165	none noted	taxon above family	R022BI202CA
Typic Dystroxerepts	119	none noted	taxon above family	R022BI216CA
Typic Dystroxerepts, landslides	118	none noted	taxon above family	F022BI118CA

Soil Survey of Lassen Volcanic National Park, California

Table 4.—Component, Map Unit Symbol, and Ecosite ID—Continued

Component name	Map unit symbol	Local phase	Component kind	Ecosite ID
Typic Endoaquands	130	none noted	taxon above family	F022BI108CA
	139	none noted	taxon above family	F022BI108CA
	148	none noted	taxon above family	F022BI108CA
Typic Endoaquents	133	none noted	taxon above family	R022BI213CA
	138	none noted	taxon above family	R022BI213CA
Typic Haploxerands	141	none noted	taxon above family	F022BI103CA
Typic Petraquepts	164	none noted	taxon above family	R022BI218CA
Typic Petraquepts, bedrock	164	none noted	taxon above family	R022BI211CA
	171	none noted	taxon above family	R022BI211CA
Typic Psammaquents	161	none noted	taxon above family	R022BI213CA
Typic Vitriixerands	153	none noted	taxon above family	F022BI103CA
	154	none noted	taxon above family	F022BI103CA
Typic Vitriixerands, bouldery	159	none noted	taxon above family	F022BI121CA
Typic Vitriixerands, tephra over colluvium	159	none noted	taxon above family	F022BI103CA
Typic Vitriixerands, unglaciaded	158	none noted	taxon above family	F022BI121CA
Typic Vitriixerands, very deep	157	none noted	taxon above family	F022BI103CA
Typic Xerorthents	108	none noted	taxon above family	F022BI100CA
Typic Xerorthents, tephra	202	none noted	taxon above family	R022BI201CA
	203	none noted	taxon above family	F022BI100CA
Typic Xerorthents, welded	202	none noted	taxon above family	R022BI201CA
Vitrandic Cryofluvents	163	none noted	taxon above family	R022BI206CA
	175	none noted	taxon above family	R022BI206CA
Vitrandic Cryorthents	174	none noted	taxon above family	R022BI214CA
Vitrandic Cryorthents, debris flows	132	none noted	taxon above family	F022BI115CA
	177	high elevation	taxon above family	R022BI207CA
Vitrandic Xerofluvents	133	none noted	taxon above family	F022BI106CA
Vitrandic Xerofluvents, debris flows	138	none noted	taxon above family	F022BI105CA
Vitrandic Xerorthents	102	none noted	taxon above family	F022BI114CA

Soil Survey of Lassen Volcanic National Park, California

Table 4.—Component, Map Unit Symbol, and Ecosite ID—Continued

Component name	Map unit symbol	Local phase	Component kind	Ecosite ID
Vitrandic Xerorthents, debris fan	111	none noted	taxon above family	F022BI106CA
Vitrandic Xerorthents, moraine	153	none noted	taxon above family	F022BI103CA
	154	none noted	taxon above family	F022BI103CA
Vitriixerands	140	none noted	taxon above family	F022BI117CA
	168	low elevation	taxon above family	F022BI123CA
Water	W	none noted	miscellaneous area	
Xeric Vitricryands	137	none noted	taxon above family	R022BI212CA
Xeric Vitricryands, ash over cinders	122	none noted	taxon above family	F022BI111CA
Xeric Vitricryands, bedrock	122	none noted	taxon above family	R022BI208CA
Xeric Vitricryands, cirque floor	116	none noted	taxon above family	R022BI205CA
	136	none noted	taxon above family	R022BI205CA
	144	none noted	taxon above family	R022BI205CA
Xeric Vitricryands, colluvium	122	none noted	taxon above family	F022BI104CA
Xeric Vitricryands, pyroclastic surge	155	none noted	taxon above family	F022BI115CA
	156	none noted	taxon above family	F022BI115CA
Xeric Vitricryands, tephra over till	116	none noted	series	F022BI104CA

Soil Survey of Lassen Volcanic National Park, California

Table 5.—Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
100	Buttelake ashy sand, 3 to 35 percent slopes-----	3,893	3.1
101	Buttewash ashy coarse sand, 0 to 15 percent slopes-----	2,318	1.8
102	Ashbutte-Vitrandic Xerorthents complex, 15 to 60 percent slopes-----	1,737	1.4
103	Scoured very bouldery medial loamy sand, 2 to 30 percent slopes-----	6,713	5.3
104	Scoured-Juniperlake-Rock outcrop complex, 3 to 40 percent slopes-----	13,134	10.4
105	Juniperlake gravelly medial sandy loam, 2 to 35 percent slopes-----	6,110	4.8
106	Cenplat ashy loamy sand, 0 to 15 percent slopes-----	8,848	7.0
107	Badgerflat-Cenplat complex, 10 to 60 percent slopes-----	6,544	5.2
108	Typic Xerorthents very gravelly ashy sand, 1 to 20 percent slopes-----	440	0.3
109	Prospectpeak ashy coarse sand, 10 to 30 percent slopes-----	2,456	1.9
110	Bearrubble-Rubble land complex, 8 to 40 percent slopes-----	5,285	4.2
111	Vitrandic Xerorthents, debris fan, 2 to 30 percent slopes-----	649	0.5
112	Cascadesprings gravelly ashy loamy coarse sand, 5 to 30 percent slopes---	894	0.7
113	Terracelake-Emeraldlake-Readingpeak-Rock outcrop complex, 15 to 65 percent slopes-----	598	0.5
114	Emeraldlake-Terracelake-Readingpeak-Rock outcrop-Rubble land complex, 20 to 95 percent slopes-----	5,401	4.3
115	Shadowlake gravelly ashy sandy loam, 2 to 30 percent slopes-----		
116	Xeric Vitricryands, tephra over till-Terracelake-Rock outcrop-Xeric Vitricryands, cirque floor, complex, 5 to 35 percent slopes-----	530	0.4
117	Humic Haploxerands, moist lake terrace, 0 to 15 percent slopes-----	1,438	1.1
118	Typic Dystraxerepts, landslides, 10 to 50 percent slopes-----	308	0.2
119	Diamondpeak-Brokeoff-Endoaquepts-Aquic Dystraxerepts, debris flows-Typic Dystraxerepts complex, 10 to 80 percent slopes-----	850	0.7
120	Buttelake-Sunhoff-Talved complex, 20 to 65 percent slopes-----	3,241	2.6
122	Xeric Vitricryands complex, 10 to 80 percent slopes-----	1,446	1.1
125	Humic Haploxerands, stream terraces-Aquandic Humaquepts, flood plains, complex, 0 to 15 percent slopes-----	1,066	0.8
126	Kingsiron-Dittmar-Rock outcrop complex, 20 to 80 percent slopes-----	139	0.1
127	Humic Haploxerands, strath terrace-Aquepts complex, 5 to 50 percent slopes-----	3,270	2.6
129	Humic Haploxerands, colluvium, 10 to 40 percent slopes-----	640	0.5
130	Histic Humaquepts, lake sediments-Histic Humaquepts, frequently flooded- Typic Endoaquands complex, 0 to 15 percent slopes-----	402	0.3
132	Vitrandic Cryorthents, debris flows, 10 to 80 percent slopes-----	497	0.4
133	Vitrandic Xerofluvents-Typic Endoaquands complex, 0 to 15 percent slopes-----	720	0.6
134	Chaos extremely gravelly ashy coarse sand, 2 to 30 percent slopes-----	214	0.2
136	Terracelake-Rock outcrop-Xeric Vitricryands, cirque floor, complex, 1 to 30 percent slopes-----	1,848	1.5
137	Xeric Vitricryands-Rock outcrop complex, 10 to 45 percent slopes-----	1,282	1.0
138	Vitrandic Xerofluvents, debris flows-Typic Endoaquands complex, 0 to 8 percent slopes-----	230	0.2
139	Duric Vitraquands-Typic Endoaquands-Aquandic Cryaquands complex, 0 to 8 percent slopes-----	417	0.4
140	Vitrixerands gravelly ashy loamy coarse sand, 1 to 15 percent slopes-----	449	0.4
141	Humic Haploxerands-Typic Haploxerands-Bearrubble-Rubble land complex, 5 to 40 percent slopes-----	720	0.6
142	Cragwash ashy loamy coarse sand, 1 to 30 percent slopes-----	1,392	1.1
143	Andic Durixerpts gravelly ashy loamy coarse sand, 3 to 20 percent slopes-----	768	0.6
144	Xeric Vitricryands, cirque floor-Humic Xeric Vitricryands complex, 1 to 35 percent slopes-----	468	0.4
145	Sueredo bouldery ashy loamy coarse sand, 2 to 30 percent slopes-----	613	0.5
146	Sueredo bouldery ashy loamy coarse sand, 20 to 60 percent slopes-----	3,792	3.0
147	Summertown gravelly ashy loamy coarse sand, 5 to 35 percent slopes-----	956	0.8
148	Humic Haploxerands, lake terrace-Typic Endoaquands complex, 1 to 30 percent slopes,-----	987	0.8
149	Rubble land-Rock outcrop, cliffs-Emeraldlake association, 35 to 150 percent slopes-----	722	0.6
150	Shadowlake-Terracelake-Acroph-Rock outcrop complex, 15 to 80 percent slopes-----	420	0.3
		1,156	0.9

See footnote at end of table.

Soil Survey of Lassen Volcanic National Park, California

Table 5.—Acreage and Proportionate Extent of the Soils—Continued

Map symbol	Soil name	Acres	Percent
151	Terracelake-Acroph-Rock outcrop-Shadowlake complex, 15 to 80 percent slopes-----	4,324	3.4
152	Terracelake-Shadowlake-Acroph-Rock outcrop complex, 5 to 35 percent slopes-----	4,142	3.3
153	Typic Vitrixerands-Vitrandic Xerorthents, moraine, complex, 3 to 30 percent slopes-----	435	0.3
154	Typic Vitrixerands-Vitrandic Xerorthents, moraine, complex, 15 to 60 percent slopes-----	187	0.1
155	Xeric Vitricryands, pyroclastic surge, 8 to 35 percent slopes-----	80	*
156	Xeric Vitricryands, pyroclastic surge, 20 to 50 percent slopes-----	58	*
157	Typic Vitrixerands, very deep, 5 to 50 percent slopes-----	326	0.3
158	Typic Vitrixerands, unglaciated-Rock outcrop complex, 5 to 20 percent slopes-----	127	0.1
159	Typic Vitrixerands, bouldery-Typic Vitrixerands, tephra over colluvium-Rubble land complex, 15 to 60 percent slopes-----	1,346	1.1
160	Aeric Endoaquents-Humic Haploxerands, stream terraces-Riverwash complex, 2 to 30 percent slopes-----	131	0.1
161	Typic Psammaquents ashy fine sand, 0 to 3 percent slopes-----	14	*
162	Humic Haploxerands, outwash, 1 to 8 percent slopes-----	108	*
163	Vitrandic Cryofluvents-Aquandic Cryaquents complex, 0 to 8 percent slopes-----	377	0.3
164	Aquepts-Typic Petraquepts, bedrock-Aquic Haploxerands-Typic Petraquepts complex, 4 to 30 percent slopes-----	270	0.2
165	Aquandic Humaquepts-Histic Humaquepts-Aquandic Endoaquepts-Terric Haplohemists complex, 1 to 5 percent slopes-----	100	*
166	Aquic Haploxerands-Humic Haploxerands, outwash terrace, complex, 2 to 30 percent slopes-----	295	0.2
167	Emeraldlake-Readingpeak-Terracelake-Rock outcrop complex, 30 to 95 percent slopes-----	1,468	1.2
168	Vitrixerands, low elevation, 1 to 15 percent slopes-----	511	0.4
169	Sueredo-Rock outcrop, cliffs-Scoured complex, 15 to 150 percent slopes---	540	0.4
170	Rock outcrop-Emeraldlake-Rubble land-Readingpeak complex, 20 to 150 percent slopes-----	1,375	1.1
171	Aquepts-Typic Petraquepts, bedrock complex, 2 to 45 percent slopes-----	1,047	0.8
172	Badgerflat very gravelly ashy sandy loam, 1 to 30 percent slopes-----	3,749	3.0
173	Badgerwash very bouldery medial loamy coarse sand, 1 to 10 percent slopes-----	1,434	1.1
174	Vitrandic Cryorthents-Readingpeak-Rock outcrop complex, 5 to 150 percent slopes-----	885	0.7
175	Shadowlake-Vitrandic Cryofluvents complex, 2 to 30 percent slopes-----	797	0.6
176	Juniperlake, bouldery, 10 to 35 percent slopes-----	922	0.7
177	Vitrandic Cryorthents, debris flows, high elevation, 15 to 95 percent slopes-----	522	0.4
200	Cinder land-----	155	0.1
201	Lava flows-----	2,040	1.6
202	Typic Xerorthents, tephra-Typic Xerorthents, welded, complex, 2 to 50 percent slopes-----	224	0.2
203	Typic Xerorthents, tephra, 2 to 20 percent slopes-----	217	0.2
205	Beaches-----	61	*
W	Water-----	2,352	1.9
	Total-----	126,720	100.0

* Less than 0.1 percent.

Soil Survey of Lassen Volcanic National Park, California

Table 6.—Land Capability Classification

(Land capability is a system of grouping soils primarily on the basis of their capability to produce common cultivated crops and pasture plants without deteriorating over a long period of time. The classification is for nonirrigated areas)

Map symbol and soil name	Land capability
100: Buttelake-----	6e
101: Buttewash-----	6e
102: Ashbutte-----	6e
Vitrandic Xerorthents-----	8
103: Scoured-----	8
104: Scoured-----	8
Juniperlake-----	6e
Rock outcrop-----	8
105: Juniperlake-----	6e
106: Cenplat-----	7e
107: Badgerflat-----	7e
Cenplat-----	7e
108: Typic Xerorthents-----	6s
109: Prospectpeak-----	8
110: Bearthrubble-----	4e
Rubble land-----	8
111: Vitrandic Xerorthents, debris fan-----	7e
112: Cascadesprings-----	7e
113: Terracelake-----	6e
Emeraldlake-----	7e
Readingpeak-----	7s
Rock outcrop-----	8

Soil Survey of Lassen Volcanic National Park, California

Table 6.--Land Capability Classification--Continued

Map symbol and soil name	Land capability
114: Emeraldlake-----	7e
Terracelake-----	7e
Readingpeak-----	7s
Rock outcrop-----	8
Rubble land-----	8
115: Shadowlake-----	4e
116: Xeric Vitricryands, tephra over till-----	6e
Terracelake-----	4e
Rock outcrop-----	8
Xeric Vitricryands, cirque floor-----	6e
117: Humic Haploxerands, moist lake terrace-----	7e
118: Typic Dystroxerepts, landslides-----	7e
119: Diamondpeak-----	6e
Brokeoff-----	7e
Endoaquepts-----	6e
Aquic Dystroxerepts, debris flows-----	6e
Typic Dystroxerepts-----	7e
120: Buttelake-----	6e
Sunhoff-----	6e
Talved-----	8
122: Xeric Vitricryands, colluvium-----	7e
Xeric Vitricryands, ash over cinders-----	7e
Xeric Vitricryands, bedrock-----	7e
125: Humic Haploxerands, stream terrace-----	7e
Aquandic Humaquepts, flood plains-----	6w

Soil Survey of Lassen Volcanic National Park, California

Table 6.—Land Capability Classification—Continued

Map symbol and soil name	Land capability
126: Kingsiron-----	8
Dittmar-----	8
Rock outcrop-----	8
127: Humic Haploxerands, strath terrace-----	7e
Aquepts-----	6e
129: Humic Haploxerands, colluvium-----	4e
130: Histic Humaquepts, lake sediments-----	5w
Histic Humaquepts, frequently flooded-----	5w
Typic Endoaquands-----	5w
132: Vitrandic Cryorthents, debris flows-----	7e
133: Vitrandic Xerofluvents-----	4e
Typic Endoaquents-----	7w
134: Chaos-----	7s
136: Terracelake-----	4e
Rock outcrop-----	8
Xeric Vitricryands, cirque floor-----	6e
137: Xeric Vitricryands-----	7e
Rock outcrop, rhyodacite-----	8
138: Vitrandic Xerofluvents, debris flows-----	5w
Typic Endoaquents-----	7w
139: Duric Vitraquands-----	6w
Typic Endoaquands-----	5w
Aquandic Cryaquents-----	5w
140: Vitrixerands-----	6e

Soil Survey of Lassen Volcanic National Park, California

Table 6.--Land Capability Classification--Continued

Map symbol and soil name	Land capability
141: Humic Haploxerands-----	4e
Typic Haploxerands-----	4e
Bearthrubble-----	4e
Rubble land-----	8
142: Cragwash-----	6e
143: Andic Durixerpts-----	6e
144: Xeric Vitricryands, cirque floor-----	6e
Humic Xeric Vitricryands-----	6e
145: Sueredo-----	7e
146: Sueredo-----	7e
147: Summertown-----	7e
148: Humic Haploxerands, lake terrace-----	7e
Typic Endoaquands-----	5w
149: Rubble land-----	8
Rock outcrop, cliffs-----	8
Emeraldlake-----	7e
150: Shadowlake-----	4e
Terracelake-----	6e
Acroph-----	8
Rock outcrop-----	8
151: Terracelake-----	6e
Acroph-----	8
Rock outcrop-----	8
Shadowlake-----	4e

Soil Survey of Lassen Volcanic National Park, California

Table 6.—Land Capability Classification—Continued

Map symbol and soil name	Land capability
152:	
Terracelake-----	4e
Shadowlake-----	4e
Acroph-----	8
Rock outcrop-----	8
153:	
Typic Vitrixerands-----	6e
Vitrantic Xerorthents, moraine-----	6e
154:	
Typic Vitrixerands-----	6e
Vitrantic Xerorthents, moraine-----	6e
155:	
Xeric Vitricryands, pyroclastic surge-----	6e
156:	
Xeric Vitricryands, pyroclastic surge-----	7e
157:	
Typic Vitrixerands, very deep-----	4e
158:	
Typic Vitrixerands, unglaciated-----	7e
Rock outcrop, rhyodacite-----	8
159:	
Typic Vitrixerands, bouldery-----	7e
Typic Vitrixerands, tephra over colluvium-----	7e
Rubble land-----	8
160:	
Aeric Endoaquents-----	6s
Humic Haploxerands, stream terrace-----	7e
Riverwash-----	8
161:	
Typic Psammaquents-----	6w
162:	
Humic Haploxerands, outwash-----	7e
163:	
Vitrantic Cryofluvents-----	5w
Aquandic Cryaquents-----	5w

Soil Survey of Lassen Volcanic National Park, California

Table 6.--Land Capability Classification--Continued

Map symbol and soil name	Land capability
164:	
Aquepts-----	6w
Typic Petraquepts, bedrock-----	7w
Aquic Haploxerands-----	6e
Typic Petraquepts-----	6w
165:	
Aquandic Humaquepts-----	6w
Histic Humaquepts-----	6w
Aquandic Endoaquepts-----	6w
Terric Haplohemists-----	5w
166:	
Aquic Haploxerands-----	6e
Humic Haploxerands, outwash terrace-----	4e
167:	
Emeraldlake-----	7e
Readingpeak-----	7s
Terracelake-----	7e
Rock outcrop, dacite-----	8
168:	
Vitriixerands, low elevation-----	6e
169:	
Sueredo-----	7e
Rock outcrop, cliffs-----	8
Scoured-----	8
170:	
Rock outcrop, rhyodacite-----	8
Emeraldlake-----	7e
Rubble land-----	8
Readingpeak-----	7s
171:	
Aquepts-----	6e
Typic Petraquepts, bedrock-----	7w
172:	
Badgerflat-----	7e
173:	
Badgerwash-----	7e

Soil Survey of Lassen Volcanic National Park, California

Table 6.—Land Capability Classification—Continued

Map symbol and soil name	Land capability
174: Vitrandic Cryorthents-----	7e
Readingpeak-----	7s
Rock outcrop-----	8
175: Shadowlake-----	4e
Vitrandic Cryofluvents-----	5w
176: Juniperlake, bouldery-----	4e
177: Vitrandic Cryorthents, debris flows, high elevation-----	7e
200: Cinder land-----	8
201: Lava flows-----	8
202: Typic Xerorthents, tephra-----	4e
Typic Xerorthents, welded-----	8
203: Typic Xerorthents, tephra-----	4e
205: Beaches-----	8
W. Water	

Table 7.—Hydric Soils

(This report includes only hydric components. Map units with no hydric components are not listed. Definitions of hydric criteria codes are included at the end of the report)

Map symbol and map unit name	Component	Percent of map unit	Hydric	Landform	Hydric soils criteria			
					Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
103: Scoured very bouldery medial loamy sand, 2 to 30 percent slopes	Typic Endoaquands	2	Yes	lake terraces	2B3, 4	Yes	Yes	No
104: Scoured-Juniperlake-Rock outcrop complex, 3 to 40 percent slopes	Typic Endoaquands	2	Yes	lake terraces	2B3, 4	Yes	Yes	No
105: Juniperlake gravelly medial sandy loam, 2 to 35 percent slopes	Typic Endoaquands	2	Yes	lake terraces	2B3, 4	Yes	Yes	No
	Histic Humaquepts, lake sediments	1	Yes	meadows in glacial lakes (relict)	2B3, 3	Yes	No	Yes
111: Vitrandic Xerorthents, debris fan, 2 to 30 percent slopes	Typic Endoaquents	5	Yes	flood plains	2B3, 4	Yes	Yes	No
117: Humic Haploxerands, moist lake terrace, 0 to 15 percent slopes	Typic Endoaquands	5	Yes	lake terraces	2B3, 4	Yes	Yes	No
118: Typic Dystroxerepts, landslides, 10 to 50 percent slopes	Endoaquepts	5	Yes	seeps on landslides	2B3	Yes	No	No
119: Diamondpeak-Brokeoff-Endoaquepts-Aquic Dystroxerepts, debris flows-Typic Dystroxerepts complex, 10 to 80 percent slopes	Endoaquepts	14	Yes	seeps on mountain slopes	2B3	Yes	No	No
	Aquic Dystroxerepts, debris flows	11	Yes	debris flows	2B3	Yes	No	No

Table 7.—Hydric Soils—Continued

Map symbol and map unit name	Component	Percent of map unit	Hydric	Landform	Hydric soils criteria			
					Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
125: Humic Haploxerands, stream terraces-Aquandic Humaquepts, flood plains, complex, 0 to 15 percent slopes	Aquandic Humaquepts, flood plains	40	Yes	flood plains	4	No	Yes	No
126: Kingsiron-Dittmar-Rock outcrop complex, 20 to 80 percent slopes	Aquepts	2	Yes	seeps on glacial-valley walls	2B3	Yes	No	No
127: Humic Haploxerands, strath terrace-Aquepts complex, 5 to 50 percent slopes	Aquepts	15	Yes	seeps on glacial-valley floors	2B3	Yes	No	No
	Aquandic Humaquepts, flood plains	4	Yes	flood plains	4	No	Yes	No
	Endoaquepts	1	Yes	seeps on glacial-valley floors	2B3	Yes	No	No
129: Humic Haploxerands, colluvium, 10 to 40 percent slopes	Aquepts	2	Yes	seeps on colluvial aprons	2B3	Yes	No	No
130: Histic Humaquepts, lake sediments-Histic Humaquepts, frequently flooded-Typic Endoaquands complex, 0 to 15 percent slopes	Histic Humaquepts, lake sediments	55	Yes	meadows in glacial lakes (relict)	2B3, 3	Yes	No	Yes
	Histic Humaquepts, frequently flooded	30	Yes	along channels in meadows in glacial lakes (relict)	2B3, 4	Yes	Yes	No
	Typic Endoaquands	15	Yes	lake terraces	2B3, 4	Yes	Yes	No
132: Vitrandic Cryorthents, debris flows, 10 to 80 percent slopes	Typic Endoaquents	2	Yes	flood plains	2B3, 4	Yes	Yes	No

Table 7.—Hydric Soils—Continued

Map symbol and map unit name	Component	Percent of map unit	Hydric	Landform	Hydric soils criteria			
					Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
133: Vitrandic Xerofluvents-Typic Endoaquents complex, 0 to 15 percent slopes	Typic Endoaquents	30	Yes	flood plains	2B3, 4	Yes	Yes	No
134: Chaos extremely gravelly ashy coarse sand, 2 to 30 percent slopes	Aquepts	3	Yes	rockfall avalanches	2B3	Yes	No	No
138: Vitrandic Xerofluvents, debris flows-Typic Endoaquents complex, 0 to 8 percent slopes	Typic Endoaquents	10	Yes	flood plains	2B3, 4	Yes	Yes	No
139: Duric Vitraquands-Typic Endoaquands-Aquandic Cryaquents complex, 0 to 8 percent slopes	Duric Vitraquands	60	Yes	outwash plains	2B3	Yes	No	No
	Typic Endoaquands	20	Yes	stream terraces	2B3, 4	Yes	Yes	No
	Aquandic Cryaquents	15	Yes	along channels in meadows in glacial lakes (relict)	2B3, 4	Yes	Yes	No
	Vitrandic Cryofluvents	3	Yes	meadows in glacial lakes (relict)	2B3, 3	Yes	No	Yes
	Typic Endoaquents	1	Yes	flood plains	2B3, 4	Yes	Yes	No
140: Vitrixerands gravelly ashy loamy coarse sand, 1 to 15 percent slopes	Duric Vitraquands	10	Yes	outwash plains	2B3	Yes	No	No
142: Cragwash ashy loamy coarse sand, 1 to 30 percent slopes	Aquepts	3	Yes	kettles	2B3	Yes	No	No

Table 7.—Hydric Soils—Continued

Map symbol and map unit name	Component	Percent of map unit	Hydric	Landform	Hydric soils criteria			
					Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
143: Andic Durixercepts gravelly ashy loamy coarse sand, 3 to 20 percent slopes	Aquepts	2	Yes	drainageways	2B3	Yes	No	No
144: Xeric Vitricryands, cirque floor-Humic Xeric Vitricryands complex, 1 to 35 percent slopes	Aquepts	3	Yes	drainageways	2B3	Yes	No	No
145: Sueredo bouldery ashy loamy coarse sand, 2 to 30 percent slopes	Aquepts	2	Yes	kettles	2B3	Yes	No	No
148: Humic Haploxerands, lake terrace-Typic Endoaquands complex, 1 to 30 percent slopes	Typic Endoaquands	15	Yes	lake terraces	2B3, 4	Yes	Yes	No
	Histic Humaquepts, lake sediments	2	Yes	meadows in glacial lakes (relict)	2B3, 3	Yes	No	Yes
	Histic Humaquepts, frequently flooded	1	Yes	along channels in glacial lakes (relict)	2B3, 4	Yes	Yes	No
150: Shadowlake- Terracelake-Acroph- Rock outcrop complex, 15 to 80 percent slopes	Aquepts	2	Yes	seeps on glacial- valley walls	2B3	Yes	No	No
151: Terracelake-Acroph- Rock outcrop- Shadowlake complex, 15 to 80 percent slopes	Aquepts	2	Yes	seeps on glacial- valley walls	2B3	Yes	No	No

Table 7.—Hydric Soils—Continued

Map symbol and map unit name	Component	Percent of map unit	Hydric	Landform	Hydric soils criteria			
					Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
152: Terracelake-Shadowlake-Acroph-Rock outcrop complex, 5 to 35 percent slopes	Aquepts	2	Yes	seeps on glacial-valley floors	2B3	Yes	No	No
154: Typic Vitrixerands-Vitrantic Xerorthents, moraine, complex, 15 to 60 percent slopes	Aquepts	3	Yes	seeps on moraines	2B3	Yes	No	No
	Typic Endoaquents	2	Yes	flood plains	2B3, 4	Yes	Yes	No
155: Xeric Vitricryands, pyroclastic surge, 8 to 35 percent slopes	Aquepts	2	Yes	seeps on moraines	2B3	Yes	No	No
156: Xeric Vitricryands, pyroclastic surge, 20 to 50 percent slopes	Aquepts	5	Yes	seeps on moraines	2B3	Yes	No	No
160: Aeric Endoaquents-Humic Haploxerands, stream terraces-Riverwash complex, 2 to 30 percent slopes	Riverwash	15	Yes	flood plains	4	No	Yes	No
	Aquandic Humaquepts, flood plains	5	Yes	flood plains	4	No	Yes	No
161: Typic Psammaquents ashy fine sand, 0 to 3 percent slopes	Typic Psammaquents	95	Yes	flood plains	2B2	Yes	No	No
	Riverwash	5	Yes	flood plains	4	No	Yes	No

Table 7.—Hydric Soils—Continued

Map symbol and map unit name	Component	Percent of map unit	Hydric	Landform	Hydric soils criteria			
					Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
163: Vitrandic Cryofluvents-Aquandic Cryaquents complex, 0 to 8 percent slopes	Vitrandic Cryofluvents	65	Yes	meadows in glacial lakes (relict)	2B3, 3	Yes	No	Yes
	Aquandic Cryaquents	30	Yes	along channels in meadows in glacial lakes (relict)	2B3, 4	Yes	Yes	No
	Typic Endoaquands	2	Yes	lake terraces	2B3, 4	Yes	Yes	No
	Aquepts	1	Yes	lake terraces	2B3	Yes	No	No
	Duric Vitraquands	1	Yes	outwash plains	2B3	Yes	No	No
	Typic Endoaquents	1	Yes	flood plains	2B3, 4	Yes	Yes	No
164: Aquepts-Typic Petraquepts, bedrock-Aquic Haploxerands-Typic Petraquepts complex, 4 to 30 percent slopes	Aquepts	35	Yes	seeps on glacial-valley floors	2B3	Yes	No	No
	Typic Petraquepts, bedrock	25	Yes	seeps on glacial-valley floors	2B3	Yes	No	No
	Typic Petraquepts	10	Yes	seeps on strath terraces	2B3	Yes	No	No
	Aquic Dystroxepts, debris flows	3	Yes	debris flows	2B3	Yes	No	No
	Aquandic Humaquepts, flood plains	1	Yes	flood plains	4	No	Yes	No

Table 7.—Hydric Soils—Continued

Map symbol and map unit name	Component	Percent of map unit	Hydric	Landform	Hydric soils criteria			
					Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
165: Aquandic Humaquepts-Histic Humaquepts-Aquandic Endoaquepts-Terric Haplohemists complex, 1 to 5 percent slopes	Aquandic Humaquepts	35	Yes	meadows on stream terraces	2B3, 3	Yes	No	Yes
	Histic Humaquepts	25	Yes	meadows on stream terraces	2B3	Yes	No	No
	Aquandic Endoaquepts	20	Yes	meadows on bars on stream terraces	2B3	Yes	No	No
	Terric Haplohemists	15	Yes	fens on stream terraces	1, 2B3, 3	Yes	No	Yes
166: Aquic Haploxerands-Humic Haploxerands, outwash terrace, complex, 2 to 30 percent slopes	Aquepts	2	Yes	seeps on glacial-valley floors	2B3	Yes	No	No
	Aquandic Humaquepts, flood plains	1	Yes	flood plains	4	No	Yes	No
171: Aquepts-Typic Petraquepts, bedrock complex, 2 to 45 percent slopes	Aquepts	50	Yes	seeps on glacial-valley walls	2B3	Yes	No	No
	Typic Petraquepts, bedrock	35	Yes	seeps on glacial-valley walls	2B3	Yes	No	No
	Endoaquepts	5	Yes	seeps on mountain slopes	2B3	Yes	No	No
	Typic Endoaquands	5	Yes	stream terraces	2B3, 4	Yes	Yes	No
172: Badgerflat very gravelly ashy sandy loam, 1 to 30 percent slopes	Typic Endoaquands	1	Yes	lake terraces	2B3, 4	Yes	Yes	No

Table 7.—Hydric Soils—Continued

Map symbol and map unit name	Component	Percent of map unit	Hydric	Landform	Hydric soils criteria			
					Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
173: Badgerwash very bouldery medial loamy coarse sand, 1 to 10 percent slopes	Typic Endoaquands	8	Yes	lake terraces	2B3, 4	Yes	Yes	No
175: Shadowlake-Vitrandic Cryofluvents complex, 2 to 30 percent slopes	Vitrandic Cryofluvents	15	Yes	meadows in glacial lakes (relict)	2B3, 3	Yes	No	Yes
	Aquandic Cryaquents	3	Yes	along channels in meadows in glacial lakes (relict)	2B3, 4	Yes	Yes	No
	Aquepts	2	Yes	glacial-valley floors	2B3	Yes	No	No
176: Juniperlake, bouldery, 10 to 35 percent slopes	Aquepts	1	Yes	seeps on glacial-valley walls	2B3	Yes	No	No
	Endoaquepts	1	Yes	seeps on glacial-valley walls	2B3	Yes	No	No

Explanation of hydric criteria codes:

1. All Histels except for Folistels, and Histosols except for Folist.
2. Soils in Aquic suborders, great groups, or subgroups, Albolls suborder, Historthels great group, Histoturbels great group, Pachic subgroups, or Cumulic subgroups that:
 - A. are somewhat poorly drained and have a water table at the surface (0.0 feet) during the growing season, or
 - B. are poorly drained or very poorly drained and have either:
 - 1.) a water table at the surface (0.0 feet) during the growing season if textures are coarse sand, sand, or fine sand in all layers within a depth of 20 inches, or
 - 2.) a water table at a depth of 0.5 foot or less during the growing season if permeability is equal to or greater than 6.0 in/hr in all layers within a depth of 20 inches, or
 - 3.) a water table at a depth of 1.0 foot or less during the growing season if permeability is less than 6.0 in/hr in any layer within a depth of 20 inches.
3. Soils that are frequently ponded for long or very long duration during the growing season.
4. Soils that are frequently flooded for long or very long duration during the growing season.

Table 8.--Landscape, Parent Material, and Ecosite ID

(Miscellaneous non-soil components are not displayed in this report. Component percents may not add up to 100 percent. MAP indicates mean annual precipitation)

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landscape	Landform	Parent material	Ecological site name and number
	Pct	Pct	Ft	In				
100: Buttelake-----	85	3-35	5853-6959	23-43	Mountains	Ground moraine on glacial-valley floor	Tephra over till derived from volcanic rock	Pinus jeffreyi-Abies concolor/Achnatherum occidentale ssp. occidentale-Elymus elymoides, F022BI100CA
						Ground moraine on lava plateau		
Sunhoff-----	5	3-35	5853-6959	23-43	Mountains	Ground moraine on glacial-valley wall	Tephra over till derived from volcanic rock	Abies magnifica-Abies concolor/Chrysolepis sempervirens, F022BI107CA
Buttewash-----	3	3-35	5853-6959	23-43	Mountains	Outwash plain	Tephra over outwash derived from volcanic rock	Pinus jeffreyi-Abies concolor/Achnatherum occidentale ssp. occidentale-Elymus elymoides, F022BI100CA
Badgerflat-----	2	3-35	5853-6959	23-43	Mountains	Ground moraine	Tephra over till derived from volcanic rock	Pinus jeffreyi-Pinus contorta var. murrayana/Monardella odoratissima, F022BI126CA
Typic Xerorthents--	2	3-35	5853-6959	23-43	Mountains	Tephra-covered moraine	Tephra over till derived from volcanic rock	Pinus jeffreyi-Abies concolor/Achnatherum occidentale ssp. occidentale-Elymus elymoides, F022BI100CA
Talved-----	1	3-35	5853-6959	23-43	Mountains	Scoured glacial-valley wall	Tephra over colluvium derived from volcanic rock	Talus slope, R022BI200CA
101: Buttewash-----	85	0-15	5850-6526	23-43	Mountains	Outwash plain	Tephra over outwash derived from volcanic rock	Pinus jeffreyi-Abies concolor/Achnatherum occidentale ssp. occidentale-Elymus elymoides, F022BI100CA

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Table 8.—Landscape, Parent Material, and Ecosite ID—Continued

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landscape	Landform	Parent material	Ecological site name and number
	Pct	Pct	Ft	In				
101: Badgerwash-----	8	0-15	5850-6526	23-43	Mountains	Outwash plain	Mixed tephra and outwash over outwash derived from volcanic rock	Pinus contorta var. murrayana/Elymus elymoides, F022BI125CA
Buttelake-----	5	3-15	5850-6526	23-43	Mountains	Ground moraine on glacial- valley floor	Tephra over till derived from volcanic rock	Pinus jeffreyi-Abies concolor/Achnatherum occidentale ssp. occidentale-Elymus elymoides, F022BI100CA
Humic Haploxerands, moist lake terrace	2	0-1	5850-6526	23-43	Mountains	Lake terrace	Tephra over glaciolacustrine deposits derived from volcanic rock	Pinus contorta var. murrayana/Elymus elymoides, F022BI125CA
102: Ashbutte-----	65	15-60	6240-8199	27-57	Mountains	Cinder cone	Tephra from cinder cones	Abies magnifica-Pinus jeffreyi/Arctostaphylos nevadensis-Achnatherum occidentale, F022BI109CA
Vitrandic Xerorthents	25	15-60	6240-8199	27-57	Mountains	Cinder cone	Ash over colluvium over residuum weathered from volcanic rock	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis-Chrysolepis sempervirens/Angelica breweri, F022BI114CA
Prospectpeak-----	6	15-60	6240-8199	27-57	Mountains	Summits on cinder cone	Tephra over residuum weathered from andesite	Abies magnifica-Pinus jeffreyi/Arctostaphylos nevadensis-Achnatherum occidentale, F022BI109CA
103: Scoured-----	75	2-30	6335-8067	33-53	Mountains	Glacial headland	Tephra over colluvium and/or residuum weathered from volcanic rock	Abies magnifica/Arctostaphylos nevadensis/Carex rossii- Penstemon gracilentus, F022BI102CA
Juniperlake-----	10	2-30	6335-8067	33-53	Mountains	Ground moraine on glacial headland	Tephra and till derived from volcanic rock	Abies magnifica/Penstemon gracilentus-Lupinus arbustus, F022BI112CA

Table 8.—Landscape, Parent Material, and Ecosite ID—Continued

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landscape	Landform	Parent material	Ecological site name and number
	Pct	Pct	Ft	In				
103: Sunhoff-----	3	2-30	6335-8067	33-53	Mountains	Ground moraine on glacial headland	Tephra over till derived from volcanic rock	Abies magnifica-Abies concolor/Chrysolepis sempervirens, F022BI107CA
Typic Endoaquands--	2	2-8	6335-8067	33-53	Mountains	Lake terrace	Alluvium derived from volcanic rock	Pinus contorta var. murrayana/Veratrum californicum var. californicum-Elymus glaucus, F022BI108CA
104: Scoured-----	55	3-40	5495-8192	43-109	Mountains	Glacially scoured ridge	Tephra over colluvium and/or residuum weathered from volcanic rock	Abies magnifica/Arctostaphylos nevadensis/Carex rossii-Penstemon gracilentus, F022BI102CA
Juniperlake-----	20	3-40	5495-8192	43-109	Mountains	Ground moraine	Tephra and till derived from volcanic rock	Abies magnifica/Penstemon gracilentus-Lupinus arbustus, F022BI112CA
Dittmar-----	5	3-40	5495-8192	43-109	Mountains	Glacially scoured ridge	Tephra and residuum weathered from volcanic rock	Pinus jeffreyi/Arctostaphylos patula, F022BI121CA
Typic Endoaquands--	2	2-8	5495-8192	43-109	Mountains	Lake terrace	Alluvium derived from volcanic rock	Pinus contorta var. murrayana/Veratrum californicum var. californicum-Elymus glaucus, F022BI108CA
105: Juniperlake-----	85	2-35	6004-7782	39-109	Mountains	Ground moraine	Tephra and till derived from volcanic rock	Abies magnifica/Penstemon gracilentus-Lupinus arbustus, F022BI112CA
Scoured-----	5	2-35	6004-7782	39-109	Mountains	Glacially scoured ridge	Tephra over colluvium and/or residuum weathered from volcanic rock	Abies magnifica/Arctostaphylos nevadensis/Carex rossii-Penstemon gracilentus, F022BI102CA

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Table 8.--Landscape, Parent Material, and Ecosite ID--Continued

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landscape	Landform	Parent material	Ecological site name and number
	Pct	Pct	Ft	In				
105: Humic Haploxerands, lake terrace	4	2-8	6004-7782	39-109	Mountains	Lake terrace	Lacustrine deposits derived from volcanic rock	Abies magnifica/Penstemon gracilentus-Lupinus arbusus, F022BI112CA
Typic Endoaquands--	2	2-8	6004-7782	39-109	Mountains	Lake terrace	Alluvium derived from volcanic rock	Pinus contorta var. murrayana/Veratrum californicum var. californicum-Elymus glaucus, F022BI108CA
Histic Humaquepts, lake sediments	1	0-8	6004-7782	39-109	Mountains	Meadows in glacial lake (relict)	Ash over glaciolacustrine deposits derived from volcanic rock	Frigid lacustrine flat, R022BI217CA
106: Cenplat-----	70	0-15	6204-7372	35-59	Mountains	Glacially scoured lava plateau	Tephra over residuum weathered from volcanic rock	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale, F022BI115CA
Badgerflat-----	7	0-15	6204-7372	35-59	Mountains	Ground moraine on lava plateau	Tephra over till derived from volcanic rock	Abies magnifica-Abies concolor/Chrysolepis sempervirens, F022BI107CA
Sunhoff-----	5	0-15	6204-7372	35-59	Mountains	Ground moraine on lava plateau	Tephra over till derived from volcanic rock	Abies magnifica-Abies concolor/Chrysolepis sempervirens, F022BI107CA
Cascadesprings----	5	0-15	6204-7372	35-59	Mountains	Ground moraine on lava plateau	Tephra over till derived from volcanic rock	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale, F022BI115CA
Buttelake-----	2	0-15	6204-7372	35-59	Mountains	Ground moraine on lava plateau	Tephra over till derived from volcanic rock	Abies magnifica-Abies concolor/Chrysolepis sempervirens, F022BI107CA
Buttewash-----	1	0-15	6204-7372	35-59	Mountains	Outwash plain on lava plateau	Tephra over outwash derived from volcanic rock	Abies magnifica-Abies concolor/Chrysolepis sempervirens, F022BI107CA

Table 8.—Landscape, Parent Material, and Ecosite ID—Continued

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landscape	Landform	Parent material	Ecological site name and number
	Pct	Pct	Ft	In				
106: Badgerwash-----	1	0-15	6204-7372	35-59	Mountains	Outwash plain on lava plateau	Mixed tephra and outwash over outwash derived from volcanic rock	Abies magnifica-Abies concolor/Chrysolepis sempervirens, F022BI107CA
107: Badgerflat-----	40	10-60	6079-7333	35-65	Mountains	Ground moraine on side slopes on lava plateau	Tephra over till derived from volcanic rock	Abies magnifica-Abies concolor/Chrysolepis sempervirens, F022BI107CA
Cenplat-----	35	10-60	6079-7333	35-65	Mountains	Side slopes on glacially scoured lava plateau	Tephra over residuum weathered from volcanic rock	Abies magnifica-Abies concolor/Chrysolepis sempervirens, F022BI107CA
Scoured-----	3	10-60	6079-7333	35-65	Mountains	Side slopes on glacially scoured lava plateau	Tephra over colluvium and/or residuum weathered from volcanic rock	Abies magnifica/Arctostaphylos nevadensis/Carex rossii- Penstemon gracilentus, F022BI102CA
Buttelake-----	3	10-60	6079-7333	35-65	Mountains	Ground moraine on side slopes on lava plateau	Tephra over till derived from volcanic rock	Abies concolor-Pinus jeffreyi/Elymus elymoides, F022BI119CA
Juniperlake-----	3	10-60	6079-7333	35-65	Mountains	Ground moraine on side slopes on lava plateau	Tephra and till derived from volcanic rock	Abies magnifica/Penstemon gracilentus-Lupinus arbustus, F022BI112CA
Dittmar-----	3	10-60	6079-7333	35-65	Mountains	Side slopes on glacially scoured lava plateau	Tephra and residuum weathered from volcanic rock	Pinus jeffreyi/Arctostaphylos patula, F022BI121CA
Sunhoff-----	2	10-60	6079-7333	35-65	Mountains	Ground moraine on side slopes on lava plateau	Tephra over till derived from volcanic rock	Abies magnifica-Abies concolor/Chrysolepis sempervirens, F022BI107CA

Table 8.—Landscape, Parent Material, and Ecosite ID—Continued

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landscape	Landform	Parent material	Ecological site name and number
	Pct	Pct	Ft	In				
108: Typic Xerorthents--	80	1-20	6043-6345	27-37	Mountains	Tephra-covered lake terrace Tephra-covered moraine Tephra-covered outwash plain	Tephra over till and/or outwash and/or glaciolacustrine deposits derived from volcanic rock	Pinus jeffreyi-Abies concolor/Achnatherum occidentale ssp. occidentale-Elymus elymoides, F022BI100CA
Buttewash-----	10	1-10	6043-6345	27-37	Mountains	Outwash plain	Tephra over outwash derived from volcanic rock	Pinus jeffreyi-Abies concolor/Achnatherum occidentale ssp. occidentale-Elymus elymoides, F022BI100CA
Typic Xerorthents, tephra	5	1-20	6043-6345	27-37	Mountains	Tephra-covered lake terrace Tephra-covered moraine Tephra-covered outwash plain	Cinder cone tephra	Pinus jeffreyi-Abies concolor/Achnatherum occidentale ssp. occidentale-Elymus elymoides, F022BI100CA
Humic Haploxerands, moist lake terrace	3	1-3	6043-6345	27-37	Mountains	Lake terrace	Tephra over glaciolacustrine deposits derived from volcanic rock	Pinus contorta var. murrayana/Elymus elymoides, F022BI125CA
Buttelake-----	2	1-20	6043-6345	27-37	Mountains	Ground moraine on glacial- valley floor	Tephra over till derived from volcanic rock	Pinus jeffreyi-Abies concolor/Achnatherum occidentale ssp. occidentale-Elymus elymoides, F022BI100CA
109: Prospectpeak-----	85	10-30	6447-7992	31-43	Mountains	Unglaciated shield volcano	Tephra over residuum weathered from andesite	Abies magnifica-Pinus jeffreyi/Arctostaphylos nevadensis-Achnatherum occidentale, F022BI109CA

Table 8.—Landscape, Parent Material, and Ecosite ID—Continued

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landscape	Landform	Parent material	Ecological site name and number
	Pct	Pct	Ft	In				
109: Bearrubble-----	10	10-30	6447-7992	31-43	Mountains	Unglaci- ated shield volcano	Tephra over residuum weathered from basalt and/or basaltic andesite	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis-Chrysolepis sempervirens/Angelica breweri, F022BI114CA
110: Bearrubble-----	50	8-40	6043-8054	33-83	Mountains	Shield volcano	Tephra over residuum weathered from basalt and/or basaltic andesite	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis-Chrysolepis sempervirens/Angelica breweri, F022BI114CA
Scoured-----	3	5-40	6043-8054	33-83	Mountains	Glacially scoured shield volcano	Tephra over colluvium and/or residuum weathered from volcanic rock	Abies magnifica/Arctostaphylos nevadensis/Carex rossii- Penstemon gracilentus, F022BI102CA
Prospectpeak-----	2	5-40	6043-8054	33-83	Mountains	Shield volcano	Tephra over residuum weathered from andesite	Abies magnifica-Pinus jeffreyi/Arctostaphylos nevadensis-Achnatherum occidentale, F022BI109CA
111: Vitrandic Xerorthents, debris fan	95	2-30	5879-7208	45-95	Mountains	Debris flow	Debris flow deposits derived from volcanic rock	Pinus jeffreyi- Abies/Achnatherum- Lupinus, F022BI106CA
Typic Endoaquents--	5	2-30	5879-7208	45-95	Mountains	Flood plain	Alluvium derived from volcanic rock	Sandy flood plains, R022BI213CA
112: Cascadesprings-----	85	5-30	6503-7605	59-83	Mountains	Ground moraine	Tephra over till derived from volcanic rock	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale, F022BI115CA
Terracelake-----	13	5-30	6503-7605	59-83	Mountains	Glaci- ated volcanic dome	Tephra over colluvium and residuum weathered from volcanic rock	Glaci-ated mountain slopes, R022BI204CA

Table 8.—Landscape, Parent Material, and Ecosite ID—Continued

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landscape	Landform	Parent material	Ecological site name and number
	Pct	Pct	Ft	In				
112: Emeraldlake-----	2	5-30	6503-7605	59-83	Mountains	Glaciated volcanic dome	Tephra mixed with colluvium derived from volcanic rock	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale, F022BI115CA
113: Terracelake-----	35	15-65	7129-8323	69-105	Mountains	Glaciated volcanic dome	Tephra over colluvium and residuum weathered from volcanic rock	Glaciated mountain slopes, R022BI204CA
Emeraldlake-----	25	15-65	7129-8323	69-105	Mountains	Cirque wall on volcanic dome	Tephra mixed with colluvium derived from volcanic rock	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale, F022BI115CA
Readingpeak-----	20	15-65	7129-8323	69-105	Mountains	Glaciated volcanic dome	Tephra over colluvium and residuum weathered from volcanic rock	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale, F022BI115CA
Acroph-----	3	15-65	7129-8323	69-105	Mountains	Glaciated volcanic dome	Tephra over residuum	Glaciated mountain slopes, R022BI204CA
Cascadesprings-----	2	15-65	7129-8323	69-105	Mountains	Ground moraine	Tephra over till derived from volcanic rock	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale, F022BI115CA
114: Emeraldlake-----	25	20-95	6726-9229	73-119	Mountains	Cirque wall on mountain slope	Tephra mixed with colluvium derived from volcanic rock	Alpine slopes, R022BI207CA
						Cirque wall on volcanic dome		
Terracelake-----	23	20-95	6726-9229	73-119	Mountains	Glaciated mountain slope	Tephra over colluvium and residuum weathered from volcanic rock	Alpine slopes, R022BI207CA
						Glaciated volcanic dome		

Table 8.—Landscape, Parent Material, and Ecosite ID—Continued

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landscape	Landform	Parent material	Ecological site name and number
	Pct	Pct	Ft	In				
114: Readingpeak-----	20	20-95	6726-9229	73-119	Mountains	Glaciated mountain slope	Tephra over colluvium and residuum weathered from volcanic rock	Tsuga mertensiana-Pinus albicaulis/Holodiscus discolor/Lupinus obtusilobus-Polygonum davisiae, F022BI124CA
Acroph-----	3	20-95	6726-9229	73-119	Mountains	Glaciated volcanic dome	Tephra over residuum	Alpine slopes, R022BI207CA
Xeric Vitricryands, cirque floor	2	20-30	6726-9229	73-119	Mountains	Glaciated mountain slope Glaciated volcanic dome	Subglacial till derived from volcanic rock	Cirque floor, R022BI205CA
115: Shadowlake-----	85	2-30	6945-7618	67-111	Mountains	Ground moraine on cirque floor	Tephra over or mixed with till derived from volcanic rock	Tsuga mertensiana-Abies magnifica/Lupinus obtusilobus-Eriogonum marifolium, F022BI111CA
Terracelake-----	10	2-30	6945-7618	67-111	Mountains	Glacially scoured ridge	Tephra over colluvium and residuum weathered from volcanic rock	Tsuga mertensiana-Abies magnifica/Lupinus obtusilobus-Eriogonum marifolium, F022BI111CA
Xeric Vitricryands, cirque floor-----	5	2-30	6945-7618	67-111	Mountains	Ground moraine on cirque floor	Subglacial till derived from volcanic rock	Cirque floor, R022BI205CA
116: Xeric Vitricryands, tephra over till	30	5-35	7037-8924	81-113	Mountains	Moraine on lava flow	Tephra over till derived from volcanic rock	Tsuga mertensiana/Lupinus obtusilobus-Cistanthe umbellata var. umbellata, F022BI104CA
Terracelake-----	25	5-35	7037-8924	81-113	Mountains	Glaciated lava flow	Tephra over colluvium and residuum weathered from volcanic rock	Tsuga mertensiana/Lupinus obtusilobus-Cistanthe umbellata var. umbellata, F022BI104CA

Table 8.—Landscape, Parent Material, and Ecosite ID—Continued

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landscape	Landform	Parent material	Ecological site name and number
	<u>Pct</u>	<u>Pct</u>	<u>Ft</u>	<u>In</u>				
116: Xeric Vitricryands, cirque floor	15	5-35	7037-8924	81-113	Mountains	Ground moraine on cirque floor on lava flow	Subglacial till derived from volcanic rock	Cirque floor, R022BI205CA
Humic Xeric Vitricryands	10	5-35	7037-8924	81-113	Mountains	Ground moraine on lava flow	Tephra over till derived from volcanic rock	Tsuga mertensiana/Lupinus obtusilobus-Cistanthe umbellata var. umbellata, F022BI104CA
Acroph-----	5	5-35	7037-8924	81-113	Mountains	Glaciated lava flow	Tephra over residuum	Alpine slopes, R022BI207CA
117: Humic Haploxerands, moist lake terrace	90	0-15	5853-6358	23-43	Mountains	Lake terrace	Tephra over glaciolacustrine deposits derived from volcanic rock	Pinus contorta var. murrayana/Elymus elymoides, F022BI125CA
Typic Endoaquands--	5	0-15	5853-6358	23-43	Mountains	Lake terrace	Alluvium derived from volcanic rock	Pinus contorta var. murrayana/Veratrum californicum var. californicum-Elymus glaucus, F022BI108CA
Buttewash-----	3	0-15	5853-6358	23-43	Mountains	Outwash plain	Tephra over outwash derived from volcanic rock	Pinus jeffreyi-Abies concolor/Achnatherum occidentale ssp. occidentale-Elymus elymoides, F022BI100CA
Badgerwash-----	2	0-15	5853-6358	23-43	Mountains	Outwash plain	Mixed tephra and outwash over outwash derived from volcanic rock	Pinus contorta var. murrayana/Elymus elymoides, F022BI125CA
118: Typic Dystrocherepts, landslides	90	10-50	5827-8104	99-113	Mountains	Landslide	Colluvium derived from hydrothermally altered volcanic rock	Abies magnifica/Carex- Hieracium albiflorum, F022BI118CA

Table 8.—Landscape, Parent Material, and Ecosite ID—Continued

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landscape	Landform	Parent material	Ecological site name and number
	Pct	Pct	Ft	In				
118: Endoaquepts-----	5	10-50	5827-8104	99-113	Mountains	Seeps on landslide	Slope alluvium over colluvium from hydrothermally altered volcanic rock	Loamy seeps, R022BI209CA
Brokeoff-----	5	10-50	5827-8104	99-113	Mountains	Mountain slope	Tephra and colluvium over residuum weathered from hydrothermally altered volcanic rock	Moderately deep fragmental slopes, R022BI203CA
119: Diamondpeak-----	30	10-80	5676-8566	63-119	Mountains	Mountain slope	Tephra over colluvium and/or residuum weathered from hydrothermally altered volcanic rock	Abies magnifica/Monardella odoratissima-Phlox diffusa, F022BI113CA
Brokeoff-----	25	10-80	5676-8566	63-119	Mountains	Mountain slope	Tephra and colluvium over residuum weathered from hydrothermally altered volcanic rock	Moderately deep fragmental slopes, R022BI203CA
Endoaquepts-----	14	10-80	5676-8566	63-119	Mountains	Seeps on mountain slope	Slope alluvium over colluvium over till derived from hydrothermally altered volcanic rock	Loamy seeps, R022BI209CA
Aquic Dystroxerepts, debris flows	11	10-80	5676-8566	63-119	Mountains	Debris flow	Debris flow deposits derived from hydrothermally altered volcanic rock	Active hydrothermal areas, R022BI216CA
Typic Dystroxerepts	10	10-80	5676-8566	63-119	Mountains	Actively eroding mountain slope	Colluvium and residuum derived from hydrothermally altered volcanic rock	Active hydrothermal areas, R022BI216CA

Table 8.—Landscape, Parent Material, and Ecosite ID—Continued

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landscape	Landform	Parent material	Ecological site name and number
	<u>Pct</u>	<u>Pct</u>	<u>Ft</u>	<u>In</u>				
120: Buttelake-----	65	20-65	5981-7605	25-45	Mountains	Ground moraine on glacial- valley wall	Tephra over till derived from volcanic rock	Abies concolor-Pinus jeffreyi/Elymus elymoides, F022BI119CA
Sunhoff-----	15	20-65	5981-7605	25-45	Mountains	Ground moraine on glacial- valley wall	Tephra over till derived from volcanic rock	Abies magnifica-Abies concolor/Chrysolepis sempervirens, F022BI107CA
Talved-----	10	20-65	5981-7605	25-45	Mountains	Scoured glacial-valley wall	Tephra over colluvium derived from volcanic rock	Talus slope, R022BI200CA
Scoured-----	5	20-65	5981-7605	25-45	Mountains	Scoured glacial-valley wall	Tephra over colluvium and/or residuum weathered from volcanic rock	Abies magnifica/Arctostaphylos nevadensis/Carex rossii- Penstemon gracilentus, F022BI102CA
122: Xeric Vitricryands, colluvium	35	10-80	6962-8330	37-81	Mountains	Cinder cone Nunatak	Colluvium derived from volcanic rock	Tsuga mertensiana/Lupinus obtusilobus-Cistanthe umbellata var. umbellata, F022BI104CA
Xeric Vitricryands, ash over cinders	30	10-80	6962-8330	37-81	Mountains	Cinder cone Nunatak	Volcanic ash over colluvium derived from volcanic rock	Tsuga mertensiana-Abies magnifica/Lupinus obtusilobus-Eriogonum marifolium, F022BI111CA
Xeric Vitricryands, bedrock	20	10-80	6962-8330	37-81	Mountains	Cinder cone Nunatak	Tephra over residuum weathered from volcanic rock	Cryic pyroclastic cones, R022BI208CA
125: Humic Haploxerands, stream terrace	55	2-15	5236-6463	45-87	Mountains	Stream terrace	Ash-influenced alluvium derived from volcanic rock	Abies concolor-Pinus contorta var. murrayana/Elymus glaucus, F022BI120CA

Table 8.—Landscape, Parent Material, and Ecosite ID—Continued

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landscape	Landform	Parent material	Ecological site name and number
	Pct	Pct	Ft	In				
125: Aquandic Humaquepts, flood plains	40	0-3	5236-6463	45-87	Mountains	Flood plain	Alluvium derived from volcanic rock	Loamy flood plains, R022BI210CA
Aeric Endoaquents--	3	0-3	5236-6463	45-87	Mountains	Flood plain	Recent alluvium derived from volcanic rock	Loamy flood plains, R022BI210CA
126: Kingsiron-----	45	20-80	5292-7408	43-91	Mountains	Glacial-valley wall	Ash mixed with colluvium derived from volcanic rock	Abies concolor-Calocedrus decurrens/Ceanothus cordulatus/Achnatherum, F022BI110CA
Dittmar-----	20	20-80	5292-7408	43-91	Mountains	Scoured glacial-valley wall	Tephra and residuum weathered from volcanic rock	Pinus jeffreyi/Arctostaphylos patula, F022BI121CA
Scoured-----	10	20-80	5292-7408	43-91	Mountains	Scoured glacial-valley wall	Tephra over colluvium and/or residuum weathered from volcanic rock	Abies magnifica/Arctostaphylos nevadensis/Carex rossii- Penstemon gracilentus, F022BI102CA
Bearrubble-----	3	20-80	5292-7408	43-91	Mountains	Shield volcano	Tephra over residuum weathered from basalt and/or basaltic andesite	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis-Chrysolepis sempervirens/Angelica breweri, F022BI114CA
Aquepts-----	2	20-80	5292-7408	43-91	Mountains	Seeps on glacial-valley wall	Slope alluvium derived from volcanic rock over colluvium derived from volcanic rock	Spring complex, R022BI211CA
127: Humic Haploxerands, strath terrace	65	5-50	5285-6129	51-79	Mountains	Strath terrace	Alluvium derived from andesite over residuum weathered from andesite	Abies concolor-Calocedrus decurrens/Ceanothus cordulatus/Achnatherum, F022BI110CA
Aquepts-----	15	5-50	5285-6129	51-79	Mountains	Seeps on glacial-valley floor	Alluvium derived from volcanic rock	Spring complex, R022BI211CA

Table 8.--Landscape, Parent Material, and Ecosite ID--Continued

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landscape	Landform	Parent material	Ecological site name and number
	Pct	Pct	Ft	In				
127: Humic Haploxerands, colluvium	5	5-50	5285-6129	51-79	Mountains	Colluvial apron	Ash mixed with colluvium over colluvium derived from volcanic rock	Abies concolor-Calocedrus decurrens/Ceanothus cordulatus/Achnatherum, F022BI110CA
						Landslide		
Dittmar-----	5	5-50	5285-6129	51-79	Mountains	Strath terrace	Tephra and residuum weathered from volcanic rock	Pinus jeffreyi/Arctostaphylos patula, F022BI121CA
Aquandic Humaquepts, flood plains	4	5-15	5285-6129	51-79	Mountains	Flood plain	Alluvium derived from volcanic rock	Loamy flood plains, R022BI210CA
Endoaquepts-----	1	5-50	5285-6129	51-79	Mountains	Seeps on glacial-valley floor	Slope alluvium over colluvium derived from hydrothermally altered volcanic rock	Loamy seeps, R022BI209CA
129: Humic Haploxerands, colluvium	80	10-40	5256-5791	43-63	Mountains	Colluvial apron	Ash mixed with colluvium over colluvium derived from volcanic rock	Abies concolor-Calocedrus decurrens/Ceanothus cordulatus/Achnatherum, F022BI110CA
						Landslide		
Kingsiron-----	10	10-40	5256-5791	43-63	Mountains	Glacial-valley wall	Ash mixed with colluvium derived from volcanic rock	Abies concolor-Calocedrus decurrens/Ceanothus cordulatus/Achnatherum, F022BI110CA
Humic Haploxerands, strath terrace	2	10-40	5256-5791	43-63	Mountains	Strath terrace	Alluvium derived from andesite over residuum weathered from andesite	Abies concolor-Calocedrus decurrens/Ceanothus cordulatus/Achnatherum, F022BI110CA
Aquepts-----	2	10-40	5256-5791	43-63	Mountains	Seeps on colluvial apron	Slope alluvium derived from volcanic rock over colluvium derived from volcanic rock	Spring complex, R022BI211CA

Table 8.—Landscape, Parent Material, and Ecosite ID—Continued

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landscape	Landform	Parent material	Ecological site name and number
	Pct	Pct	Ft	In				
130: Histic Humaquepts, lake sediments	55	0-3	5958-6758	37-65	Mountains	Meadows in glacial lake (relict)	Ash over glaciolacustrine deposits derived from volcanic rock	Frigid lacustrine flat, R022BI217CA
Histic Humaquepts, frequently flooded	30	0-3	5958-6758	37-65	Mountains	Along channels in meadows in glacial lake (relict)	Stream alluvium over glaciolacustrine deposits derived from volcanic rock	Frigid lacustrine flat, R022BI217CA
Typic Endoaquands--	15	0-15	5958-6758	37-65	Mountains	Lake terrace	Alluvium derived from volcanic rock	Pinus contorta var. murrayana/Veratrum californicum var. californicum-Elymus glaucus, F022BI108CA
132: Vitrandic Cryorthents, debris flows	90	10-80	6286-8704	73-115	Mountains	Moraine	Debris flow deposits and/or pyroclastic flow over till derived from volcanic rock	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale, F022BI115CA
Xeric Vitricryands, pyroclastic surge	3	10-80	6286-8704	73-115	Mountains	Lateral moraine	Pyroclastic surge over till derived from volcanic rock	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale, F022BI115CA
Typic Endoaquents--	2	2-30	6286-8704	73-115	Mountains	Flood plain	Alluvium derived from volcanic rock	Sandy flood plains, R022BI213CA
Vitrandic Xerorthents, moraine	2	10-80	6286-8704	73-115	Mountains	Moraine	Debris flow deposits and/or pyroclastic flow and/or rockfall avalanche deposits over till derived from volcanic rock	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens, F022BI103CA
Typic Vitriixerands-	1	10-80	6286-8704	73-115	Mountains	Moraine	Avalanche and debris flow deposits over till derived from volcanic rock	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens, F022BI103CA

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Table 8.—Landscape, Parent Material, and Ecosite ID—Continued

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landscape	Landform	Parent material	Ecological site name and number
	Pct	Pct	Ft	In				
133: Vitrandic Xerofluvents	55	0-15	6037-6329	51-75	Mountains	Debris flow	Debris flow deposits derived from volcanic rock over tephra derived from volcanic rock	Pinus jeffreyi- Abies/Achnatherum- Lupinus, F022BI106CA
Typic Endoaquents--	30	0-8	6037-6329	51-75	Mountains	Flood plain	Alluvium derived from volcanic rock	Sandy flood plains, R022BI213CA
Vitrandic Xerorthents, debris fan	5	0-15	6037-6329	51-75	Mountains	Debris flow	Debris flow deposits derived from volcanic rock	Pinus jeffreyi- Abies/Achnatherum- Lupinus, F022BI106CA
Vitrandic Xerofluvents, debris flows	5	0-15	6037-6329	51-75	Mountains	Low stream terrace	Debris flow deposits over alluvium derived from volcanic rock	Pinus contorta var. murrayana-Populus tremuloides/Elymus glaucus, F022BI105CA
Vitrandic Xerofluvents	5	15-50	6037-6329	51-75	Mountains	Risers on debris flow	Debris flow deposits derived from volcanic rock over tephra derived from volcanic rock	Pinus jeffreyi- Abies/Achnatherum- Lupinus, F022BI106CA
134: Chaos-----	85	2-30	5758-7201	39-93	Mountains	Rockfall avalanche	Rockfall avalanche deposits derived from volcanic rock	Pinus jeffreyi-Abies concolor/Holodiscus discolor, F022BI122CA
Aquepts-----	3	1-5	5758-7201	39-93	Mountains	Rockfall avalanche	Alluvium derived from volcanic rock	Pinus contorta var. murrayana/Veratrum californicum var. californicum-Elymus glaucus, F022BI108CA
136: Terracelake-----	45	1-30	6975-7684	81-109	Mountains	Glaciated lava plateau	Tephra over colluvium and residuum weathered from volcanic rock	Tsuga mertensiana-Abies magnifica/Lupinus obtusilobus-Eriogonum marifolium, F022BI111CA
Xeric Vitricryands, cirque floor	15	1-30	6975-7684	81-109	Mountains	Ground moraine on cirque floor on lava plateau	Subglacial till derived from volcanic rock	Cirque floor, R022BI205CA

Table 8.—Landscape, Parent Material, and Ecosite ID—Continued

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landscape	Landform	Parent material	Ecological site name and number
	Pct	Pct	Ft	In				
136: Xeric Vitricryands, tephra over till	10	1-30	6975-7684	81-109	Mountains	Moraine on lava plateau	Tephra over till derived from volcanic rock	Tsuga mertensiana/Lupinus obtusilobus-Cistanthe umbellata var. umbellata, F022BI104CA
Acroph-----	10	1-30	6975-7684	81-109	Mountains	Glaciated lava plateau	Tephra over residuum	Alpine slopes, R022BI207CA
137: Xeric Vitricryands-	75	10-45	7743-8655	81-99	Mountains	Moraine on lava flow	Ash mixed with till derived from rhyodacite	Windy peak, R022BI212CA
Acroph-----	3	10-45	7743-8655	81-99	Mountains	Glaciated lava flow	Tephra over residuum	Glaciated mountain slopes, R022BI204CA
Terracelake-----	2	10-45	7743-8655	81-99	Mountains	Glaciated lava flow	Tephra over colluvium and residuum weathered from volcanic rock	Alpine slopes, R022BI207CA
138: Vitrandic Xerofluvents, debris flows	80	0-8	6122-6355	45-61	Mountains	Low stream terrace	Debris flow deposits over alluvium derived from volcanic rock	Pinus contorta var. murrayana-Populus tremuloides/Elymus glaucus, F022BI105CA
Typic Endoaquents--	10	0-8	6122-6355	45-61	Mountains	Flood plain	Alluvium derived from volcanic rock	Sandy flood plains, R022BI213CA
Vitriixerands, low elevation	9	0-8	6122-6355	45-61	Mountains	Outwash terrace	Tephra over outwash derived from volcanic rock	Abies concolor-Pinus contorta var. murrayana/Achnatherum occidentale, F022BI123CA
139: Duric Vitraquands--	60	0-8	6283-6706	57-63	Mountains	Outwash plain	Volcanic ash over glaciolacustrine deposits over outwash derived from volcanic rock	Abies magnifica-Pinus contorta var. murrayana/Elymus elymoides, F022BI117CA

Table 8.—Landscape, Parent Material, and Ecosite ID—Continued

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landscape	Landform	Parent material	Ecological site name and number
	Pct	Pct	Ft	In				
139: Typic Endoaquands--	20	0-8	6283-6706	57-63	Mountains	Stream terrace	Alluvium derived from volcanic rock	Pinus contorta var. murrayana/Veratrum californicum var. californicum-Elymus glaucus, F022BI108CA
Aquandic Cryaquents	15	0-8	6283-6706	57-63	Mountains	Along channels in meadows in glacial lake (relict)	Glaciolacustrine deposits derived from volcanic rock	Crylic lacustrine flat, R022BI206CA
Vitrandid Cryofluvents	3	0-8	6283-6706	57-63	Mountains	Meadows in glacial lake (relict)	Glaciolacustrine deposits derived from volcanic rock	Crylic lacustrine flat, R022BI206CA
Vitriixerands-----	1	0-8	6283-6706	57-63	Mountains	Outwash terrace	Glaciolacustrine deposits over outwash derived from volcanic rock	Abies magnifica-Pinus contorta var. murrayana/Elymus elymoides, F022BI117CA
Typic Endoaquents--	1	0-8	6283-6706	57-63	Mountains	Flood plain	Alluvium derived from volcanic rock	Sandy flood plains, R022BI213CA
140: Vitriixerands-----	90	1-15	6427-6798	57-61	Mountains	Outwash terrace	Glaciolacustrine deposits over outwash derived from volcanic rock	Abies magnifica-Pinus contorta var. murrayana/Elymus elymoides, F022BI117CA
Duric Vitraquands--	10	1-15	6427-6798	57-61	Mountains	Outwash plain	Volcanic ash over glaciolacustrine deposits over outwash derived from volcanic rock	Abies magnifica-Pinus contorta var. murrayana/Elymus elymoides, F022BI117CA
141: Humic Haploxerands-	40	5-40	5456-6893	37-57	Mountains	Unglaciated shield volcano	Ash over colluvium derived from volcanic rock	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens, F022BI103CA

Table 8.—Landscape, Parent Material, and Ecosite ID—Continued

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landscape	Landform	Parent material	Ecological site name and number
	Pct	Pct	Ft	In				
141: Typic Haploxerands-	35	5-40	5456-6893	37-57	Mountains	Unglaci- ated shield volcano	Colluvium over residuum weathered from volcanic rock	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens, F022BI103CA
Bearrubble-----	15	5-40	5456-6893	37-57	Mountains	Unglaci- ated shield volcano	Tephra over residuum weathered from basalt and/or basaltic andesite	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens, F022BI103CA
142: Cragwash-----	85	1-30	5499-7257	39-93	Mountains	Outwash plain	Alluvium redeposited from tephra over outwash derived from volcanic rock	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens, F022BI103CA
Sueredo-----	7	1-30	5499-7257	39-93	Mountains	Ground moraine	Tephra over till derived from volcanic rock	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens, F022BI103CA
Aquepts-----	3	1-4	5499-7257	39-93	Mountains	Kettle	Glaciolacustrine deposits derived from volcanic rock	Pinus contorta var. murrayana/Veratrum californicum var. californicum-Elymus glaucus, F022BI108CA
143: Andic Durixerpts--	95	3-20	6627-7132	61-89	Mountains	Outwash terrace	Ash over outwash derived from volcanic rock	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale, F022BI115CA
Cascadesprings-----	3	3-20	6627-7132	61-89	Mountains	Ground moraine	Tephra over till derived from volcanic rock	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale, F022BI115CA
Aquepts-----	2	2-20	6627-7132	61-89	Mountains	Drainageway	Alluvium derived from volcanic rock	Spring complex, R022BI211CA

Table 8.—Landscape, Parent Material, and Ecosite ID—Continued

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landscape	Landform	Parent material	Ecological site name and number
	Pct	Pct	Ft	In				
144: Xeric Vitricryands, cirque floor	55	1-35	7221-9160	103-125	Mountains	Ground moraine on cirque floor	Subglacial till derived from volcanic rock	Cirque floor, R022BI205CA
Humic Xeric Vitricryands	30	1-35	7221-9160	103-125	Mountains	Moraine	Tephra over till derived from volcanic rock	Tsuga mertensiana/Lupinus obtusilobus-Cistanthe umbellata var. umbellata, F022BI104CA
Terracelake-----	5	1-35	7221-9160	103-125	Mountains	Moraine	Tephra over colluvium and residuum weathered from volcanic rock	Alpine slopes, R022BI207CA
Aquepts-----	3	1-35	7221-9160	103-125	Mountains	Drainageway	Alluvium derived from volcanic rock	Spring complex, R022BI211CA
Shadowlake-----	2	1-35	7221-9160	103-125	Mountains	Ground moraine	Tephra over or mixed with till derived from volcanic rock	Tsuga mertensiana-Abies magnifica/Lupinus obtusilobus-Eriogonum marifolium, F022BI111CA
145: Sueredo-----	85	2-30	5643-7493	41-89	Mountains	Ground moraine	Tephra over till derived from volcanic rock	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens, F022BI103CA
Cragwash-----	3	2-30	5643-7493	41-89	Mountains	Outwash plain	Alluvium redeposited from tephra over outwash derived from volcanic rock	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens, F022BI103CA
Aquepts-----	2	2-4	5643-7493	41-89	Mountains	Kettle	Glaciolacustrine deposits derived from volcanic rock	Pinus contorta var. murrayana/Veratrum californicum var. californicum-Elymus glaucus, F022BI108CA
Badgerflat-----	2	2-30	5643-7493	41-89	Mountains	Ground moraine	Tephra over till derived from volcanic rock	Pinus jeffreyi-Pinus contorta var. murrayana/Monardella odoratissima, F022BI126CA

Table 8.—Landscape, Parent Material, and Ecosite ID—Continued

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landscape	Landform	Parent material	Ecological site name and number
	Pct	Pct	Ft	In				
146: Sueredo-----	90	20-60	5909-7470	43-95	Mountains	Ground moraine on glacial-valley wall	Tephra over till derived from volcanic rock	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens, F022BI103CA
Scoured-----	3	20-60	5909-7470	43-95	Mountains	Scoured glacial-valley wall	Tephra over colluvium and/or residuum weathered from volcanic rock	Pinus jeffreyi/Arctostaphylos patula, F022BI121CA
Vitrandic Xerorthents, debris fan	1	20-60	5909-7470	43-95	Mountains	Debris flow	Debris flow deposits derived from volcanic rock	Pinus jeffreyi-Abies/Achnatherum-Lupinus, F022BI106CA
147: Summertown-----	85	5-35	5705-6804	39-65	Mountains	Moraine	Volcanic ash mixed with till derived from volcanic rock	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens, F022BI103CA
Sueredo-----	7	5-35	5705-6804	39-65	Mountains	Ground moraine	Tephra over till derived from volcanic rock	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens, F022BI103CA
Humic Haploxerands, outwash	4	5-35	5705-6804	39-65	Mountains	Outwash plain	Outwash derived from volcanic rock	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens, F022BI103CA
Vitrandic Xerorthents, debris fan	2	5-35	5705-6804	39-65	Mountains	Debris flow	Debris flow deposits derived from volcanic rock	Pinus jeffreyi-Abies/Achnatherum-Lupinus, F022BI106CA
148: Humic Haploxerands, lake terrace	70	1-30	6079-6896	35-51	Mountains	Lake terrace	Lacustrine deposits derived from volcanic rock	Abies magnifica/Penstemon gracilentus-Lupinus arbustus, F022BI112CA

Table 8.—Landscape, Parent Material, and Ecosite ID—Continued

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landscape	Landform	Parent material	Ecological site name and number
	Pct	Pct	Ft	In				
148: Typic Endoaquands--	15	1-30	6079-6896	35-51	Mountains	Lake terrace	Alluvium derived from volcanic rock	Pinus contorta var. murrayana/Veratrum californicum var. californicum-Elymus glaucus, F022BI108CA
Juniperlake-----	5	1-30	6079-6896	35-51	Mountains	Ground moraine	Tephra and till derived from volcanic rock	Abies magnifica/Penstemon gracilentus-Lupinus arbustus, F022BI112CA
Histic Humaquepts, lake sediments	2	1-4	6079-6896	35-51	Mountains	Meadows in glacial lake (relict)	Ash over glaciolacustrine deposits derived from volcanic rock	Frigid lacustrine flat, R022BI217CA
Histic Humaquepts, frequently flooded	1	1-4	6079-6896	35-51	Mountains	Along channels in glacial lake (relict)	Stream alluvium over glaciolacustrine deposits derived from volcanic rock	Frigid lacustrine flat, R022BI217CA
149: Emeraldlake-----	15	35-60	6473-8835	81-125	Mountains	Colluvial apron	Tephra mixed with colluvium derived from volcanic rock	Alpine slopes, R022BI207CA
Acroph-----	4	35-90	6473-8835	81-125	Mountains	Glaciated lava plateau	Tephra over residuum	Glaciated mountain slopes, R022BI204CA
Terracelake-----	3	35-90	6473-8835	81-125	Mountains	Glaciated lava plateau	Tephra over colluvium and residuum weathered from volcanic rock	Alpine slopes, R022BI207CA
Readingpeak-----	3	35-90	6473-8835	81-125	Mountains	Glaciated lava plateau	Tephra over colluvium and residuum weathered from volcanic rock	Tsuga mertensiana-Pinus albicaulis/Holodiscus discolor/Lupinus obtusilobus-Polygonum davisiae, F022BI124CA
150: Shadowlake-----	40	15-80	6358-8514	61-107	Mountains	Ground moraine on glacial- valley wall	Tephra over or mixed with till derived from volcanic rock	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale, F022BI115CA

Table 8.—Landscape, Parent Material, and Ecosite ID—Continued

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landscape	Landform	Parent material	Ecological site name and number
	Pct	Pct	Ft	In				
150: Terracelake-----	30	15-80	6358-8514	61-107	Mountains	Scoured glacial-valley wall	Tephra over colluvium and residuum weathered from volcanic rock	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale, F022BI115CA
Acroph-----	15	15-80	6358-8514	61-107	Mountains	Scoured glacial-valley wall	Tephra over residuum	Glaciated mountain slopes, R022BI204CA
Sueredo-----	2	15-80	6358-8514	61-107	Mountains	Ground moraine	Tephra over till derived from volcanic rock	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens, F022BI103CA
Aquepts-----	2	15-80	6358-8514	61-107	Mountains	Seeps on glacial-valley wall	Slope alluvium derived from volcanic rock over colluvium derived from volcanic rock	Spring complex, R022BI211CA
151: Terracelake-----	40	15-80	5722-8455	55-117	Mountains	Scoured glacial-valley wall	Tephra over colluvium and residuum weathered from volcanic rock	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale, F022BI115CA
Acroph-----	20	15-80	5722-8455	55-117	Mountains	Scoured glacial-valley wall	Tephra over residuum	Glaciated mountain slopes, R022BI204CA
Shadowlake-----	15	15-80	5722-8455	55-117	Mountains	Ground moraine on glacial- valley wall	Tephra over or mixed with till derived from volcanic rock	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale, F022BI115CA
Sueredo-----	5	15-80	5722-8455	55-117	Mountains	Ground moraine	Tephra over till derived from volcanic rock	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale, F022BI115CA
Aquepts-----	2	15-80	5722-8455	55-117	Mountains	Seeps on glacial-valley wall	Slope alluvium derived from volcanic rock over colluvium derived from volcanic rock	Spring complex, R022BI211CA

Table 8.—Landscape, Parent Material, and Ecosite ID—Continued

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landscape	Landform	Parent material	Ecological site name and number
	Pct	Pct	Ft	In				
152: Terracelake-----	35	5-35	5784-8202	55-109	Mountains	Scoured glacial-valley floor	Tephra over colluvium and residuum weathered from volcanic rock	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale, F022BI115CA
Shadowlake-----	30	5-35	5784-8202	55-109	Mountains	Ground moraine on glacial- valley floor	Tephra over or mixed with till derived from volcanic rock	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale, F022BI115CA
Acroph-----	15	5-35	5784-8202	55-109	Mountains	Scoured glacial-valley floor	Tephra over residuum	Glaciated mountain slopes, R022BI204CA
Sueredo-----	4	5-35	5784-8202	55-109	Mountains	Ground moraine	Tephra over till derived from volcanic rock	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale, F022BI115CA
Aquepts-----	2	1-35	5784-8202	55-109	Mountains	Seeps on glacial-valley floor	Slope alluvium derived from volcanic rock over colluvium derived from volcanic rock	Spring complex, R022BI211CA
153: Typic Vitrixerands-	50	3-30	6283-7333	59-95	Mountains	Moraine	Debris flow deposits and/or pyroclastic flow and/or rockfall avalanche deposits over till derived from volcanic rock	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens, F022BI103CA
Vitrandic Xerorthents, moraine	45	3-30	6283-7333	59-95	Mountains	Moraine	Debris flow deposits and/or pyroclastic flow and/or rockfall avalanche deposits over till derived from volcanic rock	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens, F022BI103CA
Vitrandic Cryorthents, debris flows	2	3-30	6283-7333	59-95	Mountains	Moraine	Debris flow deposits and/or pyroclastic flow over till derived from volcanic rock	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale, F022BI115CA

Table 8.—Landscape, Parent Material, and Ecosite ID—Continued

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landscape	Landform	Parent material	Ecological site name and number
	Pct	Pct	Ft	In				
153: Sueredo-----	2	3-30	6283-7333	59-95	Mountains	Ground moraine	Tephra over till derived from volcanic rock	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens, F022BI103CA
Vitrandic Xerorthents, debris fan	1	3-30	6283-7333	59-95	Mountains	Debris flow	Debris flow deposits derived from volcanic rock	Pinus jeffreyi- Abies/Achnatherum- Lupinus, F022BI106CA
154: Typic Vitrixerands-	45	15-60	6266-7234	59-89	Mountains	Moraine	Debris flow deposits and/or pyroclastic flow and/or rockfall avalanche deposits over till derived from volcanic rock	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens, F022BI103CA
Vitrandic Xerorthents, moraine	35	15-60	6266-7234	59-89	Mountains	Moraine	Debris flow deposits and/or pyroclastic flow and/or rockfall avalanche deposits over till derived from volcanic rock	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens, F022BI103CA
Aquepts-----	3	15-60	6266-7234	59-89	Mountains	Seeps on moraine	Slope alluvium derived from volcanic rock over colluvium derived from volcanic rock	Pinus contorta var. murrayana-Populus tremuloides/Elymus glaucus, F022BI105CA
Sueredo-----	3	15-60	6266-7234	59-89	Mountains	Ground moraine	Tephra over till derived from volcanic rock	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens, F022BI103CA
Vitrandic Cryorthents, debris flows	2	15-60	6266-7234	59-89	Mountains	Moraine	Debris flow deposits and/or pyroclastic flow over till derived from volcanic rock	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale, F022BI115CA
Typic Endoaquents--	2	1-5	6266-7234	59-89	Mountains	Flood plain	Alluvium derived from volcanic rock	Sandy flood plains, R022BI213CA

Table 8.—Landscape, Parent Material, and Ecosite ID—Continued

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landscape	Landform	Parent material	Ecological site name and number
	Pct	Pct	Ft	In				
155: Xeric Vitricryands, pyroclastic surge	90	8-35	6808-7598	83-101	Mountains	Medial moraine	Pyroclastic surge over till derived from volcanic rock	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale, F022BI115CA
Vitrandic Cryorthents, debris flows	5	8-35	6808-7598	83-101	Mountains	Moraine	Debris flow deposits and/or pyroclastic flow over till derived from volcanic rock	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale, F022BI115CA
Shadowlake-----	3	8-35	6808-7598	83-101	Mountains	Moraine	Tephra over or mixed with till derived from volcanic rock	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale, F022BI115CA
Aquepts-----	2	8-35	6808-7598	83-101	Mountains	Seeps on moraine	Slope alluvium derived from volcanic rock over colluvium derived from volcanic rock	Spring complex, R022BI211CA
156: Xeric Vitricryands, pyroclastic surge	90	20-50	6555-7326	79-93	Mountains	Medial moraine	Pyroclastic surge over till derived from volcanic rock	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale, F022BI115CA
Aquepts-----	5	20-50	6555-7326	79-93	Mountains	Seeps on moraine	Slope alluvium derived from volcanic rock over colluvium derived from volcanic rock	Spring complex, R022BI211CA
Shadowlake-----	5	20-50	6555-7326	79-93	Mountains	Moraine	Tephra over or mixed with till derived from volcanic rock	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale, F022BI115CA
157: Typic Vitrixerands, very deep	90	5-50	5725-6519	45-57	Mountains	Glaciated rhyodacite lava flow	Volcanic ash mixed with colluvium and residuum weathered from rhyodacite	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens, F022BI103CA

Table 8.—Landscape, Parent Material, and Ecosite ID—Continued

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landscape	Landform	Parent material	Ecological site name and number
	Pct	Pct	Ft	In				
157: Typic Vitrixerands, unglaciated	3	5-50	5725-6519	45-57	Mountains	Unglaciated rhyodacite lava flow	Volcanic ash over colluvium over residuum weathered from rhyodacite	Pinus jeffreyi/Arctostaphylos patula, F022BI121CA
158: Typic Vitrixerands, unglaciated	75	5-20	6302-6686	49-59	Mountains	Unglaciated rhyodacite lava flow	Volcanic ash over colluvium over residuum weathered from rhyodacite	Pinus jeffreyi/Arctostaphylos patula, F022BI121CA
Typic Vitrixerands, very deep	5	5-20	6302-6686	49-59	Mountains	Glaciated rhyodacite lava flow	Volcanic ash mixed with colluvium and residuum weathered from rhyodacite	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens, F022BI103CA
159: Typic Vitrixerands, bouldery	40	15-60	5676-7333	39-61	Mountains	Unglaciated volcanic dome	Tephra mixed with colluvium derived from rhyodacite	Pinus jeffreyi/Arctostaphylos patula, F022BI121CA
Typic Vitrixerands, tephra over colluvium	35	15-60	5676-7333	39-61	Mountains	Unglaciated volcanic dome	Tephra over colluvium derived from volcanic rock	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens, F022BI103CA
160: Aeric Endoaquents--	45	2-6	5279-5525	49-53	Mountains	Flood plain	Recent alluvium derived from volcanic rock	Gravelly flood plains, R022BI215CA
Humic Haploxerands, stream terrace	35	2-30	5279-5525	49-53	Mountains	Stream terrace	Ash-influenced alluvium derived from volcanic rock	Abies concolor-Calocedrus decurrens/Ceanothus cordulatus/Achnatherum, F022BI110CA
Aquandic Humaquepts, flood plains	5	2-5	5279-5525	49-53	Mountains	Flood plain	Alluvium derived from volcanic rock	Gravelly flood plains, R022BI215CA

Table 8.—Landscape, Parent Material, and Ecosite ID—Continued

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landscape	Landform	Parent material	Ecological site name and number
	Pct	Pct	Ft	In				
161: Typic Psammaquents-	95	0-3	5863-5925	45-47	Mountains	Flood plain	Alluvium redeposited from debris flows derived from volcanic rock	Sandy flood plains, R022BI213CA
162: Humic Haploxerands, outwash	95	1-8	5705-5974	45-53	Mountains	Outwash plain	Outwash derived from volcanic rock	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens, F022BI103CA
Vitrandic Xerorthents, debris fan	3	1-8	5705-5974	45-53	Mountains	Debris flow	Debris flow deposits derived from volcanic rock	Pinus jeffreyi- Abies/Achnatherum- Lupinus, F022BI106CA
Summertown-----	2	1-8	5705-5974	45-53	Mountains	Moraine	Volcanic ash mixed with till derived from volcanic rock	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens, F022BI103CA
163: Vitrandic Cryofluvents	65	0-8	6417-7513	59-111	Mountains	Meadows in glacial lake (relict)	Glaciolacustrine deposits derived from volcanic rock	Cryic lacustrine flat, R022BI206CA
Aquandic Cryaquents	30	0-8	6417-7513	59-111	Mountains	Along channels in meadows in glacial lake (relict)	Glaciolacustrine deposits derived from volcanic rock	Cryic lacustrine flat, R022BI206CA
Typic Endoaquands--	2	0-8	6417-7513	59-111	Mountains	Lake terrace	Alluvium derived from volcanic rock	Pinus contorta var. murrayana/Veratrum californicum var. californicum-Elymus glaucus, F022BI108CA
Aquepts-----	1	0-15	6417-7513	59-111	Mountains	Lake terrace	Glaciolacustrine deposits derived from volcanic rock	Spring complex, R022BI211CA

Table 8.—Landscape, Parent Material, and Ecosite ID—Continued

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landscape	Landform	Parent material	Ecological site name and number
	Pct	Pct	Ft	In				
163: Duric Vitraquands--	1	0-8	6417-7513	59-111	Mountains	Outwash plain	Volcanic ash over glaciolacustrine deposits over outwash derived from volcanic rock	Abies magnifica-Pinus contorta var. murrayana/Elymus elymoides, F022BI117CA
Typic Endoaquents--	1	0-8	6417-7513	59-111	Mountains	Flood plain	Alluvium derived from volcanic rock	Sandy flood plains, R022BI213CA
164: Aquepts-----	35	4-30	5659-6755	63-91	Mountains	Seeps on glacial-valley floor	Slope alluvium derived from volcanic rock over colluvium derived from volcanic rock	Spring complex, R022BI211CA
Typic Petraquepts, bedrock	25	4-30	5659-6755	63-91	Mountains	Seeps on glacial-valley floor	Colluvium derived from volcanic rock	Spring complex, R022BI211CA
Aquic Haploxerands-	20	4-30	5659-6755	63-91	Mountains	Outwash terrace	Outwash derived from volcanic rock	Abies concolor-Pinus contorta var. murrayana/Elymus glaucus, F022BI120CA
Typic Petraquepts--	10	4-30	5659-6755	63-91	Mountains	Seeps on strath terrace	Geothermal spring alluvium derived from volcanic rock	Thermal seeps, R022BI218CA
Aquandic Humaquepts, flood plains	1	4-8	5659-6755	63-91	Mountains	Flood plain	Alluvium derived from volcanic rock	Loamy flood plains, R022BI210CA
Humic Haploxerands, strath terrace	1	4-30	5659-6755	63-91	Mountains	Strath terrace	Alluvium derived from andesite over residuum weathered from andesite	Abies concolor-Calocedrus decurrens/Ceanothus cordulatus/Achnatherum, F022BI110CA
165: Aquandic Humaquepts	35	1-5	5440-5787	51-69	Mountains	Meadows on stream terrace	Alluvium derived from volcanic rock	Frigid alluvial flat, R022BI202CA
Histic Humaquepts--	25	1-5	5440-5787	51-69	Mountains	Meadows on stream terrace	Alluvium derived from volcanic rock	Frigid alluvial flat, R022BI202CA

Table 8.—Landscape, Parent Material, and Ecosite ID—Continued

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landscape	Landform	Parent material	Ecological site name and number
	Pct	Pct	Ft	In				
165: Aquandic Endoaquepts	20	1-5	5440-5787	51-69	Mountains	Meadow on bar on stream terrace	Alluvium derived from volcanic rock	Frigid alluvial flat, R022BI202CA
Terric Haplohemists	15	1-5	5440-5787	51-69	Mountains	Fen on stream terrace	Herbaceous organic material over alluvium derived from volcanic rock	Frigid alluvial flat, R022BI202CA
Humic Haploxerands, stream terrace	5	1-5	5440-5787	51-69	Mountains	Stream terrace	Ash-influenced alluvium derived from volcanic rock	Abies concolor-Pinus contorta var. murrayana/Elymus glaucus, F022BI120CA
166: Aquic Haploxerands-	50	2-30	5741-6007	63-77	Mountains	Outwash terrace	Outwash derived from volcanic rock	Abies concolor-Pinus contorta var. murrayana/Elymus glaucus, F022BI120CA
Humic Haploxerands, outwash terrace	40	2-30	5741-6007	63-77	Mountains	Outwash terrace	Ash mixed with outwash derived from volcanic rock	Abies concolor-Calocedrus decurrens/Ceanothus cordulatus/Achnatherum, F022BI110CA
Juniperlake, bouldery	4	2-30	5741-6007	63-77	Mountains	Ground moraine	Tephra and till derived from volcanic rock	Abies concolor-Calocedrus decurrens/Ceanothus cordulatus/Achnatherum, F022BI110CA
Humic Haploxerands, strath terrace	3	2-30	5741-6007	63-77	Mountains	Strath terrace	Alluvium derived from andesite over residium weathered from andesite	Abies concolor-Calocedrus decurrens/Ceanothus cordulatus/Achnatherum, F022BI110CA
Aquepts-----	2	2-30	5741-6007	63-77	Mountains	Seeps on glacial-valley floor	Alluvium derived from volcanic rock	Spring complex, R022BI211CA
Aquandic Humaquepts, flood plains	1	2-8	5741-6007	63-77	Mountains	Flood plain	Alluvium derived from volcanic rock	Loamy flood plains, R022BI210CA

Table 8.—Landscape, Parent Material, and Ecosite ID—Continued

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landscape	Landform	Parent material	Ecological site name and number
	Pct	Pct	Ft	In				
167: Emeraldlake-----	35	30-95	7595-10453	101-125	Mountains	Glaciated volcanic dome	Tephra mixed with colluvium derived from volcanic rock	Alpine slopes, R022BI207CA
Readingpeak-----	20	30-95	7595-10453	101-125	Mountains	Glaciated volcanic dome	Tephra over colluvium and residuum weathered from volcanic rock	Tsuga mertensiana-Pinus albicaulis/Holodiscus discolor/Lupinus obtusilobus-Polygonum davisiae, F022BI124CA
Terracelake-----	15	30-95	7595-10453	101-125	Mountains	Glaciated volcanic dome	Tephra over colluvium and residuum weathered from volcanic rock	Alpine slopes, R022BI207CA
168: Vitrixerands, low elevation	90	1-15	6096-6296	43-59	Mountains	Outwash terrace	Tephra over outwash derived from volcanic rock	Abies concolor-Pinus contorta var. murrayana/Achnatherum occidentale, F022BI123CA
Vitrandic Xerofluvents, debris flows	5	1-15	6096-6296	43-59	Mountains	Low stream terrace	Debris flow deposits over alluvium derived from volcanic rock	Pinus contorta var. murrayana-Populus tremuloides/Elymus glaucus, F022BI105CA
Sueredo-----	4	1-15	6096-6296	43-59	Mountains	Ground moraine	Tephra over till derived from volcanic rock	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens, F022BI103CA
169: Sueredo-----	55	15-80	6230-7487	57-69	Mountains	Ground moraine on volcanic dome	Tephra over till derived from volcanic rock	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens, F022BI103CA
Scoured-----	15	15-90	6230-7487	57-69	Mountains	Glacially scoured volcanic dome	Tephra over colluvium and/or residuum weathered from volcanic rock	Pinus jeffreyi/Arctostaphylos patula, F022BI121CA

Table 8.—Landscape, Parent Material, and Ecosite ID—Continued

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landscape	Landform	Parent material	Ecological site name and number
	Pct	Pct	Ft	In				
170: Emeraldlake-----	20	20-95	6676-8530	53-91	Mountains	Colluvial apron on volcanic dome	Tephra mixed with colluvium derived from volcanic rock	Alpine slopes, R022BI207CA
Readingpeak-----	15	20-95	6676-8530	53-91	Mountains	Convex backslopes on volcanic dome	Tephra over colluvium and residuum weathered from volcanic rock	Alpine slopes, R022BI207CA
Terracelake-----	12	20-95	6676-8530	53-91	Mountains	Volcanic dome	Tephra over colluvium and residuum weathered from volcanic rock	Alpine slopes, R022BI207CA
171: Aquepts-----	50	2-45	5397-8209	55-113	Mountains	Seeps on glacial-valley wall	Slope alluvium derived from volcanic rock over colluvium derived from volcanic rock	Spring complex, R022BI211CA
Typic Petraquepts, bedrock	35	2-45	5397-8209	55-113	Mountains	Seeps on glacial-valley wall	Colluvium derived from volcanic rock	Spring complex, R022BI211CA
Shadowlake-----	5	2-45	5397-8209	55-113	Mountains	Moraine	Tephra over or mixed with till derived from volcanic rock	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale, F022BI115CA
Endoaquepts-----	5	2-45	5397-8209	55-113	Mountains	Seeps on mountain slope	Slope alluvium over colluvium derived from hydrothermally altered volcanic rock	Loamy seeps, R022BI209CA
Typic Endoaquands--	5	2-15	5397-8209	55-113	Mountains	Stream terrace	Alluvium derived from volcanic rock	Pinus contorta var. murrayana/Veratrum californicum var. californicum-Elymus glaucus, F022BI108CA

Table 8.—Landscape, Parent Material, and Ecosite ID—Continued

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landscape	Landform	Parent material	Ecological site name and number
	Pct	Pct	Ft	In				
172: Badgerflat-----	90	1-30	6112-6883	39-57	Mountains	Ground moraine	Tephra over till derived from volcanic rock	Pinus jeffreyi-Pinus contorta var. murrayana/Monardella odoratissima, F022BI126CA
Badgerwash-----	5	1-10	6112-6883	39-57	Mountains	Outwash plain	Mixed tephra and outwash over outwash derived from volcanic rock	Pinus contorta var. murrayana/Elymus elymoides, F022BI125CA
Cenplat-----	4	1-30	6112-6883	39-57	Mountains	Glaciated lava plateau	Tephra over residuum weathered from volcanic rock	Abies magnifica-Abies concolor/Chrysolepis sempervirens, F022BI107CA
Typic Endoaquands--	1	1-15	6112-6883	39-57	Mountains	Lake terrace	Alluvium derived from volcanic rock	Pinus contorta var. murrayana/Veratrum californicum var. californicum-Elymus glaucus, F022BI108CA
173: Badgerwash-----	90	1-10	6214-6614	39-49	Mountains	Outwash plain	Mixed tephra and outwash over outwash derived from volcanic rock	Pinus contorta var. murrayana/Elymus elymoides, F022BI125CA
Typic Endoaquands--	8	1-10	6214-6614	39-49	Mountains	Lake terrace	Alluvium derived from volcanic rock	Pinus contorta var. murrayana/Veratrum californicum var. californicum-Elymus glaucus, F022BI108CA
Badgerflat-----	2	1-10	6214-6614	39-49	Mountains	Ground moraine	Tephra over till derived from volcanic rock	Pinus jeffreyi-Pinus contorta var. murrayana/Monardella odoratissima, F022BI126CA
174: Vitrandic Cryorthents	60	5-60	6713-8625	71-119	Mountains	Pyroclastic flow in hanging valley	Pumiceous pyroclastic flow derived from volcanic rock	Pyroclastic flow, R022BI214CA

Table 8.—Landscape, Parent Material, and Ecosite ID—Continued

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landscape	Landform	Parent material	Ecological site name and number
	Pct	Pct	Ft	In				
174: Readingpeak-----	20	5-60	6713-8625	71-119	Mountains	Roche moutonnée in hanging valley	Tephra over colluvium and residuum weathered from volcanic rock	Tsuga mertensiana-Pinus albicaulis/Holodiscus discolor/Lupinus obtusilobus-Polygonum davisiae, F022BI124CA
Terracelake-----	7	5-60	6713-8625	71-119	Mountains	Glaciated volcanic dome	Tephra over colluvium and residuum weathered from volcanic rock	Alpine slopes, R022BI207CA
175: Shadowlake-----	75	2-30	6470-7441	71-111	Mountains	Ground moraine	Tephra over or mixed with till derived from volcanic rock	Tsuga mertensiana-Abies magnifica/Lupinus obtusilobus-Eriogonum marifolium, F022BI111CA
Vitrantic Cryofluvents	15	2-8	6470-7441	71-111	Mountains	Meadows in glacial lake (relict)	Glaciolacustrine deposits derived from volcanic rock	Cryic lacustrine flat, R022BI206CA
Terracelake-----	5	2-30	6470-7441	71-111	Mountains	Glacial-valley floor	Tephra over colluvium and residuum weathered from volcanic rock	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale, F022BI115CA
Aquandic Cryaquents	3	2-8	6470-7441	71-111	Mountains	Along channels in meadows in glacial lake (relict)	Glaciolacustrine deposits derived from volcanic rock	Cryic lacustrine flat, R022BI206CA
Aquepts-----	2	2-30	6470-7441	71-111	Mountains	Glacial-valley floor	Slope alluvium derived from volcanic rock over colluvium derived from volcanic rock	Spring complex, R022BI211CA
176: Juniperlake, bouldery	85	10-35	5443-6450	51-83	Mountains	Ground moraine on glacial- valley wall	Tephra and till derived from volcanic rock	Abies concolor-Calocedrus decurrens/Ceanothus cordulatus/Achnatherum, F022BI110CA

Table 8.—Landscape, Parent Material, and Ecosite ID—Continued

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landscape	Landform	Parent material	Ecological site name and number
	Pct	Pct	Ft	In				
176: Scoured-----	10	10-35	5443-6450	51-83	Mountains	Scoured glacial-valley wall	Tephra over colluvium and/or residuum weathered from volcanic rock	Pinus jeffreyi/Arctostaphylos patula, F022BI121CA
Humic Haploxerands, outwash terrace	3	10-35	5443-6450	51-83	Mountains	Outwash terrace	Ash mixed with outwash derived from volcanic rock	Abies concolor-Calocedrus decurrens/Ceanothus cordulatus/Achnatherum, F022BI110CA
Aquepts-----	1	10-35	5443-6450	51-83	Mountains	Seeps on glacial-valley wall	Slope alluvium derived from volcanic rock over colluvium derived from volcanic rock	Spring complex, R022BI211CA
Endoaquepts-----	1	10-35	5443-6450	51-83	Mountains	Seeps on glacial-valley wall	Slope alluvium over colluvium derived from hydrothermally altered volcanic rock	Loamy seeps, R022BI209CA
177: Vitrandic Cryorthents, debris flows, high elevation	85	15-95	7467-10341	103-125	Mountains	Debris flow	Debris flow deposits and/or pyroclastic flow	Alpine slopes, R022BI207CA
202: Typic Xerorthents, tephra	85	2-50	6155-6532	31-35	Mountains	Tephra-covered lava flow	Cinder cone tephra	Bedded Tephra Deposits, R022BI201CA
Typic Xerorthents, welded	10	2-30	6155-6532	31-35	Mountains	Tephra-covered knoll on lava flow	Cinder cone tephra	Bedded Tephra Deposits, R022BI201CA

Table 8.—Landscape, Parent Material, and Ecosite ID—Continued

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landscape	Landform	Parent material	Ecological site name and number
	<u>Pct</u>	<u>Pct</u>	<u>Ft</u>	<u>In</u>				
203: Typic Xerorthents, tephra	90	2-20	6109-6529	31-35	Mountains	Tephra-covered lake terrace	Cinder cone tephra	Pinus jeffreyi-Abies concolor/Achnatherum occidentale ssp. occidentale-Elymus elymoides, F022BI100CA
						Tephra-covered lava flow Tephra-covered moraine Tephra-covered outwash plain		
Typic Xerorthents--	10	2-20	6109-6529	31-35	Mountains	Tephra-covered lake terrace	Tephra over till and/or outwash and/or glaciolacustrine deposits derived from volcanic rock	Pinus jeffreyi-Abies concolor/Achnatherum occidentale ssp. occidentale-Elymus elymoides, F022BI100CA
						Tephra-covered moraine Tephra-covered outwash plain		

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Table 9.—Ecological Site-Soil Correlation

(Only soils and miscellaneous land types with correlated ecological sites are shown)

Map unit symbol, soil percent, and soil name	Ecological site name	Ecological site type	Ecological site ID
100: 85%-Buttelake-----	Pinus jeffreyi-Abies concolor/Achnatherum occidentale ssp. occidentale- Elymus elymoides	Forestland	F022BI100CA
5%-Sunhoff-----	Abies magnifica-Abies concolor/Chrysolepis sempervirens	Forestland	F022BI107CA
3%-Buttewash-----	Pinus jeffreyi-Abies concolor/Achnatherum occidentale ssp. occidentale- Elymus elymoides	Forestland	F022BI100CA
2%-Badgerflat-----	Pinus jeffreyi-Pinus contorta var. murrayana/Monardella odoratissima	Forestland	F022BI126CA
2%-Typic Xerorthents-----	Pinus jeffreyi-Abies concolor/Achnatherum occidentale ssp. occidentale- Elymus elymoides	Forestland	F022BI100CA
1%-Talved-----	Talus slope	Rangeland	R022BI200CA
101: 85%-Buttewash-----	Pinus jeffreyi-Abies concolor/Achnatherum occidentale ssp. occidentale- Elymus elymoides	Forestland	F022BI100CA
8%-Badgerwash-----	Pinus contorta var. murrayana/Elymus elymoides	Forestland	F022BI125CA
5%-Buttelake-----	Pinus jeffreyi-Abies concolor/Achnatherum occidentale ssp. occidentale- Elymus elymoides	Forestland	F022BI100CA
2%-Humic Haploxerands, moist lake terrace-----	Pinus contorta var. murrayana/Elymus elymoides	Forestland	F022BI125CA
102: 65%-Ashbutte-----	Abies magnifica-Pinus jeffreyi/Arctostaphylos nevadensis-Achnatherum occidentale	Forestland	F022BI109CA
25%-Vitrandic Xerorthents-----	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis-Chrysolepis sempervirens/Angelica breweri	Forestland	F022BI114CA
6%-Prospectpeak-----	Abies magnifica-Pinus jeffreyi/Arctostaphylos nevadensis-Achnatherum occidentale	Forestland	F022BI109CA

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Table 9.—Ecological Site-Soil Correlation—Continued

Map unit symbol, soil percent, and soil name	Ecological site name	Ecological site type	Ecological site ID
103: 75%-Scoured-----	Abies magnifica/Arctostaphylos nevadensis/Carex rossii- Penstemon gracilentus	Forestland	F022BI102CA
10%-Juniperlake-----	Abies magnifica/Penstemon gracilentus-Lupinus arbustus	Forestland	F022BI112CA
3%-Sunhoff-----	Abies magnifica-Abies concolor/Chrysolepis sempervirens	Forestland	F022BI107CA
2%-Typic Endoaquands-----	Pinus contorta var. murrayana/Veratrum californicum var. californicum-Elymus glaucus	Forestland	F022BI108CA
104: 55%-Scoured-----	Abies magnifica/Arctostaphylos nevadensis/Carex rossii- Penstemon gracilentus	Forestland	F022BI102CA
20%-Juniperlake-----	Abies magnifica/Penstemon gracilentus-Lupinus arbustus	Forestland	F022BI112CA
5%-Dittmar-----	Pinus jeffreyi/Arctostaphylos patula	Forestland	F022BI121CA
2%-Typic Endoaquands-----	Pinus contorta var. murrayana/Veratrum californicum var. californicum-Elymus glaucus	Forestland	F022BI108CA
105: 85%-Juniperlake-----	Abies magnifica/Penstemon gracilentus-Lupinus arbustus	Forestland	F022BI112CA
5%-Scoured-----	Abies magnifica/Arctostaphylos nevadensis/Carex rossii- Penstemon gracilentus	Forestland	F022BI102CA
4%-Humic Haploxerands, lake terrace-----	Abies magnifica/Penstemon gracilentus-Lupinus arbustus	Forestland	F022BI112CA
2%-Typic Endoaquands-----	Pinus contorta var. murrayana/Veratrum californicum var. californicum-Elymus glaucus	Forestland	F022BI108CA
1%-Histic Humaquepts, lake sediments-----	Frigid lacustrine flat	Rangeland	R022BI217CA
106: 70%-Cenplat-----	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale	Forestland	F022BI115CA
7%-Badgerflat-----	Abies magnifica-Abies concolor/Chrysolepis sempervirens	Forestland	F022BI107CA

Soil Survey of Lassen Volcanic National Park, California

Table 9.—Ecological Site-Soil Correlation—Continued

Map unit symbol, soil percent, and soil name	Ecological site name	Ecological site type	Ecological site ID
106: 5%-Cascadesprings-----	<i>Abies magnifica</i> - <i>Pinus monticola</i> / <i>Arctostaphylos nevadensis</i> / <i>Achnatherum occidentale</i>	Forestland	F022BI115CA
5%-Sunhoff-----	<i>Abies magnifica</i> - <i>Abies concolor</i> / <i>Chrysolepis sempervirens</i>	Forestland	F022BI107CA
2%-Buttelake-----	<i>Abies magnifica</i> - <i>Abies concolor</i> / <i>Chrysolepis sempervirens</i>	Forestland	F022BI107CA
1%-Badgerwash-----	<i>Abies magnifica</i> - <i>Abies concolor</i> / <i>Chrysolepis sempervirens</i>	Forestland	F022BI107CA
1%-Buttewash-----	<i>Abies magnifica</i> - <i>Abies concolor</i> / <i>Chrysolepis sempervirens</i>	Forestland	F022BI107CA
107: 40%-Badgerflat-----	<i>Abies magnifica</i> - <i>Abies concolor</i> / <i>Chrysolepis sempervirens</i>	Forestland	F022BI107CA
35%-Cenplat-----	<i>Abies magnifica</i> - <i>Abies concolor</i> / <i>Chrysolepis sempervirens</i>	Forestland	F022BI107CA
3%-Buttelake-----	<i>Abies concolor</i> - <i>Pinus jeffreyi</i> / <i>Elymus elymoides</i>	Forestland	F022BI119CA
3%-Dittmar-----	<i>Pinus jeffreyi</i> / <i>Arctostaphylos patula</i>	Forestland	F022BI121CA
3%-Juniperlake-----	<i>Abies magnifica</i> / <i>Penstemon gracilentus</i> - <i>Lupinus arbustus</i>	Forestland	F022BI112CA
3%-Scoured-----	<i>Abies magnifica</i> / <i>Arctostaphylos nevadensis</i> / <i>Carex rossii</i> - <i>Penstemon gracilentus</i>	Forestland	F022BI102CA
2%-Sunhoff-----	<i>Abies magnifica</i> - <i>Abies concolor</i> / <i>Chrysolepis sempervirens</i>	Forestland	F022BI107CA
108: 80%-Typic Xerorthents-----	<i>Pinus jeffreyi</i> - <i>Abies concolor</i> / <i>Achnatherum occidentale</i> ssp. <i>occidentale</i> - <i>Elymus elymoides</i>	Forestland	F022BI100CA
10%-Buttewash-----	<i>Pinus jeffreyi</i> - <i>Abies concolor</i> / <i>Achnatherum occidentale</i> ssp. <i>occidentale</i> - <i>Elymus elymoides</i>	Forestland	F022BI100CA
5%-Typic Xerorthents, tephra-----	<i>Pinus jeffreyi</i> - <i>Abies concolor</i> / <i>Achnatherum occidentale</i> ssp. <i>occidentale</i> - <i>Elymus elymoides</i>	Forestland	F022BI100CA

Soil Survey of Lassen Volcanic National Park, California

Table 9.—Ecological Site-Soil Correlation—Continued

Map unit symbol, soil percent, and soil name	Ecological site name	Ecological site type	Ecological site ID
108: 3%-Humic Haploxerands, moist lake terrace-----	Pinus contorta var. murrayana/Elymus elymoides	Forestland	F022BI125CA
2%-Buttelake-----	Pinus jeffreyi-Abies concolor/Achnatherum occidentale ssp. occidentale- Elymus elymoides	Forestland	F022BI100CA
109: 85%-Prospectpeak-----	Abies magnifica-Pinus jeffreyi/Arctostaphylos nevadensis-Achnatherum occidentale	Forestland	F022BI109CA
10%-Bearrubble-----	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis-Chrysolepis sempervirens/Angelica breweri	Forestland	F022BI114CA
110: 50%-Bearrubble-----	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis-Chrysolepis sempervirens/Angelica breweri	Forestland	F022BI114CA
3%-Scoured-----	Abies magnifica/Arctostaphylos nevadensis/Carex rossii- Penstemon gracilentus	Forestland	F022BI102CA
2%-Prospectpeak-----	Abies magnifica-Pinus jeffreyi/Arctostaphylos nevadensis-Achnatherum occidentale	Forestland	F022BI109CA
111: 95%-Vitrandic Xerorthents, debris fan-----	Pinus jeffreyi- Abies/Achnatherum-Lupinus	Forestland	F022BI106CA
5%-Typic Endoaquents-----	Sandy flood plains	Rangeland	R022BI213CA
112: 85%-Cascadesprings-----	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale	Forestland	F022BI115CA
13%-Terracelake-----	Glaciated mountain slopes	Rangeland	R022BI204CA
2%-Emeraldlake-----	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale	Forestland	F022BI115CA
113: 35%-Terracelake-----	Glaciated mountain slopes	Rangeland	R022BI204CA
25%-Emeraldlake-----	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale	Forestland	F022BI115CA

Soil Survey of Lassen Volcanic National Park, California

Table 9.—Ecological Site-Soil Correlation—Continued

Map unit symbol, soil percent, and soil name	Ecological site name	Ecological site type	Ecological site ID
113: 20%-Readingpeak-----	<i>Abies magnifica</i> - <i>Pinus monticola</i> / <i>Arctostaphylos nevadensis</i> / <i>Achnatherum occidentale</i>	Forestland	F022BI115CA
3%-Acroph-----	Glaciated mountain slopes	Rangeland	R022BI204CA
2%-Cascadesprings-----	<i>Abies magnifica</i> - <i>Pinus monticola</i> / <i>Arctostaphylos nevadensis</i> / <i>Achnatherum occidentale</i>	Forestland	F022BI115CA
114: 25%-Emeraldlake-----	Alpine slopes	Rangeland	R022BI207CA
23%-Terracelake-----	Alpine slopes	Rangeland	R022BI207CA
20%-Readingpeak-----	<i>Tsuga mertensiana</i> - <i>Pinus albicaulis</i> / <i>Holodiscus discolor</i> / <i>Lupinus obtusilobus</i> - <i>Polygonum davisiae</i>	Forestland	F022BI124CA
3%-Acroph-----	Alpine slopes	Rangeland	R022BI207CA
2%-Xeric Vitricryands, cirque floor-----	Cirque floor	Rangeland	R022BI205CA
115: 85%-Shadowlake-----	<i>Tsuga mertensiana</i> - <i>Abies magnifica</i> / <i>Lupinus obtusilobus</i> - <i>Eriogonum marifolium</i>	Forestland	F022BI111CA
10%-Terracelake-----	<i>Tsuga mertensiana</i> - <i>Abies magnifica</i> / <i>Lupinus obtusilobus</i> - <i>Eriogonum marifolium</i>	Forestland	F022BI111CA
5%-Xeric Vitricryands, cirque floor-----	Cirque floor	Rangeland	R022BI205CA
116: 30%-Xeric Vitricryands, tephra over till-----	<i>Tsuga mertensiana</i> / <i>Lupinus obtusilobus</i> - <i>Cistanthe umbellata</i> var. <i>umbellata</i>	Forestland	F022BI104CA
25%-Terracelake-----	<i>Tsuga mertensiana</i> / <i>Lupinus obtusilobus</i> - <i>Cistanthe umbellata</i> var. <i>umbellata</i>	Forestland	F022BI104CA
15%-Xeric Vitricryands, cirque floor-----	Cirque floor	Rangeland	R022BI205CA
10%-Humic Xeric Vitricryands-----	<i>Tsuga mertensiana</i> / <i>Lupinus obtusilobus</i> - <i>Cistanthe umbellata</i> var. <i>umbellata</i>	Forestland	F022BI104CA
5%-Acroph-----	Alpine slopes	Rangeland	R022BI207CA

Soil Survey of Lassen Volcanic National Park, California

Table 9.—Ecological Site-Soil Correlation—Continued

Map unit symbol, soil percent, and soil name	Ecological site name	Ecological site type	Ecological site ID
117: 90%-Humic Haploxerands, moist lake terrace-----	<i>Pinus contorta</i> var. <i>murrayana</i> / <i>Elymus elymoides</i>	Forestland	F022BI125CA
5%-Typic Endoaquands-----	<i>Pinus contorta</i> var. <i>murrayana</i> / <i>Veratrum</i> <i>californicum</i> var. <i>californicum</i> - <i>Elymus glaucus</i>	Forestland	F022BI108CA
3%-Buttewash-----	<i>Pinus jeffreyi</i> - <i>Abies</i> <i>concolor</i> / <i>Achnatherum</i> <i>occidentale</i> ssp. <i>occidentale</i> - <i>Elymus elymoides</i>	Forestland	F022BI100CA
2%-Badgerwash-----	<i>Pinus contorta</i> var. <i>murrayana</i> / <i>Elymus elymoides</i>	Forestland	F022BI125CA
118: 90%-Typic Dystroxerepts, landslides-----	<i>Abies magnifica</i> / <i>Carex</i> - <i>Hieracium albiflorum</i>	Forestland	F022BI118CA
5%-Brokeoff-----	Moderately deep fragmental slopes	Rangeland	R022BI203CA
5%-Endoaquepts-----	Loamy seeps	Rangeland	R022BI209CA
119: 30%-Diamondpeak-----	<i>Abies magnifica</i> / <i>Monardella</i> <i>odoratissima</i> - <i>Phlox diffusa</i>	Forestland	F022BI113CA
25%-Brokeoff-----	Moderately deep fragmental slopes	Rangeland	R022BI203CA
14%-Endoaquepts-----	Loamy seeps	Rangeland	R022BI209CA
11%-Aquic Dystroxerepts, debris flows-----	Active hydrothermal areas	Rangeland	R022BI216CA
10%-Typic Dystroxerepts-----	Active hydrothermal areas	Rangeland	R022BI216CA
120: 65%-Buttelake-----	<i>Abies concolor</i> - <i>Pinus</i> <i>jeffreyi</i> / <i>Elymus elymoides</i>	Forestland	F022BI119CA
15%-Sunhoff-----	<i>Abies magnifica</i> - <i>Abies</i> <i>concolor</i> / <i>Chrysolepis</i> <i>sempervirens</i>	Forestland	F022BI107CA
10%-Talved-----	Talus slope	Rangeland	R022BI200CA
5%-Scoured-----	<i>Abies magnifica</i> / <i>Arctostaphylos</i> <i>nevadensis</i> / <i>Carex rossii</i> - <i>Penstemon gracilentus</i>	Forestland	F022BI102CA
122: 35%-Xeric Vitricryands, colluvium-	<i>Tsuga mertensiana</i> / <i>Lupinus</i> <i>obtusilobus</i> - <i>Cistanthe</i> <i>umbellata</i> var. <i>umbellata</i>	Forestland	F022BI104CA

Soil Survey of Lassen Volcanic National Park, California

Table 9.—Ecological Site-Soil Correlation—Continued

Map unit symbol, soil percent, and soil name	Ecological site name	Ecological site type	Ecological site ID
122: 30%-Xeric Vitricryands, ash over cinders-----	Tsuga mertensiana-Abies magnifica/Lupinus obtusilobus-Eriogonum marifolium	Forestland	F022BI111CA
20%-Xeric Vitricryands, bedrock---	Cryic pyroclastic cones	Rangeland	R022BI208CA
125: 55%-Humic Haploxerands, stream terrace-----	Abies concolor-Pinus contorta var. murrayana/Elymus glaucus	Forestland	F022BI120CA
40%-Aquandic Humaquepts, flood plains-----	Loamy flood plains	Rangeland	R022BI210CA
3%-Aeric Endoaquepts-----	Loamy flood plains	Rangeland	R022BI210CA
126: 45%-Kingsiron-----	Abies concolor-Calocedrus decurrens/Ceanothus cordulatus/Achnatherum	Forestland	F022BI110CA
20%-Dittmar-----	Pinus jeffreyi/Arctostaphylos patula	Forestland	F022BI121CA
10%-Scoured-----	Abies magnifica/Arctostaphylos nevadensis/Carex rossii- Penstemon gracilentus	Forestland	F022BI102CA
3%-Bearrubble-----	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis-Chrysolepis sempervirens/Angelica breweri	Forestland	F022BI114CA
2%-Aquepts-----	Spring complex	Rangeland	R022BI211CA
127: 65%-Humic Haploxerands, strath terrace-----	Abies concolor-Calocedrus decurrens/Ceanothus cordulatus/Achnatherum	Forestland	F022BI110CA
15%-Aquepts-----	Spring complex	Rangeland	R022BI211CA
5%-Dittmar-----	Pinus jeffreyi/Arctostaphylos patula	Forestland	F022BI121CA
5%-Humic Haploxerands, colluvium--	Abies concolor-Calocedrus decurrens/Ceanothus cordulatus/Achnatherum	Forestland	F022BI110CA
4%-Aquandic Humaquepts, flood plains-----	Loamy flood plains	Rangeland	R022BI210CA
1%-Endoaquepts-----	Loamy seeps	Rangeland	R022BI209CA
129: 80%-Humic Haploxerands, colluvium-	Abies concolor-Calocedrus decurrens/Ceanothus cordulatus/Achnatherum	Forestland	F022BI110CA

Soil Survey of Lassen Volcanic National Park, California

Table 9.—Ecological Site-Soil Correlation—Continued

Map unit symbol, soil percent, and soil name	Ecological site name	Ecological site type	Ecological site ID
129: 10%-Kingsiron-----	Abies concolor-Calocedrus decurrens/Ceanothus cordulatus/Achnatherum	Forestland	F022BI110CA
2%-Aquepts-----	Spring complex	Rangeland	R022BI211CA
2%-Humic Haploxerands, strath terrace-----	Abies concolor-Calocedrus decurrens/Ceanothus cordulatus/Achnatherum	Forestland	F022BI110CA
130: 55%-Histic Humaquepts, lake sediments-----	Frigid lacustrine flat	Rangeland	R022BI217CA
30%-Histic Humaquepts, frequently flooded-----	Frigid lacustrine flat	Rangeland	R022BI217CA
15%-Typic Endoaquands-----	Pinus contorta var. murrayana/Veratrum californicum var. californicum-Elymus glaucus	Forestland	F022BI108CA
132: 90%-Vitrandic Cryorthents, debris flows-----	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale	Forestland	F022BI115CA
3%-Xeric Vitricryands, pyroclastic surge-----	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale	Forestland	F022BI115CA
2%-Typic Endoaquents-----	Sandy flood plains	Rangeland	R022BI213CA
2%-Vitrandic Xerorthents, moraine-	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens	Forestland	F022BI103CA
1%-Typic Vitrixerands-----	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens	Forestland	F022BI103CA
133: 55%-Vitrandic Xerofluvents-----	Pinus jeffreyi- Abies/Achnatherum-Lupinus	Forestland	F022BI106CA
30%-Typic Endoaquents-----	Sandy flood plains	Rangeland	R022BI213CA
5%-Vitrandic Xerofluvents-----	Pinus jeffreyi- Abies/Achnatherum-Lupinus	Forestland	F022BI106CA
5%-Vitrandic Xerofluvents, debris flows-----	Pinus contorta var. murrayana- Populus tremuloides/Elymus glaucus	Forestland	F022BI105CA

Soil Survey of Lassen Volcanic National Park, California

Table 9.—Ecological Site-Soil Correlation—Continued

Map unit symbol, soil percent, and soil name	Ecological site name	Ecological site type	Ecological site ID
133: 5%-Vitrandic Xerorthents, debris fan-----	Pinus jeffreyi- Abies/Achnatherum-Lupinus	Forestland	F022BI106CA
134: 85%-Chaos-----	Pinus jeffreyi-Abies concolor/Holodiscus discolor	Forestland	F022BI122CA
3%-Aquepts-----	Pinus contorta var. murrayana/Veratrum californicum var. californicum-Elymus glaucus	Forestland	F022BI108CA
136: 45%-Terracelake-----	Tsuga mertensiana-Abies magnifica/Lupinus obtusilobus-Eriogonum marifolium	Forestland	F022BI111CA
15%-Xeric Vitricryands, cirque floor-----	Cirque floor	Rangeland	R022BI205CA
10%-Acroph-----	Alpine slopes	Rangeland	R022BI207CA
10%-Xeric Vitricryands, tephra over till-----	Tsuga mertensiana/Lupinus obtusilobus-Cistanthe umbellata var. umbellata	Forestland	F022BI104CA
137: 75%-Xeric Vitricryands-----	Windy peak	Rangeland	R022BI212CA
3%-Acroph-----	Glaciated mountain slopes	Rangeland	R022BI204CA
2%-Terracelake-----	Alpine slopes	Rangeland	R022BI207CA
138: 80%-Vitrandic Xerofluvents, debris flows-----	Pinus contorta var. murrayana- Populus tremuloides/Elymus glaucus	Forestland	F022BI105CA
10%-Typic Endoaquents-----	Sandy flood plains	Rangeland	R022BI213CA
9%-Vitrixerands, low elevation----	Abies concolor-Pinus contorta var. murrayana/Achnatherum occidentale	Forestland	F022BI123CA
139: 60%-Duric Vitraquands-----	Abies magnifica-Pinus contorta var. murrayana/Elymus elymoides	Forestland	F022BI117CA
20%-Typic Endoaquands-----	Pinus contorta var. murrayana/Veratrum californicum var. californicum-Elymus glaucus	Forestland	F022BI108CA
15%-Aquadric Cryaquents-----	Cryic lacustrine flat	Rangeland	R022BI206CA
3%-Vitrandic Cryofluvents-----	Cryic lacustrine flat	Rangeland	R022BI206CA
1%-Typic Endoaquents-----	Sandy flood plains	Rangeland	R022BI213CA

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Table 9.—Ecological Site-Soil Correlation—Continued

Map unit symbol, soil percent, and soil name	Ecological site name	Ecological site type	Ecological site ID
139: 1%-Vitrixerands-----	<i>Abies magnifica</i> - <i>Pinus contorta</i> var. <i>murrayana</i> / <i>Elymus</i> <i>elymoides</i>	Forestland	F022BI117CA
140: 90%-Vitrixerands-----	<i>Abies magnifica</i> - <i>Pinus contorta</i> var. <i>murrayana</i> / <i>Elymus</i> <i>elymoides</i>	Forestland	F022BI117CA
10%-Duric Vitraquands-----	<i>Abies magnifica</i> - <i>Pinus contorta</i> var. <i>murrayana</i> / <i>Elymus</i> <i>elymoides</i>	Forestland	F022BI117CA
141: 40%-Humic Haploxerands-----	<i>Abies concolor</i> - <i>Pinus</i> <i>jeffreyi</i> / <i>Arctostaphylos</i> <i>patula</i> - <i>Chrysolepis</i> <i>sempervirens</i>	Forestland	F022BI103CA
35%-Typic Haploxerands-----	<i>Abies concolor</i> - <i>Pinus</i> <i>jeffreyi</i> / <i>Arctostaphylos</i> <i>patula</i> - <i>Chrysolepis</i> <i>sempervirens</i>	Forestland	F022BI103CA
15%-Bearrubble-----	<i>Abies concolor</i> - <i>Pinus</i> <i>jeffreyi</i> / <i>Arctostaphylos</i> <i>patula</i> - <i>Chrysolepis</i> <i>sempervirens</i>	Forestland	F022BI103CA
142: 85%-Cragwash-----	<i>Abies concolor</i> - <i>Pinus</i> <i>jeffreyi</i> / <i>Arctostaphylos</i> <i>patula</i> - <i>Chrysolepis</i> <i>sempervirens</i>	Forestland	F022BI103CA
7%-Sueredo-----	<i>Abies concolor</i> - <i>Pinus</i> <i>jeffreyi</i> / <i>Arctostaphylos</i> <i>patula</i> - <i>Chrysolepis</i> <i>sempervirens</i>	Forestland	F022BI103CA
3%-Aquepts-----	<i>Pinus contorta</i> var. <i>murrayana</i> / <i>Veratrum</i> <i>californicum</i> var. <i>californicum</i> - <i>Elymus glaucus</i>	Forestland	F022BI108CA
143: 95%-Andic Durixerepts-----	<i>Abies magnifica</i> - <i>Pinus</i> <i>monticola</i> / <i>Arctostaphylos</i> <i>nevadensis</i> / <i>Achnatherum</i> <i>occidentale</i>	Forestland	F022BI115CA
3%-Cascadesprings-----	<i>Abies magnifica</i> - <i>Pinus</i> <i>monticola</i> / <i>Arctostaphylos</i> <i>nevadensis</i> / <i>Achnatherum</i> <i>occidentale</i>	Forestland	F022BI115CA
2%-Aquepts-----	Spring complex	Rangeland	R022BI211CA
144: 55%-Xeric Vitricryands, cirque floor-----	Cirque floor	Rangeland	R022BI205CA

Soil Survey of Lassen Volcanic National Park, California

Table 9.—Ecological Site-Soil Correlation—Continued

Map unit symbol, soil percent, and soil name	Ecological site name	Ecological site type	Ecological site ID
144: 30%-Humic Xeric Vitricryands-----	Tsuga mertensiana/Lupinus obtusilobus-Cistanthe umbellata var. umbellata	Forestland	F022BI104CA
5%-Terracelake-----	Alpine slopes	Rangeland	R022BI207CA
3%-Aquepts-----	Spring complex	Rangeland	R022BI211CA
2%-Shadowlake-----	Tsuga mertensiana-Abies magnifica/Lupinus obtusilobus-Eriogonum marifolium	Forestland	F022BI111CA
145: 85%-Sueredo-----	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens	Forestland	F022BI103CA
3%-Cragwash-----	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens	Forestland	F022BI103CA
2%-Aquepts-----	Pinus contorta var. murrayana/Veratrum californicum var. californicum-Elymus glaucus	Forestland	F022BI108CA
2%-Badgerflat-----	Pinus jeffreyi-Pinus contorta var. murrayana/Monardella odoratissima	Forestland	F022BI126CA
146: 90%-Sueredo-----	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens	Forestland	F022BI103CA
3%-Scoured-----	Pinus jeffreyi/Arctostaphylos patula	Forestland	F022BI121CA
1%-Vitrandic Xerorthents, debris fan-----	Pinus jeffreyi- Abies/Achnatherum-Lupinus	Forestland	F022BI106CA
147: 85%-Summertown-----	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens	Forestland	F022BI103CA
7%-Sueredo-----	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens	Forestland	F022BI103CA
4%-Humic Haploxerands, outwash----	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens	Forestland	F022BI103CA

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Table 9.—Ecological Site-Soil Correlation—Continued

Map unit symbol, soil percent, and soil name	Ecological site name	Ecological site type	Ecological site ID
147: 2%-Vitrandic Xerorthents, debris fan-----	Pinus jeffreyi- Abies/Achnatherum-Lupinus	Forestland	F022BI106CA
148: 70%-Humic Haploxerands, lake terrace-----	Abies magnifica/Penstemon gracilentus-Lupinus arbustus	Forestland	F022BI112CA
15%-Typic Endoaquands-----	Pinus contorta var. murrayana/Veratrum californicum var. californicum-Elymus glaucus	Forestland	F022BI108CA
5%-Juniperlake-----	Abies magnifica/Penstemon gracilentus-Lupinus arbustus	Forestland	F022BI112CA
2%-Histic Humaquepts, lake sediments-----	Frigid lacustrine flat	Rangeland	R022BI217CA
1%-Histic Humaquepts, frequently flooded-----	Frigid lacustrine flat	Rangeland	R022BI217CA
149: 15%-Emeraldlake-----	Alpine slopes	Rangeland	R022BI207CA
4%-Acroph-----	Glaciated mountain slopes	Rangeland	R022BI204CA
3%-Readingpeak-----	Tsuga mertensiana-Pinus albicaulis/Holodiscus discolor/Lupinus obtusilobus- Polygonum davisiae	Forestland	F022BI124CA
3%-Terracelake-----	Alpine slopes	Rangeland	R022BI207CA
150: 40%-Shadowlake-----	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale	Forestland	F022BI115CA
30%-Terracelake-----	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale	Forestland	F022BI115CA
15%-Acroph-----	Glaciated mountain slopes	Rangeland	R022BI204CA
2%-Aquepts-----	Spring complex	Rangeland	R022BI211CA
2%-Sueredo-----	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens	Forestland	F022BI103CA
151: 40%-Terracelake-----	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale	Forestland	F022BI115CA
20%-Acroph-----	Glaciated mountain slopes	Rangeland	R022BI204CA

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Table 9.—Ecological Site-Soil Correlation—Continued

Map unit symbol, soil percent, and soil name	Ecological site name	Ecological site type	Ecological site ID
151: 15%-Shadowlake-----	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale	Forestland	F022BI115CA
5%-Sueredo-----	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale	Forestland	F022BI115CA
2%-Aquepts-----	Spring complex	Rangeland	R022BI211CA
152: 35%-Terracelake-----	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale	Forestland	F022BI115CA
30%-Shadowlake-----	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale	Forestland	F022BI115CA
15%-Acroph-----	Glaciated mountain slopes	Rangeland	R022BI204CA
4%-Sueredo-----	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale	Forestland	F022BI115CA
2%-Aquepts-----	Spring complex	Rangeland	R022BI211CA
153: 50%-Typic Vitrixerands-----	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens	Forestland	F022BI103CA
45%-Vitrandic Xerorthents, moraine	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens	Forestland	F022BI103CA
2%-Sueredo-----	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens	Forestland	F022BI103CA
2%-Vitrandic Cryorthents, debris flows-----	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale	Forestland	F022BI115CA
1%-Vitrandic Xerorthents, debris fan-----	Pinus jeffreyi- Abies/Achnatherum-Lupinus	Forestland	F022BI106CA
154: 45%-Typic Vitrixerands-----	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens	Forestland	F022BI103CA

Soil Survey of Lassen Volcanic National Park, California

Table 9.—Ecological Site-Soil Correlation—Continued

Map unit symbol, soil percent, and soil name	Ecological site name	Ecological site type	Ecological site ID
154: 35%-Vitrandic Xerorthents, moraine	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens	Forestland	F022BI103CA
3%-Aquepts-----	Pinus contorta var. murrayana- Populus tremuloides/Elymus glaucus	Forestland	F022BI105CA
3%-Sueredo-----	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens	Forestland	F022BI103CA
2%-Typic Endoaquents-----	Sandy flood plains	Rangeland	R022BI213CA
2%-Vitrandic Cryorthents, debris flows-----	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale	Forestland	F022BI115CA
155: 90%-Xeric Vitricryands, pyroclastic surge-----	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale	Forestland	F022BI115CA
5%-Vitrandic Cryorthents, debris flows-----	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale	Forestland	F022BI115CA
3%-Shadowlake-----	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale	Forestland	F022BI115CA
2%-Aquepts-----	Spring complex	Rangeland	R022BI211CA
156: 90%-Xeric Vitricryands, pyroclastic surge-----	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale	Forestland	F022BI115CA
5%-Aquepts-----	Spring complex	Rangeland	R022BI211CA
5%-Shadowlake-----	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale	Forestland	F022BI115CA
157: 90%-Typic Vitriixerands, very deep-	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens	Forestland	F022BI103CA
3%-Typic Vitriixerands, unglaciated	Pinus jeffreyi/Arctostaphylos patula	Forestland	F022BI121CA

Soil Survey of Lassen Volcanic National Park, California

Table 9.—Ecological Site-Soil Correlation—Continued

Map unit symbol, soil percent, and soil name	Ecological site name	Ecological site type	Ecological site ID
158: 75%-Typic Vitrixerands, unglaciaded-----	Pinus jeffreyi/Arctostaphylos patula	Forestland	F022BI121CA
5%-Typic Vitrixerands, very deep--	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens	Forestland	F022BI103CA
159: 40%-Typic Vitrixerands, bouldery--	Pinus jeffreyi/Arctostaphylos patula	Forestland	F022BI121CA
35%-Typic Vitrixerands, tephra over colluvium-----	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens	Forestland	F022BI103CA
160: 45%-Aeric Endoaquents-----	Gravelly flood plains	Rangeland	R022BI215CA
35%-Humic Haploxerands, stream terrace-----	Abies concolor-Calocedrus decurrens/Ceanothus cordulatus/Achnatherum	Forestland	F022BI110CA
5%-Aquandic Humaquepts, flood plains-----	Gravelly flood plains	Rangeland	R022BI215CA
161: 95%-Typic Psammaquents-----	Sandy flood plains	Rangeland	R022BI213CA
162: 95%-Humic Haploxerands, outwash---	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens	Forestland	F022BI103CA
3%-Vitrandic Xerorthents, debris fan-----	Pinus jeffreyi- Abies/Achnatherum-Lupinus	Forestland	F022BI106CA
2%-Summertown-----	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens	Forestland	F022BI103CA
163: 65%-Vitrandic Cryofluvents-----	Cryic lacustrine flat	Rangeland	R022BI206CA
30%-Aquandic Cryaquents-----	Cryic lacustrine flat	Rangeland	R022BI206CA
2%-Typic Endoaquands-----	Pinus contorta var. murrayana/Veratrum californicum var. californicum-Elymus glaucus	Forestland	F022BI108CA
1%-Aquepts-----	Spring complex	Rangeland	R022BI211CA
1%-Duric Vitraquands-----	Abies magnifica-Pinus contorta var. murrayana/Elymus elymoides	Forestland	F022BI117CA

Soil Survey of Lassen Volcanic National Park, California

Table 9.—Ecological Site-Soil Correlation—Continued

Map unit symbol, soil percent, and soil name	Ecological site name	Ecological site type	Ecological site ID
163: 1%-Typic Endoaquepts-----	Sandy flood plains	Rangeland	R022BI213CA
164: 35%-Aquepts-----	Spring complex	Rangeland	R022BI211CA
25%-Typic Petraquepts, bedrock----	Spring complex	Rangeland	R022BI211CA
20%-Aquic Haploxerands-----	Abies concolor-Pinus contorta var. murrayana/Elymus glaucus	Forestland	F022BI120CA
10%-Typic Petraquepts-----	Thermal seeps	Rangeland	R022BI218CA
1%-Aquandic Humaquepts, flood plains-----	Loamy flood plains	Rangeland	R022BI210CA
1%-Humic Haploxerands, strath terrace-----	Abies concolor-Calocedrus decurrens/Ceanothus cordulatus/Achnatherum	Forestland	F022BI110CA
165: 35%-Aquandic Humaquepts-----	Frigid alluvial flat	Rangeland	R022BI202CA
25%-Histic Humaquepts-----	Frigid alluvial flat	Rangeland	R022BI202CA
20%-Aquandic Endoaquepts-----	Frigid alluvial flat	Rangeland	R022BI202CA
15%-Terric Haplohemists-----	Frigid alluvial flat	Rangeland	R022BI202CA
5%-Humic Haploxerands, stream terrace-----	Abies concolor-Pinus contorta var. murrayana/Elymus glaucus	Forestland	F022BI120CA
166: 50%-Aquic Haploxerands-----	Abies concolor-Pinus contorta var. murrayana/Elymus glaucus	Forestland	F022BI120CA
40%-Humic Haploxerands, outwash terrace-----	Abies concolor-Calocedrus decurrens/Ceanothus cordulatus/Achnatherum	Forestland	F022BI110CA
4%-Juniperlake, bouldery-----	Abies concolor-Calocedrus decurrens/Ceanothus cordulatus/Achnatherum	Forestland	F022BI110CA
3%-Humic Haploxerands, strath terrace-----	Abies concolor-Calocedrus decurrens/Ceanothus cordulatus/Achnatherum	Forestland	F022BI110CA
2%-Aquepts-----	Spring complex	Rangeland	R022BI211CA
1%-Aquandic Humaquepts, flood plains-----	Loamy flood plains	Rangeland	R022BI210CA
167: 35%-Emeraldlake-----	Alpine slopes	Rangeland	R022BI207CA
20%-Readingpeak-----	Tsuga mertensiana-Pinus albicaulis/Holodiscus discolor/Lupinus obtusilobus- Polygonum davisiae	Forestland	F022BI124CA

Soil Survey of Lassen Volcanic National Park, California

Table 9.—Ecological Site-Soil Correlation—Continued

Map unit symbol, soil percent, and soil name	Ecological site name	Ecological site type	Ecological site ID
167: 15%-Terracelake-----	Alpine slopes	Rangeland	R022BI207CA
168: 90%-Vitrixerands, low elevation---	Abies concolor-Pinus contorta var. murrayana/Achnatherum occidentale	Forestland	F022BI123CA
5%-Vitrandic Xerofluvents, debris flows-----	Pinus contorta var. murrayana- Populus tremuloides/Elymus glaucus	Forestland	F022BI105CA
4%-Sueredo-----	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens	Forestland	F022BI103CA
169: 55%-Sueredo-----	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens	Forestland	F022BI103CA
15%-Scoured-----	Pinus jeffreyi/Arctostaphylos patula	Forestland	F022BI121CA
170: 20%-Emeraldlake-----	Alpine slopes	Rangeland	R022BI207CA
15%-Readingpeak-----	Alpine slopes	Rangeland	R022BI207CA
12%-Terracelake-----	Alpine slopes	Rangeland	R022BI207CA
171: 50%-Aquepts-----	Spring complex	Rangeland	R022BI211CA
35%-Typic Petraquepts, bedrock---	Spring complex	Rangeland	R022BI211CA
5%-Endoaquepts-----	Loamy seeps	Rangeland	R022BI209CA
5%-Shadowlake-----	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale	Forestland	F022BI115CA
5%-Typic Endoaquands-----	Pinus contorta var. murrayana/Veratrum californicum var. californicum-Elymus glaucus	Forestland	F022BI108CA
172: 90%-Badgerflat-----	Pinus jeffreyi-Pinus contorta var. murrayana/Monardella odoratissima	Forestland	F022BI126CA
5%-Badgerwash-----	Pinus contorta var. murrayana/Elymus elymoides	Forestland	F022BI125CA
4%-Cenplat-----	Abies magnifica-Abies concolor/Chrysolepis sempervirens	Forestland	F022BI107CA

Soil Survey of Lassen Volcanic National Park, California

Table 9.—Ecological Site-Soil Correlation—Continued

Map unit symbol, soil percent, and soil name	Ecological site name	Ecological site type	Ecological site ID
172: 1%-Typic Endoaquands-----	Pinus contorta var. murrayana/Veratrum californicum var. californicum-Elymus glaucus	Forestland	F022BI108CA
173: 90%-Badgerwash-----	Pinus contorta var. murrayana/Elymus elymoides	Forestland	F022BI125CA
8%-Typic Endoaquands-----	Pinus contorta var. murrayana/Veratrum californicum var. californicum-Elymus glaucus	Forestland	F022BI108CA
2%-Badgerflat-----	Pinus jeffreyi-Pinus contorta var. murrayana/Monardella odoratissima	Forestland	F022BI126CA
174: 60%-Vitrandic Cryorthents-----	Pyroclastic flow	Rangeland	R022BI214CA
20%-Readingpeak-----	Tsuga mertensiana-Pinus albicaulis/Holodiscus discolor/Lupinus obtusilobus- Polygonum davisiae	Forestland	F022BI124CA
7%-Terracelake-----	Alpine slopes	Rangeland	R022BI207CA
175: 75%-Shadowlake-----	Tsuga mertensiana-Abies magnifica/Lupinus obtusilobus-Eriogonum marifolium	Forestland	F022BI111CA
15%-Vitrandic Cryofluvents-----	Cryic lacustrine flat	Rangeland	R022BI206CA
5%-Terracelake-----	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale	Forestland	F022BI115CA
3%-Aquandic Cryaquents-----	Cryic lacustrine flat	Rangeland	R022BI206CA
2%-Aquepts-----	Spring complex	Rangeland	R022BI211CA
176: 85%-Juniperlake, bouldery-----	Abies concolor-Calocedrus decurrens/Ceanothus cordulatus/Achnatherum	Forestland	F022BI110CA
10%-Scoured-----	Pinus jeffreyi/Arctostaphylos patula	Forestland	F022BI121CA
3%-Humic Haploxerands, outwash terrace-----	Abies concolor-Calocedrus decurrens/Ceanothus cordulatus/Achnatherum	Forestland	F022BI110CA
1%-Aquepts-----	Spring complex	Rangeland	R022BI211CA
1%-Endoaquepts-----	Loamy seeps	Rangeland	R022BI209CA

Soil Survey of Lassen Volcanic National Park, California

Table 9.—Ecological Site-Soil Correlation—Continued

Map unit symbol, soil percent, and soil name	Ecological site name	Ecological site type	Ecological site ID
177: 85%-Vitrandic Cryorthents, debris flows, high elevation-----	Alpine slopes	Rangeland	R022BI207CA
202: 85%-Typic Xerorthents, tephra-----	Bedded tephra deposits	Rangeland	R022BI201CA
10%-Typic Xerorthents, welded-----	Bedded tephra deposits	Rangeland	R022BI201CA
203: 90%-Typic Xerorthents, tephra-----	Pinus jeffreyi-Abies concolor/Achnatherum occidentale ssp. occidentale- Elymus elymoides	Forestland	F022BI100CA
10%-Typic Xerorthents-----	Pinus jeffreyi-Abies concolor/Achnatherum occidentale ssp. occidentale- Elymus elymoides	Forestland	F022BI100CA

Soil Survey of Lassen Volcanic National Park, California

Table 10.--Forest Productivity

[Characteristic trees are pulled from the National Soil Information System (NASIS) component forest productivity table. The site index base corresponds to the site index curve used to determine the site index and the annual productivity of the forest overstory tree species displayed in this report. The site index base age indicates the age used for the site curves. The volume of wood fiber is the yield likely to be produced by the most important tree species at the age of culmination of the mean annual increment (CMAI). The volume is the amount of fiber produced in a fully stocked, even-aged, unmanaged stand. CMAI age is the point at which the stand reaches its maximum annual rate of growth. The letters "rv" indicate representative value. Only the map unit components suitable for forest production are listed]

Map unit symbol and soil name	Potential productivity				Volume of wood fiber (CMAI) cu ft/ac/yr low-rv-high
	Characteristic trees	Site index	Site index	Site index in feet	
		base	base age		
			yr	low-rv-high	
100: Buttelake-----	Jeffrey pine-----	600	100	75-83-93	62-74-90
	white fir-----	030	50	41-47-56	67-83-113
101: Buttewash-----	Jeffrey pine-----	600	100	69-88-100	54-82-102
	white fir-----	030	50	55-59-67	98-131-152
102: Ashbutte-----	California red fir--	050	50	32-37-44	110-126-149
	Jeffrey pine-----	600	100	62-63-65	48-49-50
Vitrandic Xerorthents---	California red fir--	050	50	29-32-35	101-110-119
	Jeffrey pine-----	600	100	62-64-65	48-50-50
103: Scoured-----	California red fir--	050	50	25-28-33	90-98-113
	Sierra lodgepole				
	pine-----	520	100	45-49-53	36-40-43
	western white pine--	570	50	20-30-39	48-67-82
104: Scoured-----	California red fir--	050	50	33-46-58	113-157-205
	Sierra lodgepole				
	pine-----	520	100	67-69-74	56-58-63
	western white pine--	570	50	23-33-40	64-72-84
Juniperlake-----	California red fir--	050	50	49-52-53	167-180-184
	white fir-----	030	50	52-57-64	98-117-142
105: Juniperlake-----	California red fir--	050	50	49-52-53	167-180-184
	white fir-----	030	50	52-57-64	98-117-142
106: Cenplat, ashy loamy sand	California red fir--	050	50	32-37-45	110-126-153
	western white pine--	570	50	40-43-45	84-89-92
107: Badgerflat-----	California red fir--	050	50	35-42-46	119-142-157
Cenplat-----	white fir-----	030	50	43-46-51	72-80-95

Soil Survey of Lassen Volcanic National Park, California

Table 10.--Forest Productivity--Continued

Map unit symbol and soil name	Potential productivity				Volume of wood fiber (CMAI) cu ft/ac/yr <u>low-rv-high</u>
	Characteristic trees	Site index base	Site index base age	Site index in feet <u>yr</u> <u>low-rv-high</u>	
108: Typic Xerorthents-----	Jeffrey pine-----	600	100	51-68-78	38-53-65
109: Prospectpeak-----	California red fir--	050	50	42-50-60	142-171-214
	Jeffrey pine-----	600	100	69-76-85	54-63-77
110: Bearrubble-----	California red fir--	050	50	31-39-64	107-132-231
	western white pine--	570	50	28-40-48	64-84-98
111: Vitrandic Xerorthents, debris fan-----	California red fir--	050	50	34-59-70	116-210-260
	Jeffrey pine-----	600	100	61-80-96	47-69-96
	Sierra lodgepole pine-----	520	100	33-56-80	25-46-69
	western white pine--	570	50	40-43-46	84-89-94
	white fir-----	030	50	72-102-131	170-243-305
112: Cascadesprings-----	California red fir--	050	50	31-36-44	107-123-149
	Sierra lodgepole pine-----	520	100	45-50-60	36-41-50
	western white pine--	570	50	20-25-31	48-58-69
113: Terracelake-----	California red fir--	050	50	38-47-53	129-160-184
	mountain hemlock----	990	100	52-70-86	38-78-112
	Sierra lodgepole pine-----	520	100	63-68-72	52-57-61
Emeraldlake-----	California red fir--	050	50	28-29-29	98-101-101
Readingpeak-----	California red fir--	050	50	38-47-53	129-160-184
115: Shadowlake-----	California red fir--	050	50	31-37-44	107-126-149
	mountain hemlock----	990	100	76-81-87	91-102-114
116: Xeric Vitricryands, tephra over till-----	mountain hemlock----	990	100	58-60-63	52-56-63
Terracelake-----	mountain hemlock----	990	100	52-64-73	38-65-85
117: Humic Haploxerands, moist lake terrace-----	Jeffrey pine-----	600	100	81-90-99	70-85-101
	Sierra lodgepole pine-----	520	100	86-89-90	75-78-79
118: Typic Dystroxerepts, landslides-----	California red fir--	050	50	45-62-73	153-223-275

Soil Survey of Lassen Volcanic National Park, California

Table 10.--Forest Productivity--Continued

Map unit symbol and soil name	Potential productivity				Volume of wood fiber (CMAI) cu ft/ac/yr low-rv-high
	Characteristic trees	Site index	Site index	Site index in feet	
		base	base age		
			yrs	low-rv-high	
119: Diamondpeak-----	California red fir--	050	50	35-50-65	119-171-236
Aquic Dystraxepts, debris flows-----	California red fir--	050	50	-33-	-113-
	mountain hemlock---	990	100	-67-	-78-
120: Buttelake-----	Jeffrey pine-----	600	100	39-57-66	29-43-51
	white fir-----	030	50	28-39-46	48-63-80
Sunhoff-----	California red fir--	050	50	-43-	-146-
	Jeffrey pine-----	600	100	52-61-71	39-47-56
	white fir-----	030	50	33-37-39	55-60-63
122: Xeric Vitricryands, colluvium-----	mountain hemlock---	990	100	52-60-73	52-70-87
Xeric Vitricryands, ash over cinders-----	California red fir--	050	50	39-46-60	132-157-214
	mountain hemlock---	990	100	-74-	-87-
125: Humic Haploxerands, stream terrace-----	white fir-----	030	50	95-98-101	228-234-241
126: Kingsiron-----	Jeffrey pine-----	600	100	68-69-69	53-54-54
	sugar pine-----	605	300	-180-	--
	white fir-----	030	50	63-67-79	138-152-193
Dittmar-----	Jeffrey pine-----	600	100	59-61-62	45-47-48
127: Humic Haploxerands, strath terrace-----	incense cedar-----	605	300	-113-	---
	white fir-----	030	50	52-64-77	98-142-186
129: Humic Haploxerands, colluvium-----	white fir-----	030	50	76-83-93	183-202-224
130: Typic Endoaquands-----	Sierra lodgepole pine-----	520	100	93-99-107	82-88-96
133: Vitrandic Xerofluvents--	Jeffrey pine-----	600	100	66-69-76	51-54-63
	Sierra lodgepole pine-----	520	100	80-82-83	69-71-72
Typic Endoaquants-----	Sierra lodgepole pine-----	520	100	93-98-107	82-87-96

Soil Survey of Lassen Volcanic National Park, California

Table 10.--Forest Productivity--Continued

Map unit symbol and soil name	Potential productivity				Volume of wood fiber (CMAI) <u>low-rv-high</u>
	Characteristic trees	Site index base	Site index base age	Site index in feet	
			yr	low-rv-high	
134: Chaos-----	Jeffrey pine-----	600	100	50-65-89	38-50-89
	white fir-----	030	50	49-51-53	88-95-102
136: Terracelake-----	mountain hemlock----	990	100	81-84-86	102-108-112
138: Vitrandic Xerofluvents, debris flows-----	Sierra lodgepole pine-----	520	100	90-93-100	79-82-89
Typic Endoaquents-----	Sierra lodgepole pine-----	520	100	93-98-107	82-87-96
139: Duric Vitraquands-----	California red fir--	050	50	-41-	-139-
	Sierra lodgepole pine-----	520	100	88-94-105	77-83-94
Typic Endoaquands-----	Sierra lodgepole pine-----	520	100	84-86-89	73-75-78
140: Vitrixerands-----	California red fir--	050	50	35-48-60	119-164-214
	Sierra lodgepole pine-----	520	100	64-68-85	53-57-85
141: Humic Haploxerands-----	Jeffrey pine-----	600	100	76-90-103	63-85-108
	white fir-----	030	50	81-114-135	198-268-313
Typic Haploxerands-----	Jeffrey pine-----	600	100	85-86-87	77-78-80
Bearrubble-----	Jeffrey pine-----	600	100	59-64-67	45-50-52
142: Cragwash-----	Jeffrey pine-----	600	100	95-102-115	94-102-115
	white fir-----	030	50	49-55-59	88-109-124
143: Andic Durixercepts-----	California red fir--	050	50	32-34-35	110-116-119
	western white pine--	570	50	45-46-47	92-94-96
145: Sueredo-----	Jeffrey pine-----	600	100	77-82-88	64-72-82
	white fir-----	030	50	49-67-91	88-152-219
146: Sueredo-----	white fir-----	030	50	48-56-65	86-113-145
147: Summertown-----	Jeffrey pine-----	600	100	93-109-118	90-120-137
	white fir-----	030	50	90-91-95	217-219-228

Soil Survey of Lassen Volcanic National Park, California

Table 10.--Forest Productivity--Continued

Map unit symbol and soil name	Potential productivity				Volume of wood fiber (CMAI)
	Characteristic trees	Site index base	Site index base age	Site index in feet	
			yrs	low-rv-high	cu ft/ac/yr low-rv-high
148: Humic Haploxerands, lake terrace-----	California red fir--	050	50	38-56-75	129-197-285
	Sierra lodgepole pine-----	520	100	73-86-107	62-75-96
	western white pine--	570	50	37-42-45	79-87-92
Typic Endoaquands-----	California red fir--	050	50	-44-	-149-
	Sierra lodgepole pine-----	520	100	-78-	-67-
150: Shadowlake-----	California red fir--	050	50	35-39-45	119-132-153
	western white pine--	570	50	39-41-45	82-86-92
Terracelake-----	California red fir--	050	50	38-47-53	129-160-184
	Sierra lodgepole pine-----	520	100	63-68-72	52-57-61
	western white pine--	570	50	-35-	-75-
151: Terracelake-----	California red fir--	050	50	38-47-53	129-160-184
	Sierra lodgepole pine-----	520	100	63-68-72	52-57-61
	western white pine--	570	50	-35-	-75-
Shadowlake-----	California red fir--	050	50	35-39-45	119-132-153
	western white pine--	570	50	39-41-45	82-86-92
152: Terracelake-----	California red fir--	050	50	38-47-53	129-160-184
	Sierra lodgepole pine-----	520	100	63-68-72	52-57-61
	western white pine--	570	50	-35-	-75-
Shadowlake-----	California red fir--	050	50	35-39-45	119-132-153
	western white pine--	570	50	39-41-45	82-86-92
153: Typic Vitriixerands-----	California red fir--	050	50	66-69-70	241-255-260
	Jeffrey pine-----	600	100	73-83-99	59-74-101
	Sierra lodgepole pine-----	520	100	68-68-68	57-57-57
	western white pine--	570	50	-86-	-165-
Vitrandic Xerorthents, moraine-----	white fir-----	030	50	-73-	-173-
154: Typic Vitriixerands-----	California red fir--	050	50	66-69-70	241-255-260
	Jeffrey pine-----	600	100	73-83-99	59-74-101
	Sierra lodgepole pine-----	520	100	68-68-68	57-57-57
	western white pine--	570	50	-86-	-165-
Vitrandic Xerorthents, moraine-----	white fir-----	030	50	-73-	-173-

Soil Survey of Lassen Volcanic National Park, California

Table 10.--Forest Productivity--Continued

Map unit symbol and soil name	Potential productivity				Volume of wood fiber (CMAI)
	Characteristic trees	Site index base	Site index base age	Site index in feet	
			yrs	low-rv-high	cu ft/ac/yr low-rv-high
155: Xeric Vitricryands, pyroclastic surge-----	California red fir--	050	50	42-45-48	142-153-164
156: Xeric Vitricryands, pyroclastic surge-----	California red fir--	050	50	42-45-48	142-153-164
157: Typic Vitriixerands, very deep-----	Jeffrey pine----- white fir-----	600 030	100 50	99-104-112 78-83-93	101-110-126 189-202-223
158: Typic Vitriixerands, unglaciaded-----	Jeffrey pine-----	600	100	66-67-67	51-52-52
159: Typic Vitriixerands, bouldery-----	California red fir-- sugar pine-----	050 605	50 300	35-48-65 153-157-160	119-164-236 ---
Typic Vitriixerands, tephra over colluvium--	white fir-----	030	50	64-71-82	142-166-200
160: Humic Haploixerands, stream terrace-----	white fir-----	030	50	95-98-101	227-233-241
162: Humic Haploixerands, outwash-----	white fir-----	030	50	84-87-91	204-211-219
164: Aquic Haploixerands-----	Sierra lodgepole pine----- white fir-----	520 030	100 50	88-94-100 57-59-61	77-83-89 117-124-131
166: Aquic Haploixerands-----	Sierra lodgepole pine----- white fir-----	520 030	100 50	88-94-100 57-59-61	77-83-89 117-124-131
Humic Haploixerands, outwash terrace-----	white fir-----	030	50	84-87-91	204-211-219
168: Vitriixerands, low elevation-----	Jeffrey pine----- Sierra lodgepole pine----- white fir-----	600 520 030	100 100 50	72-86-95 66-78-98 44-49-52	58-78-94 55-67-87 75-88-98

Soil Survey of Lassen Volcanic National Park, California

Table 10.--Forest Productivity--Continued

Map unit symbol and soil name	Potential productivity				Volume of wood fiber (CMAI) <u>cu ft/ac/yr</u> <u>low-rv-high</u>
	Characteristic trees	Site index base	Site index base age	Site index in feet	
			yrs	low-rv-high	
169: Sueredo-----	Jeffrey pine-----	600	100	62-65-67	48-50-52
	white fir-----	030	50	37-38-39	60-61-63
Scoured-----	Jeffrey pine-----	600	100	59-64-67	45-50-52
172: Badgerflat-----	Jeffrey pine-----	600	100	63-69-74	49-54-60
	Sierra lodgepole pine-----	520	100	60-84-109	50-73-98
	white fir-----	030	50	41-47-55	67-83-109
173: Badgerwash-----	Sierra lodgepole pine-----	520	100	55-68-80	45-57-80
175: Shadowlake-----	California red fir--	050	50	35-46-53	119-157-184
	mountain hemlock---	990	100	76-86-99	92-110-140
176: Juniperlake, bouldery---	white fir-----	030	50	45-54-66	77-106-149

Soil Survey of Lassen Volcanic National Park, California

Table 11.--Ecological Sites and Characteristic Plant Communities

[Composition of forest understory is based on understory productivity; range site composition is based on percent dry weight. Forest understory is defined as production less than or equal to 13 feet in height. Characteristic plants are pulled from the component existing plants table in the National Soils Information System (NASIS). Absence of an entry indicates that the species totaled less than one percent of annual production]

Map unit symbol, soil name, and percent of map unit	Ecological site name and number	Total production		Characteristic plants	Composition	
		Kind of year	Dry weight		Forest	Range
			Lb/ac		Pct	Pct
100: Buttelake - 85%-	Pinus jeffreyi-Abies concolor/Achnatherum occidentale ssp. occidentale-Elymus elymoides (F022BI100CA)	Favorable Normal Unfavorable	210 130 50	western needlegrass rubber rabbitbrush squirreltail Jeffrey pine silverleaf phacelia white fir snowbrush ceanothus naked buckwheat sedge Mt. Hood pussypaws Torrey's blue eyed Mary brome lettuce wirelettuce mountain monardella slender penstemon spreading groundsmoke wax currant whiteveined wintergreen	41 23 23 3 3 3 2 1 1	
101: Buttewash - 85%-	Pinus jeffreyi-Abies concolor/Achnatherum occidentale ssp. occidentale-Elymus elymoides (F022BI100CA)	Favorable Normal Unfavorable	225 125 25	squirreltail mountain monardella marumleaf buckwheat longspur lupine slender penstemon western needlegrass white fir Jeffrey pine sulphur-flower buckwheat wax currant silverleaf phacelia Sierra lodgepole pine rubber rabbitbrush whiteveined wintergreen	41 12 8 5 5 5 5 4 4 4 3 2 2	
102: Ashbutte - 65%-	Abies magnifica-Pinus jeffreyi/Arctostaphylos nevadensis-Achnatherum occidentale (F022BI109CA)	Favorable Normal Unfavorable	410 300 175	pinemat manzanita snowbrush ceanothus bush chinquapin western needlegrass California red fir little prince's pine pioneer rockcress spreading groundsmoke whiteveined wintergreen	55 17 11 11 6	
Vitrandic Xerorthents - 25%	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis-Chrysolepis sempervirens/Angelica breweri (F022BI114CA)	Favorable Normal Unfavorable	450 340 200	greenleaf manzanita bush chinquapin snowbrush ceanothus	48 37 15	

Soil Survey of Lassen Volcanic National Park, California

Table 11.—Ecological Sites and Characteristic Plant Communities—Continued

Map unit symbol, soil name, and percent of map unit	Ecological site name and number	Total production		Characteristic plants	Composition	
		Kind of year	Dry weight		Forest	Range
104: Juniperlake - 20%	Abies magnifica/Penstemon gracilentus-Lupinus arbustus (F022BI112CA)	Favorable Normal Unfavorable	165 100 50	longspur lupine western needlegrass slender penstemon squirreltail California red fir Ross' sedge narrowleaf lupine Sierra lodgepole pine white fir pinewoods lousewort western white pine Mt. Hood pussypaws Parry's rabbitbrush marumleaf buckwheat	33 15 14 11 6 5 5 3 3 2 2 1	
105: Juniperlake - 85%	Abies magnifica/Penstemon gracilentus-Lupinus arbustus (F022BI112CA)	Favorable Normal Unfavorable	165 100 50	longspur lupine western needlegrass slender penstemon squirreltail California red fir Ross' sedge narrowleaf lupine Sierra lodgepole pine white fir pinewoods lousewort western white pine Mt. Hood pussypaws Parry's rabbitbrush marumleaf buckwheat	33 15 14 11 6 5 5 3 3 2 2 1	
106: Cenplat - 70%---	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale (F022BI115CA)	Favorable Normal Unfavorable	300 225 130	pinemat manzanita California red fir western white pine western needlegrass pioneer rockcress scarlet gilia	65 30 3 2	
107: Badgerflat - 40%	Abies magnifica-Abies concolor/Chrysolepis sempervirens (F022BI107CA)	Favorable Normal Unfavorable	700 400 300	pinemat manzanita greenleaf manzanita bush chinquapin California red fir	68 19 8 5	
Cenplat - 35%---	Abies magnifica-Abies concolor/Chrysolepis sempervirens (F022BI107CA)	Favorable Normal Unfavorable	350 200 50	bush chinquapin greenleaf manzanita California red fir white fir	52 42 3 3	
108: Typic Xerorthents - 80%	Pinus jeffreyi-Abies concolor/Achnatherum occidentale ssp. occidentale-Elymus elymoides (F022BI100CA)	Favorable Normal Unfavorable	175 100 50	squirreltail white fir spreading groundsmoke waxy checkerbloom Torrey's blue eyed Mary rockcress whiteveined wintergreen	96 2 1 1	

Soil Survey of Lassen Volcanic National Park, California

Table 11.—Ecological Sites and Characteristic Plant Communities—Continued

Map unit symbol, soil name, and percent of map unit	Ecological site name and number	Total production		Characteristic plants	Composition	
		Kind of year	Dry weight		Forest	Range
			Lb/ac		Pct	Pct
109: Prospectpeak - 85%	Abies magnifica-Pinus jeffreyi/Arctostaphylos nevadensis-Achnatherum occidentale (F022BI109CA)	Favorable Normal Unfavorable	320 220 120	pinemat manzanita bush chinquapin mountain monardella western needlegrass Jeffrey pine California red fir Holboell's rockcress Sierra gooseberry naked buckwheat Sacramento waxydogbane goldenbush whiteveined wintergreen	60 23 6 5 2 1 1 1 1 1	
110: Bearrubble - 50%	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis-Chrysolepis sempervirens/Angelica breweri (F022BI114CA)	Favorable Normal Unfavorable	450 340 200	pinemat manzanita bush chinquapin California red fir Brewer's angelica mountain monardella wax currant western needlegrass western white pine greenleaf manzanita little prince's pine white hawkweed	70 15 4 3 3 3 1 1	
111: Vitrandic Xerorthents, debris fan - 95%	Pinus jeffreyi- Abies/Achnatherum-Lupinus (F022BI106CA)	Favorable Normal Unfavorable	125 75 25	bluntlobe lupine narrowleaf lupine western needlegrass Sierra lodgepole pine pinemat manzanita white fir buckwheat rockcress	31 29 28 5 3 2 1 1	
112: Cascadesprings - 85%	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale (F022BI115CA)	Favorable Normal Unfavorable	350 250 150	pinemat manzanita bluntlobe lupine California red fir squirreltail Mt. Hood pussypaws marumleaf buckwheat scarlet gilia pioneer rockcress	56 23 10 8 1 1 1	
113: Terracelake - 35%	Glaciated mountain slopes (R022BI204CA)	Favorable Normal Unfavorable	700 500 350	pinemat manzanita bush chinquapin California red fir Jeffrey pine marumleaf buckwheat naked buckwheat western white pine Sierra lodgepole pine mountain hemlock mountain pride sedge	60 25 3 2 2 2 2 1 1 1 1	

Soil Survey of Lassen Volcanic National Park, California

Table 11.--Ecological Sites and Characteristic Plant Communities--Continued

Map unit symbol, soil name, and percent of map unit	Ecological site name and number	Total production		Characteristic plants	Composition	
		Kind of year	Dry weight		Forest	Range
113:						
Emeraldlake - 25%	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale (F022BI115CA)	Favorable	450	pinemat manzanita	85	
		Normal	325	bush chinquapin	8	
		Unfavorable	200	California red fir oceanspray	6 1	
Readingpeak - 20%	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale (F022BI115CA)	Favorable	425	pinemat manzanita	83	
		Normal	300	bush chinquapin	8	
		Unfavorable	175	California red fir oceanspray sedge western white pine	6 1 1 1	
114:						
Emeraldlake - 25%	Alpine slopes (R022BI207CA)	Favorable	450	bluntlobe lupine		90
		Normal	300	Parry's rush		3
		Unfavorable	200	pinemat manzanita sedge mountain hemlock sulphur-flower buckwheat woodrush Indian paintbrush stonecrop		2 2 1 1 1 1
Terracelake - 23%	Alpine slopes (R022BI207CA)	Favorable	140	mountain pride		36
		Normal	40	spike trisetum		27
		Unfavorable	5	King's sandwort pioneer rockcress woodrush mountain hemlock stonecrop		9 9 9 8 2
Readingpeak - 20%	Tsuga mertensiana-Pinus albicaulis/Holodiscus discolor/Lupinus obtusilobus-Polygonum davisiae (F022BI124CA)	Favorable	300	bluntlobe lupine	49	
		Normal	160	Davis' knotweed	15	
		Unfavorable	60	mountain hemlock pinemat manzanita western needlegrass Ross' sedge oceanspray marumleaf buckwheat pioneer rockcress squirreltail	11 8 7 4 3 1 1 1	
115:						
Shadowlake - 85%	Tsuga mertensiana-Abies magnifica/Lupinus obtusilobus-Eriogonum marifolium (F022BI111CA)	Favorable	325	bluntlobe lupine	57	
		Normal	250	western needlegrass	21	
		Unfavorable	175	marumleaf buckwheat California red fir mountain hemlock western white pine Sierra lodgepole pine Mt. Hood pussypaws pioneer rockcress	13 4 2 2 1 1	

Soil Survey of Lassen Volcanic National Park, California

Table 11.—Ecological Sites and Characteristic Plant Communities—Continued

Map unit symbol, soil name, and percent of map unit	Ecological site name and number	Total production		Characteristic plants	Composition	
		Kind of year	Dry weight		Forest	Range
			Lb/ac		Pct	Pct
116: Xeric Vitricryands, tephra over till - 30%	Tsuga mertensiana/Lupinus obtusilobus-Cistanthe umbellata var. umbellata (F022BI104CA)	Favorable	400	bluntlobe lupine	40	
		Normal	260	mountain hemlock	23	
		Unfavorable	100	western needlegrass	19	
				sedge	8	
				marumleaf buckwheat	5	
				rush	5	
				Mt. Hood pussypaws		
				Shasta sedge		
				pioneer rockcress		
Terracelake - 25%	Tsuga mertensiana/Lupinus obtusilobus-Cistanthe umbellata var. umbellata (F022BI104CA)	Favorable	200	bluntlobe lupine	62	
		Normal	85	mountain hemlock	14	
		Unfavorable	50	sedge	6	
				spike trisetum	6	
				bluegrass	5	
				marumleaf buckwheat	2	
				pioneer rockcress	2	
				Mt. Hood pussypaws	1	
				squirreltail	1	
				western needlegrass	1	
Xeric Vitricryands, cirque floor - 15%	Cirque floor (R022BI205CA)	Favorable	850	bluntlobe lupine	85	
		Normal	600	Brewer's sedge	5	
		Unfavorable	400	mountain hemlock	5	
				Shasta sedge	4	
				Parry's rush	1	
				Mt. Hood pussypaws		
				Ross' sedge		
				spike trisetum		
				sticky cinquefoil		
				western needlegrass		
117: Humic Haploxerands, moist lake terrace - 90%	Pinus contorta var. murrayana/Elymus elymoides (F022BI125CA)	Favorable	200	woolly mule-ears	30	
		Normal	95	wax currant	26	
		Unfavorable	40	goldenbush	10	
				sedge	9	
				squirreltail	9	
				western needlegrass	8	
				Pacific lupine	2	
				bluegrass	2	
				silverleaf phacelia	2	
				California stickseed	1	
				rockcress	1	
				Jessica sticktight		
				lettuce wirelettuce		
				spreading groundsmoke		

Soil Survey of Lassen Volcanic National Park, California

Table 11.—Ecological Sites and Characteristic Plant Communities—Continued

Map unit symbol, soil name, and percent of map unit	Ecological site name and number	Total production		Characteristic plants	Composition	
		Kind of year	Dry weight		Forest	Range
118: Typic Dystroxerepts, landslides - 90%	Abies magnifica/Carex- Hieracium albiflorum (F022BI118CA)	Favorable Normal Unfavorable	155 55 10	California red fir sedge Ross' sedge mountain hemlock gooseberry currant oceanspray Holboell's rockcress mountain monardella rayless ragwort squirreltail western needlegrass white hawkweed whiteveined wintergreen	73 6 5 5 2 2 1 1 1 1 1 1 1	
119: Diamondpeak - 30%	Abies magnifica/Monardella odoratissima-Phlox diffusa (F022BI113CA)	Favorable Normal Unfavorable	100 30 10	mountain monardella bluntlobe lupine California red fir dusky onion ragwort spreading phlox longhorn steer's-head pinemat manzanita	33 22 17 8 8 8 2 2	
Brokeoff - 25%--	Moderately deep fragmental slopes (R022BI203CA)	Favorable Normal Unfavorable	2500 1800 800	woolly mule-ears arrowleaf balsamroot blue wildrye squirreltail California red fir California stickseed bluntlobe lupine mountain monardella whitethorn ceanothus Brewer's aster California brome Sierra stickseed Torrey's blue eyed Mary dusky onion naked buckwheat silverleaf phacelia sweetcicely	86 5 2 2 1 1 1 1 1 1 1 1 1 1 1 1	

Soil Survey of Lassen Volcanic National Park, California

Table 11.—Ecological Sites and Characteristic Plant Communities—Continued

Map unit symbol, soil name, and percent of map unit	Ecological site name and number	Total production		Characteristic plants	Composition	
		Kind of year	Dry weight		Forest	Range
			Lb/ac		Pct	Pct
119: Endoaquepts - 14%	Loamy seeps (R022BI209CA)	Favorable	3200	thinleaf alder		74
		Normal	2800	arrowleaf ragwort		4
		Unfavorable	2000	California false hellebore		3
				common cowparsnip		3
				Sierra rush		2
				blue wildrye		2
				sedge		2
				analogue sedge		1
				bluejoint		1
				bulrush		1
				fowl mangrass		1
				meadow barley		1
				mountain rush		1
				rush		1
				smallwing sedge		1
				tundra aster		1
				western rush		1
				Kentucky bluegrass		
				Pacific bleeding heart		
				Scouler's St. Johnswort		
arrowleaf balsamroot						
bentgrass						
common yarrow						
littleleaf sedge						
tinker's penny						
white marsh marigold						
yampah						
Aquic Dystrocherepts, debris flows - 11%	Active hydrothermal areas (R022BI216CA)	Favorable	400	hairy brackenfern		68
		Normal	220	sedge		8
		Unfavorable	100	blue wildrye		5
				western needlegrass		5
				California red fir		3
				mountain hemlock		3
				mountain monardella		3
				squirreltail		3
				California false hellebore		1
				western white pine		1
California brome						
lupine						
pinemat manzanita						
rush						
Typic Dystrocherepts - 10%	Active hydrothermal areas (R022BI216CA)	Favorable	250	pinemat manzanita		100
		Normal	150			
		Unfavorable	50			
120: Buttelake - 65%	Abies concolor-Pinus jeffreyi/Elymus elymoides (F022BI119CA)	Favorable	125	bush chinquapin	45	
		Normal	50	white fir	39	
		Unfavorable	20	lettuce wirelettuce	4	
				little prince's pine	4	
				rubber rabbitbrush	4	
whiteveined wintergreen	4					

Soil Survey of Lassen Volcanic National Park, California

Table 11.—Ecological Sites and Characteristic Plant Communities—Continued

Map unit symbol, soil name, and percent of map unit	Ecological site name and number	Total production		Characteristic plants	Composition	
		Kind of year	Dry weight		Forest	Range
120: Sunhoff - 15%---	Abies magnifica-Abies concolor/Chrysolepis sempervirens (F022BI107CA)	Favorable	400	bush chinquapin	79	
Normal		320	white fir	13		
Unfavorable		250	California red fir	5		
				slender penstemon	2	
				western needlegrass	1	
				lettuce wirelettuce		
				pioneer rockcross		
				rubber rabbitbrush		
Talved - 10%---	Talus slope (R022BI200CA)	Favorable	380	oceanspray		66
Normal		171	bush chinquapin		8	
Unfavorable		75	western snakeroot		8	
				bitter cherry		6
				Jeffrey pine		2
				Sierra gooseberry		2
				prickly hawkweed		2
				sedge		2
				squirreltail		2
				western needlegrass		2
				scabland penstemon		
				whiteveined wintergreen		
122: Xeric Vitricryands, colluvium - 35%	Tsuga mertensiana/Lupinus obtusilobus-Cistanthe umbellata var. umbellata (F022BI104CA)	Favorable	650	bluntlobe lupine		74
Normal		525	western needlegrass		16	
Unfavorable		375	mountain monardella		3	
				squirreltail		2
				Ross' sedge		1
				abruptbeak sedge		1
				mountain hemlock		1
				shieldplant		1
				spike trisetum		1
				Davis' knotweed		
				goldenbush		
Xeric Vitricryands, ash over cinders - 30%	Tsuga mertensiana-Abies magnifica/Lupinus obtusilobus-Eriogonum marifolium (F022BI111CA)	Favorable	175	bush chinquapin	46	
Normal		110	pinemat manzanita	34		
Unfavorable		50	mountain pride	5		
				California red fir	3	
				Parry's rush	3	
				mountain hemlock	3	
				western needlegrass	3	
				western white pine	3	
				whiteveined wintergreen		

Soil Survey of Lassen Volcanic National Park, California

Table 11.—Ecological Sites and Characteristic Plant Communities—Continued

Map unit symbol, soil name, and percent of map unit	Ecological site name and number	Total production		Characteristic plants	Composition	
		Kind of year	Dry weight		Forest	Range
			Lb/ac		Pct	Pct
122: Xeric Vitricryands, bedrock - 20%	Crylic pyroclastic cones (R022BI208CA)	Favorable	650	bush chinquapin		31
		Normal	510	prostrate ceanothus		19
		Unfavorable	375	oceanspray		15
				greenleaf manzanita		11
				rubber rabbitbrush		8
				pinemat manzanita		7
				snowbrush ceanothus		2
				squirreltail		2
				western needlegrass		2
				oniongrass		1
				silverleaf phacelia		1
				sulphur-flower buckwheat		1
				Brewer's angelica		
				California brome		
				California wavewing		
				Lemmon's rockcress		
				Waterton Lakes cryptantha		
				bedstraw		
				bitter cherry		
				gooseberry currant		
				granite prickly phlox		
				lettuce wirelettuce		
				mountain pride		
				pioneer rockcress		
				sedge		
				smokey mariposa		
				wavyleaf Indian		
				paintbrush		
125: Humic Haploxerands, stream terrace - 5%	Abies concolor-Pinus contorta var. murrayana/Elymus glaucus (F022BI120CA)	Favorable	1100	red fescue		47
		Normal	900	blue wildrye		22
		Unfavorable	700	Sierra lodgepole pine		19
				California brome		4
				western needlegrass		3
				Brewer's aster		1
				Columbia needlegrass		1
				Ross' sedge		1
				common yarrow		1
				white fir		1
				Kentucky bluegrass		
				Lemmon's yampah		
				Virginia strawberry		
				annual bluegrass		
				beardtongue		
				common dandelion		
				orchardgrass		
				sedge		
				silverpuffs		
				timothy		
				violet		
				white hawkweed		

Soil Survey of Lassen Volcanic National Park, California

Table 11.—Ecological Sites and Characteristic Plant Communities—Continued

Map unit symbol, soil name, and percent of map unit	Ecological site name and number	Total production		Characteristic plants	Composition	
		Kind of year	Dry weight Lb/ac		Forest	Range
126: Dittmar - 20%---	Pinus jeffreyi/Arctostaphylos patula (F022BI121CA)	Favorable	850	greenleaf manzanita	51	
Normal		700	huckleberry oak	41		
Unfavorable		550	bush chinquapin	3		
				prostrate ceanothus	2	
				Indian warrior	1	
				Jeffrey pine	1	
				western needlegrass	1	
				California oatgrass		
				Mt. Hood pussypaws		
				Utah serviceberry		
				bluegrass		
				granite prickly phlox		
				mountain pride		
			sedge			
			spreading groundsmoke			
127: Humic Haploxerands, strath terrace - 65%	Abies concolor-Calocedrus decurrens/Ceanothus cordulatus/Achnatherum (F022BI110CA)	Favorable	325	whitethorn ceanothus	33	
Normal		225	blue wildrye	16		
Unfavorable		75	Columbia needlegrass	11		
				white fir	9	
				Sierra gooseberry	7	
				California brome	5	
				squirreltail	5	
				Ross' sedge	3	
				incense cedar	3	
				Idaho fescue	2	
				fescue	1	
				lettuce wirelettuce	1	
				naked buckwheat	1	
				silverleaf phacelia	1	
				spreading groundsmoke	1	
				white hawkweed	1	
				Douglas' sagewort		
				bedstraw		
				bentgrass		
			cryptantha			
			milk kelloggia			
			prostrate ceanothus			
			sedge			
			spurry buckwheat			
			violet			
			western needlegrass			

Soil Survey of Lassen Volcanic National Park, California

Table 11.—Ecological Sites and Characteristic Plant Communities—Continued

Map unit symbol, soil name, and percent of map unit	Ecological site name and number	Total production		Characteristic plants	Composition	
		Kind of year	Dry weight Lb/ac		Forest	Range
127: Aquepts - 15%---	Spring complex (R022BI211CA)	Favorable	3500	thinleaf alder		85
		Normal	2500	blue wildrye		5
		Unfavorable	1500	California false hellebore		3
				Kentucky bluegrass		3
				common cowparsnip		3
				fowl mannagrass		1
				Douglas' thistle		
				Pacific bleeding heart		
				brittle bladderfern		
				bugle hedgenettle		
				bull thistle		
				goosefoot		
				hairy brackenfern		
				sedge		
				small enchanter's nightshade		
				stickywilly		
				sweetcicely		
				timothy		
				woolly sedge		
129: Humic Haploxerands, colluvium - 80%	Abies concolor-Calocedrus decurrens/Ceanothus cordulatus/Achnatherum (F022BI110CA)	Favorable	100	California brome	26	
		Normal	65	white fir	19	
		Unfavorable	10	incense cedar	14	
				whitethorn ceanothus	14	
				Ross' sedge	11	
				western needlegrass	9	
				blue wildrye	7	
				Brewer's aster		
				gooseberry currant		
				lettuce wirelettuce		
				rockcress		
				white hawkweed		
130: Histic Humaquepts, lake sediments - 55%	Frigid lacustrine flat (R022BI217CA)	Favorable	1800	Northwest Territory sedge		26
		Normal	1200	capitate sedge		23
		Unfavorable	750	Nebraska sedge		22
				tufted hairgrass		16
				western mountain aster		4
				tundra aster		3
				Sierra rush		2
				mountain rush		2
				pullup muhly		1
				willowherb		1
				moss		
				willow		

Soil Survey of Lassen Volcanic National Park, California

Table 11.—Ecological Sites and Characteristic Plant Communities—Continued

Map unit symbol, soil name, and percent of map unit	Ecological site name and number	Total production		Characteristic plants	Composition	
		Kind of year	Dry weight		Forest	Range
130: Histic Humaquepts, frequently flooded - 30%	Frigid lacustrine flat (R022BI217CA)	Favorable Normal Unfavorable	2800 2000 1200	Nebraska sedge blister sedge tundra aster common rush golden sedge sedge longstalk clover primrose monkeyflower toad rush Kentucky bluegrass meadow barley slender cinquefoil small floating mannagrass western blue-eyed grass willow yampah		28 21 16 8 7 7 5 5 3
Typic Endoaquands - 15%	Pinus contorta var. murrayana/Veratrum californicum var. californicum-Elymus glaucus (F022BI108CA)	Favorable Normal Unfavorable	950 650 400	arrowleaf ragwort California false hellebore blue wildrye Sierra lodgepole pine bigleaf lupine California brome common yarrow Bigelow's sneezeweed Jepson's willow abruptbeak sedge alpine leafybract aster bluejoint clover fowl mannagrass high mountain cinquefoil whitestem gooseberry American alpine speedwell foxtail muhly fragrant bedstraw monkeyflower sweetcicely thinleaf alder violet western columbine willowherb	24 20 14 11 9 5 3 2 2 2 2 1 1 1 1 1	
132: Vitrandic Cryorthents, debris flows - 90%	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale (F022BI115CA)	Favorable Normal Unfavorable	1500 1100 800	bluntlobe lupine mountain monardella rabbitbush oceanspray western needlegrass pinemat manzanita naked buckwheat squirreltail bitter cherry marumleaf buckwheat	53 14 12 10 5 3 2 1	

Soil Survey of Lassen Volcanic National Park, California

Table 11.—Ecological Sites and Characteristic Plant Communities—Continued

Map unit symbol, soil name, and percent of map unit	Ecological site name and number	Total production		Characteristic plants	Composition	
		Kind of year	Dry weight		Forest	Range
			Lb/ac		Pct	Pct
136: Xeric Vitricryands, cirque floor - 15%	Cirque floor (R022BI205CA)	Favorable	1000	bluntlobe lupine		96
		Normal	800	mountain hemlock		2
		Unfavorable	600	Davis' knotweed		1
				marumleaf buckwheat Mt. Hood pussypaws squirreltail		1
137: Xeric Vitricryands - 75%	Windy peak (R022BI212CA)	Favorable	270	rubber rabbitbrush		53
		Normal	170	oceanspray		15
		Unfavorable	70	granite prickly phlox		11
				antelope bitterbrush		5
				greenleaf manzanita		4
				squirreltail		3
				marumleaf buckwheat		2
				sulphur-flower buckwheat		2
				western needlegrass		2
				Indian paintbrush		1
				dwarf alpinegold		1
				thickstem aster		1
				Mt. Hood pussypaws		
				beardtongue		
bush chinquapin						
rockcress						
138: Vitrandic Xerofluvents, debris flows - 80%	Pinus contorta var. murrayana-Populus tremuloides/Elymus glaucus (F022BI105CA)	Favorable	650	blue wildrye	45	
		Normal	440	quaking aspen	30	
		Unfavorable	250	Sierra lodgepole pine	5	
				sedge	4	
				western needlegrass	4	
				California brome	3	
				common yarrow	2	
				mountain monardella	2	
				squirreltail	2	
				rush	1	
				spreading groundsmoke	1	
				trefoil	1	
				Kentucky bluegrass		
				Lemmon's willow		
				Pacific lupine		
				beardtongue		
				bentgrass		
				bull thistle		
				clover		
				common cowparsnip		
dusky onion						
silverleaf phacelia						
spike trisetum						
sweetcicely						
whitestem gooseberry						
wild onion						

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Table 11.—Ecological Sites and Characteristic Plant Communities—Continued

Map unit symbol, soil name, and percent of map unit	Ecological site name and number	Total production		Characteristic plants	Composition	
		Kind of year	Dry weight		Forest	Range
			Lb/ac		Pct	Pct
139: Aquandic Cryaquents - 15%	Crylic lacustrine flat (R022BI206CA)	Favorable	1600	tundra aster		32
		Normal	1300	Nebraska sedge		22
		Unfavorable	1000	Northwest Territory sedge		11
				tufted hairgrass		10
				mountain rush		5
				water sedge		5
				pullup muhly		3
				swordleaf rush		3
				clover		2
				mat muhly		2
				spikerush		2
				Brewer's sedge		1
				spikerush		1
				white marsh marigold		1
				primrose monkeyflower		
				tinker's penny		
				violet		
				willowherb		
140: Vitrixerands - 90%	Abies magnifica-Pinus contorta var. murrayana/Elymus elymoides (F022BI117CA)	Favorable	120	squirreltail	45	
		Normal	50	sedge	24	
		Unfavorable	15	Sierra lodgepole pine	15	
				California red fir	14	
				Mt. Hood pussypaws	1	
				sulphur-flower buckwheat	1	
				goosefoot violet		
				longhorn steer's-head		
141: Humic Haploxerands - 40%	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens (F022BI103CA)	Favorable	350	greenleaf manzanita	34	
		Normal	145	snowbrush ceanothus	31	
		Unfavorable	50	bush chinquapin	20	
				bitter cherry	15	
Typic Haploxerands - 35%	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens (F022BI103CA)	Favorable	100	bush chinquapin	20	
		Normal	45	prostrate ceanothus	19	
		Unfavorable	0	sedge	19	
				white fir	19	
				little prince's pine	11	
				Sierra gooseberry	6	
				greenleaf manzanita	6	
Bearrubble - 15%	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens (F022BI103CA)	Favorable	700	greenleaf manzanita	55	
		Normal	350	bush chinquapin	27	
		Unfavorable	150	snowbrush ceanothus	9	
				pinemat manzanita	7	
				white fir	2	
				beardtongue		

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Table 11.—Ecological Sites and Characteristic Plant Communities—Continued

Map unit symbol, soil name, and percent of map unit	Ecological site name and number	Total production		Characteristic plants	Composition	
		Kind of year	Dry weight		Forest	Range
142: Cragwash - 85%--	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens (F022BI103CA)	Favorable Normal Unfavorable	420 320 75	Idaho fescue white fir squirreltail western needlegrass mountain monardella rubber rabbitbrush Ross' sedge sedge marumleaf buckwheat Jeffrey pine prostrate ceanothus slender penstemon snowbrush ceanothus spreading groundsmoke	36 20 16 9 7 5 3 3 1	
143: Andic Durixerepts - 95%	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale (F022BI115CA)	Favorable Normal Unfavorable	400 270 200	pinemat manzanita California red fir western white pine western needlegrass	90 5 4 1	
144: Xeric Vitricryands, cirque floor - 55%	Cirque floor (R022BI205CA)	Favorable Normal Unfavorable	1000 800 500	bluntlobe lupine Shasta buckwheat marumleaf buckwheat mountain hemlock Davis' knotweed Mt. Hood pussypaws broadleaf knotweed squirreltail	93 3 2 2	
Humic Xeric Vitricryands - 30%	Tsuga mertensiana/Lupinus obtusilobus-Cistanthe umbellata var. umbellata (F022BI104CA)	Favorable Normal Unfavorable	300 180 50	bluntlobe lupine Rocky Mountain pussytoes spike trisetum Ross' sedge sedge mountain hemlock mountain monardella Parry's rush bentgrass western needlegrass Mt. Hood pussypaws Sierra rush marumleaf buckwheat muhly sulphur-flower buckwheat toad rush	69 10 8 3 3 2 2 1 1 1 1	

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Table 11.—Ecological Sites and Characteristic Plant Communities—Continued

Map unit symbol, soil name, and percent of map unit	Ecological site name and number	Total production		Characteristic plants	Composition	
		Kind of year	Dry weight		Forest	Range
			Lb/ac		Pct	Pct
145: Sueredo - 85%---	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens (F022BI103CA)	Favorable Normal Unfavorable	500 300 100	greenleaf manzanita white fir Jeffrey pine pinemat manzanita squirreltail western needlegrass snowbrush ceanothus mountain monardella pinewoods lousewort pioneer rockcress Ross' sedge sedge slender penstemon spreading groundsmoke whiteveined wintergreen	27 24 9 8 8 8 5 3 2 2 1 1 1 1	
146: Sueredo - 90%---	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens (F022BI103CA)	Favorable Normal Unfavorable	120 30 10	white fir greenleaf manzanita Jeffrey pine western needlegrass pinemat manzanita sticky currant whiteveined wintergreen little prince's pine oceanspray pioneer rockcress sedge	35 31 9 9 5 5 2 1 1 1 1	
147: Summertown - 85%	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens (F022BI103CA)	Favorable Normal Unfavorable	400 250 150	bush chinquapin greenleaf manzanita snowbrush ceanothus white fir bitter cherry sedge western needlegrass Jeffrey pine	33 23 21 10 5 5 2 1	
148: Humic Haploxerands, lake terrace - 70%	Abies magnifica/Penstemon gracilentus-Lupinus arbustus (F022BI112CA)	Favorable Normal Unfavorable	280 180 80	longspur lupine mountain monardella squirreltail Sierra lodgepole pine western needlegrass Columbia needlegrass slender penstemon California red fir Mt. Hood pussypaws Ross' sedge buckwheat marumleaf buckwheat pinewoods lousewort sedge spreading groundsmoke	31 27 10 8 6 5 5 2 1 1 1 1 1 1	

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Table 11.—Ecological Sites and Characteristic Plant Communities—Continued

Map unit symbol, soil name, and percent of map unit	Ecological site name and number	Total production		Characteristic plants	Composition	
		Kind of year	Dry weight		Forest	Range
			Lb/ac		Pct	Pct
148: Typic Endoaquands - 15%	Pinus contorta var. murrayana/Veratrum californicum var. californicum-Elymus glaucus (F022BI108CA)	Favorable Normal Unfavorable	1100 850 550	arrowleaf ragwort California false hellebore bigleaf lupine sedge sedge clover blue wildrye common yarrow meadow barley Sierra lodgepole pine twolobe larkspur California brome California red fir primrose monkeyflower Congdon's bulrush Sierra gooseberry oatgrass	18 17 16 11 9 7 6 5 4 2 2 1 1 1	
149: Emeraldlake - 15%	Alpine slopes (R022BI207CA)	Favorable Normal Unfavorable	425 300 175	bluntlobe lupine Parry's rush pinemat manzanita woodrush Indian paintbrush Plumas County beardtongue mountain hemlock sedge sulphur-flower buckwheat		87 3 3 2 1 1 1 1 1
150: Shadowlake - 40%	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale (F022BI115CA)	Favorable Normal Unfavorable	350 200 150	pinemat manzanita bush chinquapin greenleaf manzanita California red fir Parry's rush Ross' sedge currant mountain monardella oceanspray pioneer rockcross western white pine	50 25 25	
Terracelake - 30%	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale (F022BI115CA)	Favorable Normal Unfavorable	400 350 200	pinemat manzanita California red fir slender penstemon spike trisetum mountain pride western needlegrass western white pine rosy pussytoes squirreltail Utah serviceberry rush sedge white hawkweed	83 3 3 3 2 2 2 1 1	

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Table 11.—Ecological Sites and Characteristic Plant Communities—Continued

Map unit symbol, soil name, and percent of map unit	Ecological site name and number	Total production		Characteristic plants	Composition	
		Kind of year	Dry weight		Forest	Range
			Lb/ac		Pct	Pct
150: Acroph - 15%---	Glaciated mountain slopes (R022BI204CA)	Favorable	550	pinemat manzanita		64
		Normal	390	oceanspray		14
		Unfavorable	200	bluntlobe lupine		7
				Ross' sedge		3
				western needlegrass		3
				mountain hemlock		2
				slender penstemon		2
				buckwheat		1
				marumleaf buckwheat		1
				pioneer rockcress		1
				squirreltail		1
			western white pine		1	
151: Terracelake - 40%	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale (F022BI115CA)	Favorable	500	pinemat manzanita	83	
		Normal	350	California red fir	3	
		Unfavorable	200	slender penstemon	3	
				spike trisetum	3	
				mountain pride	2	
				western needlegrass	2	
				western white pine	2	
				rosy pussytoes	1	
				squirreltail	1	
				Utah serviceberry		
				rush		
			sedge			
			white hawkweed			
Acroph - 20%---	Glaciated mountain slopes (R022BI204CA)	Favorable	550	pinemat manzanita		64
		Normal	390	oceanspray		14
		Unfavorable	200	bluntlobe lupine		7
				Ross' sedge		3
				western needlegrass		3
				mountain hemlock		2
				slender penstemon		2
				buckwheat		1
				marumleaf buckwheat		1
				pioneer rockcress		1
				squirreltail		1
			western white pine		1	
Shadowlake - 15%	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale (F022BI115CA)	Favorable	350	pinemat manzanita	50	
		Normal	200	bush chinquapin	25	
		Unfavorable	150	greenleaf manzanita	25	
				California red fir		
				Parry's rush		
				Ross' sedge		
				currant		
				mountain monardella		
				oceanspray		
				pioneer rockcress		
			western white pine			

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Table 11.—Ecological Sites and Characteristic Plant Communities—Continued

Map unit symbol, soil name, and percent of map unit	Ecological site name and number	Total production		Characteristic plants	Composition	
		Kind of year	Dry weight		Forest	Range
152: Terracelake - 35%	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale (F022BI115CA)	Favorable Normal Unfavorable	175 150 50	pinemat manzanita California red fir slender penstemon spike trisetum mountain pride western needlegrass western white pine rosy pussytoes squirreltail Utah serviceberry rush sedge white hawkweed	83 3 3 3 2 2 2 1 1	
Shadowlake - 30%	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale (F022BI115CA)	Favorable Normal Unfavorable	350 200 150	pinemat manzanita bush chinquapin greenleaf manzanita California red fir Parry's rush Ross' sedge currant mountain monardella oceanspray pioneer rockcress western white pine	50 25 25	
Acroph - 15%---	Glaciated mountain slopes (R022BI204CA)	Favorable Normal Unfavorable	550 390 200	pinemat manzanita oceanspray bluntlobe lupine Ross' sedge western needlegrass mountain hemlock slender penstemon buckwheat marumleaf buckwheat pioneer rockcress squirreltail western white pine		64 14 7 3 3 2 2 1 1 1 1 1
153: Typic Vitrikerands - 50%	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens (F022BI103CA)	Favorable Normal Unfavorable	160 60 0	Jeffrey pine goldenbush Sierra lodgepole pine mountain monardella sulphur-flower buckwheat sedge western needlegrass pioneer rockcress wavyleaf Indian paintbrush lupine	25 25 16 8 8 5 5 3 3 2	

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Table 11.—Ecological Sites and Characteristic Plant Communities—Continued

Map unit symbol, soil name, and percent of map unit	Ecological site name and number	Total production		Characteristic plants	Composition	
		Kind of year	Dry weight		Forest	Range
153: Vitrandic Xerorthents, moraine - 45%--	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens (F022BI103CA)	Favorable Normal Unfavorable	300 195 100	bush chinquapin mountain monardella wax currant rubber rabbitbrush greenleaf manzanita narrowleaf lupine squirreltail Mt. Hood pussypaws slender penstemon western needlegrass white fir Indian paintbrush marumleaf buckwheat scarlet gilia California brome aster spreading groundsmoke spurry buckwheat	29 23 12 10 5 5 5 2 2 2 2 1 1 1	
154: Typic Vitrixerands - 45%	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens (F022BI103CA)	Favorable Normal Unfavorable	160 60 0	Jeffrey pine goldenbush Sierra lodgepole pine mountain monardella sulphur-flower buckwheat sedge western needlegrass pioneer rockcress wavyleaf Indian paintbrush lupine	25 25 16 8 8 5 5 3 3 2	
Vitrandic Xerorthents, moraine - 35%	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens (F022BI103CA)	Favorable Normal Unfavorable	300 195 100	bush chinquapin mountain monardella wax currant rubber rabbitbrush greenleaf manzanita narrowleaf lupine squirreltail Mt. Hood pussypaws slender penstemon western needlegrass white fir Indian paintbrush marumleaf buckwheat scarlet gilia California brome aster spreading groundsmoke spurry buckwheat	29 23 12 10 5 5 5 2 2 2 2 1 1 1	
155: Xeric Vitricryands, pyroclastic surge - 90%	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale (F022BI115CA)	Favorable Normal Unfavorable	250 150 50	lupine mountain monardella western needlegrass pinemat manzanita	67 20 13	

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Table 11.—Ecological Sites and Characteristic Plant Communities—Continued

Map unit symbol, soil name, and percent of map unit	Ecological site name and number	Total production		Characteristic plants	Composition	
		Kind of year	Dry weight		Forest	Range
156: Xeric Vitricryands, pyroclastic surge - 90%	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale (F022BI115CA)	Favorable Normal Unfavorable	400 230 100	pinemat manzanita bush chinquapin greenleaf manzanita California red fir sedge	65 22 9 4	
157: Typic Vitrikerands, very deep - 90%	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens (F022BI103CA)	Favorable Normal Unfavorable	2200 1800 1200	snowbrush ceanothus greenleaf manzanita bush chinquapin whiteveined wintergreen	42 36 22	
158: Typic Vitrikerands, unglaciaded - 75%	Pinus jeffreyi/Arctostaphylos patula (F022BI121CA)	Favorable Normal Unfavorable	600 420 250	pinemat manzanita greenleaf manzanita bush chinquapin snowbrush ceanothus Ross' sedge slender penstemon western needlegrass	53 22 15 7 1 1 1	
159: Typic Vitrikerands, bouldery - 40%	Pinus jeffreyi/Arctostaphylos patula (F022BI121CA)	Favorable Normal Unfavorable	340 240 100	bush chinquapin sedge western needlegrass mountain pride Brewer's angelica California red fir Jeffrey pine white fir Sacramento waxdogbane Torrey maple beardtongue groundsmoke little prince's pine mountain monardella prickly hawkweed wax currant whiteveined wintergreen	83 5 5 3 1 1 1 1	
Typic Vitrikerands, tephra over colluvium - 35%	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens (F022BI103CA)	Favorable Normal Unfavorable	80 20 0	white fir little prince's pine whiteveined wintergreen	98 1 1	

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Table 11.—Ecological Sites and Characteristic Plant Communities—Continued

Map unit symbol, soil name, and percent of map unit	Ecological site name and number	Total production		Characteristic plants	Composition	
		Kind of year	Dry weight		Forest	Range
			Lb/ac		Pct	Pct
160: Aeric Endoaquents - 45%	Gravelly flood plains (R022BI215CA)	Favorable	550	thinleaf alder		25
		Normal	330	bluejoint		11
		Unfavorable	75	Douglas' sagewort		9
				rubber rabbitbrush		8
				western pearly everlasting		5
				California brome		4
				blue wildrye		4
				fringed willowherb		4
				sedge		4
				seep monkeyflower		4
				common yarrow		3
				naked buckwheat		3
				rough bentgrass		3
				white fir		3
				Douglas' thistle		2
				bugle hedgenettle		1
				common rush		1
				fowl mannagrass		1
				giant red Indian paintbrush		1
				purple monkeyflower		1
				silverleaf phacelia		1
				smallwing sedge		1
				streambank bird's-foot trefoil		1
				Lemmon's willow		
				common mullein		
				threepetal bedstraw		
				zigzag groundsmoke		
Humic Haploxerands, stream terrace - 35%	Abies concolor-Calocedrus decurrens/Ceanothus cordulatus/Achnatherum (F022BI110CA)	Favorable	175	white fir		75
		Normal	65	western needlegrass		8
		Unfavorable	0	mountain monardella		6
				blue wildrye		4
				Brewer's aster		2
				silverleaf phacelia		2
				white hawkweed		2
				naked buckwheat		1
				spreading groundsmoke		
161: Typic Psammaquents - 95%	Sandy flood plains (R022BI213CA)	Favorable	3900	shining willow		86
		Normal	2900	sedge		3
		Unfavorable	1000	squirreltail		3
				western needlegrass		3
				mountain rush		2
				Shasta buckwheat		1
				blue wildrye		1
				rush		1
				California brome		
				Idaho bentgrass		
				bearded melicgrass		
				bull thistle		
				cryptantha		
				dwarf mountain ragwort		
				groundsmoke		
				meadow fescue		
				slender hairgrass		

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Table 11.—Ecological Sites and Characteristic Plant Communities—Continued

Map unit symbol, soil name, and percent of map unit	Ecological site name and number	Total production		Characteristic plants	Composition	
		Kind of year	Dry weight		Forest	Range
162: Humic Haploxerands, outwash - 95%	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens (F022BI103CA)	Favorable	85	white fir	95	
		Normal	45	sedge	3	
		Unfavorable	20	western needlegrass	2	
163: Vitrandic Cryofluvents - 65%	Cryic lacustrine flat (R022BI206CA)	Favorable	2000	Nebraska sedge		22
		Normal	1300	tundra aster		20
		Unfavorable	800	Northwest Territory sedge		12
				water sedge		11
				tufted hairgrass		10
				mat muhly		5
				mountain rush		5
				pullup muhly		5
				swordleaf rush		3
				clover		2
				spikerush		2
				Brewer's sedge		1
				spikerush		1
				white marsh marigold		1
				primrose monkeyflower		
				tinker's penny		
				violet		
				willowherb		
Aquandic Cryaquents - 30%	Cryic lacustrine flat (R022BI206CA)	Favorable	1600	tundra aster		38
		Normal	1300	Nebraska sedge		22
		Unfavorable	1000	tufted hairgrass		10
				Northwest Territory sedge		9
				mountain rush		5
				pullup muhly		5
				swordleaf rush		3
				water sedge		3
				spikerush		2
				Brewer's sedge		1
				clover		1
				spikerush		1
				mat muhly		
				primrose monkeyflower		
				tinker's penny		
				violet		
				white marsh marigold		
				willowherb		

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Table 11.—Ecological Sites and Characteristic Plant Communities—Continued

Map unit symbol, soil name, and percent of map unit	Ecological site name and number	Total production		Characteristic plants	Composition	
		Kind of year	Dry weight		Forest	Range
			Lb/ac		Pct	Pct
164: Aquepts - 35%---	Spring complex (R022BI211CA)	Favorable	4200	thinleaf alder		83
		Normal	3200	blue wildrye		5
		Unfavorable	2000	California false hellebore		3
				bugle hedgenettle		3
				common cowparsnip		3
				Kentucky bluegrass		2
				fowl mannagrass		1
				Douglas' thistle		
				Pacific bleeding heart		
				brittle bladderfern		
				bull thistle		
				goosefoot		
				hairy brackenfern		
				sedge		
	small enchanter's nightshade					
	stickywilly					
	sweetcicely					
	timothy					
	woolly sedge					
Typic Petraquepts, bedrock - 25%	Spring complex (R022BI211CA)	Favorable	3500	thinleaf alder		53
		Normal	2500	woollyhead parsnip		13
		Unfavorable	1500	streambank bird's-foot trefoil		10
				sedge		5
				tufted hairgrass		4
				Parish's yampah		3
				Douglas' thistle		2
				brittle bladderfern		2
				seep monkeyflower		2
				Bigelow's sneezeweed		1
				California false hellebore		1
				California grass of Parnassus		1
				bentgrass		1
				common yarrow		1
				ragwort		1
				Wolf's trisetum		
				bedstraw		
				giant red Indian paintbrush		
				hairy brackenfern		
	moss					
	rush					
	tinker's penny					
	violet					
Aquic Haploxerands - 20%	Abies concolor-Pinus contorta var. murrayana/Elymus glaucus (F022BI120CA)	Favorable	150	white hawkweed		30
		Normal	65	sedge		24
		Unfavorable	0	white fir		19
				incense cedar		9
				spike trisetum		7
				western needlegrass		7
				little prince's pine		3
				Sierra lodgepole pine		1
	hairy brackenfern					

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Table 11.—Ecological Sites and Characteristic Plant Communities—Continued

Map unit symbol, soil name, and percent of map unit	Ecological site name and number	Total production		Characteristic plants	Composition	
		Kind of year	Dry weight		Forest	Range
164: Typic Petraquepts - 10%	Thermal seeps (R022BI218CA)	Favorable Normal Unfavorable	1500 800 300	brown sedge whitetip clover lakeshore sedge Douglas' thistle Howell's yampah bluejoint California false hellebore chairmaker's bulrush smooth horsetail Jessica sticktight bentgrass field horsetail fowl mannagrass hardstem tule monkeyflower ragwort timothy mountain rush bugle hedgenettle fringed willowherb glaucus willowherb panicled bulrush		14 13 12 10 10 8 6 6 4 2 2 2 2 2 2 2 2 2 1
165: Aquandic Humaquepts - 35%	Frigid alluvial flat (R022BI202CA)	Favorable Normal Unfavorable	4500 3400 2400	tufted hairgrass widefruit sedge Kentucky bluegrass mountain rush Chamisso arnica sedge timothy California false hellebore Lemmon's yampah Rydberg's penstemon chickweed cinquefoil fringed willowherb longstalk clover meadow barley threepetal bedstraw		27 26 24 7 5 5 5 1
Histic Humaquepts - 25%	Frigid alluvial flat (R022BI202CA)	Favorable Normal Unfavorable	2900 2000 1200	Nebraska sedge mountain rush Douglas' thistle Kentucky bluegrass Rydberg's penstemon common dandelion knotweed longstalk clover meadow barley tufted hairgrass violet		98 2

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Table 11.—Ecological Sites and Characteristic Plant Communities—Continued

Map unit symbol, soil name, and percent of map unit	Ecological site name and number	Total production		Characteristic plants	Composition	
		Kind of year	Dry weight		Forest	Range
			Lb/ac		Pct	Pct
165: Aquandic Endoaquepts - 20%	Frigid alluvial flat (R022BI202CA)	Favorable	1200	mountain rush		42
		Normal	800	sedge		32
		Unfavorable	400	annual bluegrass		9
				Columbia needlegrass		8
				aster		6
				common dandelion		1
				slender cinquefoil		1
				spreading groundsmoke		1
				clover		
				longstalk clover		
				thinleaf alder		
Terric Haplohemists - 15%	Frigid alluvial flat (R022BI202CA)	Favorable	4200	rush		33
		Normal	3200	Nebraska sedge		24
		Unfavorable	2200	Northwest Territory sedge		21
				bulrush		8
				timothy		5
				longstalk clover		3
				annual bluegrass		2
				bentgrass		2
				California brome		1
				chickweed		1
				Douglas' thistle		
				Scouler's St. Johnswort		
				alpine laurel		
				bull thistle		
				common dandelion		
				thinleaf alder		
166: Aquic Haploxerands - 50%	Abies concolor-Pinus contorta var. murrayana/Elymus glaucus (F022BI120CA)	Favorable	100	white hawkweed	30	
		Normal	65	sedge	22	
		Unfavorable	20	incense cedar	15	
				white fir	15	
				spike trisetum	7	
				western needlegrass	7	
				little prince's pine	3	
				Sierra lodgepole pine	1	
				hairy brackenfern		
Humic Haploxerands, outwash terrace - 40%	Abies concolor-Calocedrus decurrens/Ceanothus cordulatus/Achnatherum (F022BI110CA)	Favorable	100	California brome	31	
		Normal	65	western needlegrass	31	
		Unfavorable	10	white fir	9	
				blue wildrye	8	
				Ross' sedge	7	
				incense cedar	7	
				whitethorn ceanothus	7	
				Brewer's aster		
				gooseberry currant		
				lettuce wirelettuce		
				rockcress		
				violet		
				white hawkweed		

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Table 11.—Ecological Sites and Characteristic Plant Communities—Continued

Map unit symbol, soil name, and percent of map unit	Ecological site name and number	Total production		Characteristic plants	Composition	
		Kind of year	Dry weight		Forest	Range
			Lb/ac		Pct	Pct
167: Emeraldlake - 35%	Alpine slopes (R022BI207CA)	Favorable	450	bluntlobe lupine		75
		Normal	300	mountain hemlock		11
		Unfavorable	150	marumleaf buckwheat		5
				Shasta buckwheat		3
				dwarf mountain ragwort		3
				Davidson's penstemon		2
				shieldplant		1
				Mt. Hood pussypaws		
				pioneer rockcress		
				spurry buckwheat		
				squirreltail		
Readingpeak - 20%	Tsuga mertensiana-Pinus albicaulis/Holodiscus discolor/Lupinus obtusilobus-Polygonum davisiae (F022BI124CA)	Favorable	300	bluntlobe lupine	52	
		Normal	150	Davis' knotweed	17	
		Unfavorable	20	mountain hemlock	13	
				western needlegrass	7	
				marumleaf buckwheat	5	
				pioneer rockcress	5	
				oceanspray	1	
Terracelake - 15%	Alpine slopes (R022BI207CA)	Favorable	110	mountain pride		36
		Normal	45	spike trisetum		27
		Unfavorable	5	woodrush		17
				mountain hemlock		10
				King's sandwort		5
				pioneer rockcress		5
168: Vitrixerands - 90%	Abies concolor-Pinus contorta var. murrayana/Achnatherum occidentale (F022BI123CA)	Favorable	350	western needlegrass	38	
		Normal	250	squirreltail	29	
		Unfavorable	50	white fir	6	
				Sierra lodgepole pine	5	
				blue wildrye	5	
				quaking aspen	5	
				Pacific lupine	3	
				rabbitbush	2	
				sedge	2	
				California brome	1	
				California stickseed	1	
				Ross' sedge	1	
				mountain monardella	1	
				spreading groundsmoke	1	
				goosefoot violet		
				lettuce wirelettuce		
				pinewoods lousewort		
				slender penstemon		

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Table 11.—Ecological Sites and Characteristic Plant Communities—Continued

Map unit symbol, soil name, and percent of map unit	Ecological site name and number	Total production		Characteristic plants	Composition	
		Kind of year	Dry weight		Forest	Range
			Lb/ac		Pct	Pct
169: Sueredo - 55%---	Abies concolor-Pinus jeffreyi/Arctostaphylos patula-Chrysolepis sempervirens (F022BI103CA)	Favorable	750	greenleaf manzanita	49	
Normal		550	prostrate ceanothus	28		
Unfavorable		350	snowbrush ceanothus	9		
				white fir	5	
				Ross' sedge	3	
				California brome	2	
				bitter cherry	2	
				western needlegrass	2	
				dwarf mountain ragwort		
				groundsmoke		
				mountain monardella		
				pioneer rockcress		
				silverleaf phacelia		
Scoured - 15%---	Pinus jeffreyi/Arctostaphylos patula (F022BI121CA)	Favorable	500	greenleaf manzanita	44	
Normal		380	snowbrush ceanothus	22		
Unfavorable		250	huckleberry oak	20		
				bush chinquapin	8	
				western needlegrass	3	
				prostrate ceanothus	2	
				Jeffrey pine	1	
				Mt. Hood pussypaws sedge spreading groundsmoke		
170: Emeraldlake - 20%	Alpine slopes (R022BI207CA)	Favorable	180	bluntlobe lupine		75
Normal		80	mountain hemlock		11	
Unfavorable		40	marumleaf buckwheat		5	
				Davidson's penstemon		4
				dwarf mountain ragwort		4
				shieldplant		1
				Mt. Hood pussypaws pioneer rockcress squirreltail		
Readingpeak - 15%	Alpine slopes (R022BI207CA)	Favorable	180	bluntlobe lupine	53	
Normal		80	Davis' knotweed	17		
Unfavorable		40	mountain hemlock	13		
				western needlegrass	7	
				marumleaf buckwheat pioneer rockcress	5 5	

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Table 11.—Ecological Sites and Characteristic Plant Communities—Continued

Map unit symbol, soil name, and percent of map unit	Ecological site name and number	Total production		Characteristic plants	Composition	
		Kind of year	Dry weight		Forest	Range
			Lb/ac		Pct	Pct
171: Aquepts - 50%---	Spring complex (R022BI211CA)	Favorable	4200	thinleaf alder		85
		Normal	3200	blue wildrye		5
		Unfavorable	2000	California false hellebore		3
				common cowparsnip		3
				bugle hedgenettle		2
				Kentucky bluegrass		1
				fowl mannagrass		1
				Douglas' thistle		
				Pacific bleeding heart		
				brittle bladderfern		
				bull thistle		
				goosefoot		
				hairy brackenfern		
				sedge		
small enchanter's nightshade						
stickywilly						
sweetcicely						
timothy						
woolly sedge						
Typic Petraquepts, bedrock - 35%	Spring complex (R022BI211CA)	Favorable	3500	thinleaf alder		53
		Normal	2500	woollyhead parsnip		13
		Unfavorable	1500	streambank bird's-foot trefoil		10
				sedge		5
				tufted hairgrass		4
				Parish's yampah		3
				Douglas' thistle		2
				brittle bladderfern		2
				seep monkeyflower		2
				Bigelow's sneezeweed		1
				California false hellebore		1
				California grass of Parnassus		1
				bentgrass		1
				common yarrow		1
				ragwort		1
				Wolf's trisetum		
				bedstraw		
				giant red Indian paintbrush		
				hairy brackenfern		
moss						
rush						
tinker's penny						
violet						

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Table 11.—Ecological Sites and Characteristic Plant Communities—Continued

Map unit symbol, soil name, and percent of map unit	Ecological site name and number	Total production		Characteristic plants	Composition	
		Kind of year	Dry weight		Forest	Range
			Lb/ac		Pct	Pct
172: Badgerflat - 90%	Pinus jeffreyi-Pinus contorta var. murrayana/Monardella odoratissima (F022BI126CA)	Favorable Normal Unfavorable	160 90 20	woolly mule-ears squirreltail Sierra lodgepole pine narrowleaf lupine western needlegrass silverleaf phacelia mountain monardella sedge California stickseed rubber rabbitbrush smooth brome Ross' sedge goosefoot violet lettuce wirelettuce spreading groundsmoke sulphur-flower buckwheat wax currant	21 16 14 14 13 4 3 3 2 2 2 1 1 1 1 1 1	
173: Badgerwash - 90%	Pinus contorta var. murrayana/Elymus elymoides (F022BI125CA)	Favorable Normal Unfavorable	150 90 40	narrowleaf lupine squirreltail western needlegrass Sierra lodgepole pine Ross' sedge lettuce wirelettuce rabbitbush sedge Mt. Hood pussypaws goosefoot violet marumleaf buckwheat mountain monardella pinewoods lousewort slender penstemon sulphur-flower buckwheat	41 21 19 8 5 2 2 2 2 2 2 2 2 2 2	
174: Vitrandic Cryorthents - 60%	Pyroclastic flow (R022BI214CA)	Favorable Normal Unfavorable	60 30 0	marumleaf buckwheat dwarf alpinegold Suksdorf's silene cobwebby Indian paintbrush Nevada dustymaiden cushion buckwheat Davidson's penstemon Pringle's bluegrass Shasta knotweed Mt. Hood pussypaws blue dwarf fleabane rockcress silverleaf phacelia squirreltail western white pine		26 20 17 13 6 6 2 2 2 2 1 1 1 1 1 1

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Table 11.—Ecological Sites and Characteristic Plant Communities—Continued

Map unit symbol, soil name, and percent of map unit	Ecological site name and number	Total production		Characteristic plants	Composition		
		Kind of year	Dry weight			Forest	Range
						Pct	Pct
			Lb/ac				
174: Readingpeak - 20%	Tsuga mertensiana-Pinus albicaulis/Holodiscus discolor/Lupinus obtusilobus-Polygonum davisiae (F022BI124CA)	Favorable	200	mountain hemlock	22		
		Normal	100	oceanspray	17		
		Unfavorable	50	Davidson's penstemon	15		
				marumleaf buckwheat	8		
				rosy pussytoes	8		
				western needlegrass	7		
				cobwebby Indian	4		
				paintbrush			
				granite prickly phlox	4		
				Greene's goldenbush	2		
				Nevada dustymaiden	2		
				Shasta sedge	2		
				bush chinquapin	2		
				squirreltail	2		
	thickstem aster	2					
	Pringle's bluegrass	1					
	mountain pride	1					
	silverleaf phacelia	1					
175: Shadowlake - 75%	Tsuga mertensiana-Abies magnifica/Lupinus obtusilobus-Eriogonum marifolium (F022BI111CA)	Favorable	180	mountain hemlock	19		
		Normal	130	sedge	19		
		Unfavorable	80	Sierra lodgepole pine	17		
				California red fir	13		
				squirreltail	13		
				Pacific lupine	8		
				rush	5		
				western needlegrass	5		
				pinewoods lousewort	1		
				Mt. Hood pussypaws			
Vitrandic Cryofluvents - 15%	Cryic lacustrine flat (R022BI206CA)	Favorable	2800	Nebraska sedge		22	
		Normal	1750	tundra aster		20	
		Unfavorable	1200	Northwest Territory sedge		12	
				water sedge		11	
				tufted hairgrass		10	
				mat muhly		5	
				mountain rush		5	
				pullup muhly		5	
				swordleaf rush		3	
				clover		2	
				spikerush		2	
				Brewer's sedge		1	
				spikerush		1	
				white marsh marigold		1	
				primrose monkeyflower			
	tinker's penny						
	violet						
	willowherb						

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Table 11.—Ecological Sites and Characteristic Plant Communities—Continued

Map unit symbol, soil name, and percent of map unit	Ecological site name and number	Total production		Characteristic plants	Composition	
		Kind of year	Dry weight		Forest	Range
			Lb/ac		Pct	Pct
176: Juniperlake - 85%	Abies concolor-Calocedrus decurrens/Ceanothus cordulatus/Achnatherum (F022BI110CA)	Favorable	350	huckleberry oak	64	
		Normal	230	incense cedar	8	
		Unfavorable	130	Kentucky bluegrass	6	
				blue wildrye	6	
				white hawkweed	5	
				Ross' sedge	4	
				white fir	4	
				Raynolds' sedge	3	
				beardtongue		
				pinewoods lousewort		
				sedge		
				whiteveined wintergreen		
177: Vitrandic Cryorthents, debris flows - 85%	Alpine slopes (R022BI207CA)	Favorable	450	bluntlobe lupine		75
		Normal	300	mountain hemlock		11
		Unfavorable	150	marumleaf buckwheat		5
				Shasta buckwheat		3
				dwarf mountain ragwort		3
				Davidson's penstemon		2
				shieldplant		1
				Mt. Hood pussypaws		
				pioneer rockcress		
				spurry buckwheat		
				squirreltail		
202: Typic Xerorthents, tephra - 85%	Bedded tephra deposits (R022BI201CA)	Favorable	40	marumleaf buckwheat		24
		Normal	15	sulphur-flower buckwheat		24
		Unfavorable	0	sulphur-flower buckwheat		24
				western needlegrass		19
				Douglas' dustymaiden		3
				pioneer rockcress		3
				silverleaf phacelia		3
Typic Xerorthents, welded - 10%	Bedded tephra deposits (R022BI201CA)	Favorable	10	Jeffrey pine		100
		Normal	5			
		Unfavorable	0			
203: Typic Xerorthents, tephra - 90%	Pinus jeffreyi-Abies concolor/Achnatherum occidentale ssp. occidentale-Elymus elymoides (F022BI100CA)	Favorable	75	Jeffrey pine		29
		Normal	50	marumleaf buckwheat		29
		Unfavorable	15	western needlegrass		25
				Sierra lodgepole pine		13
				pioneer rockcress		2
				silverleaf phacelia		2

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Table 12.—Canopy Cover—Continued

Map unit symbol and soil name	Ecological site	Characteristic vegetation	Canopy cover <u>Pct</u>
102: Vitrandic Xerorthents	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis-Chrysolepis sempervirens/Angelica breweri (F022BI114CA)	greenleaf manzanita bush chinquapin snowbrush ceanothus California red fir Jeffrey pine western white pine Sierra lodgepole pine	28 20 12 5 3 1
103: Scoured-----	Abies magnifica/Arctostaphylos nevadensis/Carex rossii- Penstemon gracilentus (F022BI102CA)	pinemat manzanita California red fir western white pine Sierra lodgepole pine longspur lupine slender penstemon bush chinquapin marumleaf buckwheat mountain pride squirreltail western needlegrass California red fir Jeffrey pine Parry's rush dusky onion mountain monardella pioneer rockcress western white pine Mt. Hood pussypaws Ross' sedge Torrey's blue eyed Mary groundsmoke oceanspray prostrate ceanothus	55 15 10 3 3 3 2 2 2 2 1 1 1 1 1 1 1 1 1 1 1

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Table 12.—Canopy Cover—Continued

Map unit symbol and soil name	Ecological site	Characteristic vegetation	Canopy cover <u>Pct</u>
105: Juniperlake-----	<i>Abies magnifica</i> / <i>Penstemon gracilentus</i> - <i>Lupinus arbustus</i> (F022BI112CA)	California red fir longspur lupine western needlegrass Sierra lodgepole pine slender penstemon California red fir Ross' sedge narrowleaf lupine squirreltail Sierra lodgepole pine white fir Mt. Hood pussypaws marumleaf buckwheat pinewoods lousewort western white pine Parry's rabbitbrush	32 8 6 5 5 3 3 3 3 2 2 1 1 1 1
106: Cenplat-----	<i>Abies magnifica</i> - <i>Pinus monticola</i> / <i>Arctostaphylos nevadensis</i> / <i>Achnatherum occidentale</i> (F022BI115CA)	pinemat manzanita California red fir western white pine western needlegrass California red fir mountain hemlock pioneer rockcress	40 15 12 2
107: Badgerflat-----	<i>Abies magnifica</i> - <i>Abies concolor</i> / <i>Chrysolepis sempervirens</i> (F022BI107CA)	pinemat manzanita California red fir California red fir greenleaf manzanita western white pine bush chinquapin	60 34 10 10 6 5
Cenplat-----	<i>Abies magnifica</i> - <i>Abies concolor</i> / <i>Chrysolepis sempervirens</i> (F022BI107CA)	white fir California red fir bush chinquapin greenleaf manzanita California red fir white fir Jeffrey pine	39 25 12 10 5 5 1
108: Typic Xerorthents	<i>Pinus jeffreyi</i> - <i>Abies concolor</i> / <i>Achnatherum occidentale</i> ssp. <i>occidentale</i> - <i>Elymus elymoides</i> (F022BI100CA)	Jeffrey pine squirreltail white fir Torrey's blue eyed Mary rockcress spreading groundsmoke waxy checkerbloom whiteveined wintergreen	33 20 2

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Table 12.—Canopy Cover—Continued

Map unit symbol and soil name	Ecological site	Characteristic vegetation	Canopy cover
			Pct
109: Prospectpeak----	Abies magnifica-Pinus jeffreyi/Arctostaphylos nevadensis-Achnatherum occidentale (F022BI109CA)	California red fir Jeffrey pine pinemat manzanita bush chinquapin California red fir Jeffrey pine mountain monardella western needlegrass Holboell's rockcress Sierra gooseberry naked buckwheat Sacramento waxydogbane goldenbush whiteveined wintergreen	22 15 15 9 3 3 3 2 1 1 1 1
110: Bearrubble-----	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis-Chrysolepis sempervirens/Angelica breweri (F022BI114CA)	pinemat manzanita California red fir bush chinquapin western white pine California red fir mountain monardella wax currant Brewer's angelica western needlegrass western white pine greenleaf manzanita little prince's pine white fir white hawkweed	32 21 10 7 2 2 2 1 1 1 1 1
111: Vitrandic Xerorthents, debris fan	Pinus jeffreyi- Abies/Achnatherum-Lupinus (F022BI106CA)	California red fir Jeffrey pine Sierra lodgepole pine Sierra lodgepole pine bluntlobe lupine narrowleaf lupine western needlegrass pinemat manzanita white fir buckwheat rockcress	18 18 18 2 2 2 2 1 1 1
112: Cascadesprings--	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale (F022BI115CA)	pinemat manzanita California red fir western white pine Sierra lodgepole pine bluntlobe lupine California red fir mountain hemlock Mt. Hood pussypaws marumleaf buckwheat scarlet gilia squirreltail pioneer rockcress	50 12 10 8 6 4 2 1 1 1 1

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Table 12.—Canopy Cover—Continued

Map unit symbol and soil name	Ecological site	Characteristic vegetation	Canopy cover
			Pct
113: Terracelake-----	Glaciated mountain slopes (R022BI204CA)	pinemat manzanita California red fir western white pine Sierra lodgepole pine bush chinquapin marumleaf buckwheat naked buckwheat mountain hemlock mountain pride sedge	75 4 3 2 2 1 1
Emeraldlake-----	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale (F022BI115CA)	pinemat manzanita California red fir bush chinquapin oceanspray western white pine Jeffrey pine Sierra lodgepole pine	70 30 5 2 1
Readingpeak-----	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale (F022BI115CA)	pinemat manzanita California red fir bush chinquapin western white pine oceanspray Jeffrey pine sedge	55 35 5 5 2
114: Emeraldlake-----	Alpine slopes (R022BI207CA)	bluntlobe lupine mountain hemlock California red fir western white pine Parry's rush pinemat manzanita sedge woodrush mountain pride Indian paintbrush stonecrop sulphur-flower buckwheat	50 7 3 3 2 2 2 2 1
Terracelake-----	Alpine slopes (R022BI207CA)	mountain hemlock mountain pride spike trisetum pioneer rockcress King's sandwort stonecrop woodrush California red fir western white pine	20 8 4 2 1 1 1

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Table 12.—Canopy Cover—Continued

Map unit symbol and soil name	Ecological site	Characteristic vegetation	Canopy cover
			Pct
114: Readingpeak-----	Tsuga mertensiana-Pinus albicaulis/Holodiscus discolor/Lupinus obtusilobus- Polygonum davisiae (F022BI124CA)	bluntlobe lupine mountain hemlock Davis' knotweed oceanspray pinemat manzanita western needlegrass California red fir Ross' sedge squirreltail western white pine marumleaf buckwheat pioneer rockcress whitebark pine	30 10 3 2 2 2 1 1 1 1 1 1
115: Shadowlake-----	Tsuga mertensiana-Abies magnifica/Lupinus obtusilobus- Eriogonum marifolium (F022BI111CA)	California red fir bluntlobe lupine western needlegrass marumleaf buckwheat Sierra lodgepole pine mountain hemlock western white pine Mt. Hood pussypaws pioneer rockcress	40 15 12 10 5 3 3
116: Xeric Vitricryands, tephra over till	Tsuga mertensiana/Lupinus obtusilobus-Cistanthe umbellata var. umbellata (F022BI104CA)	mountain hemlock bluntlobe lupine mountain hemlock sedge western needlegrass marumleaf buckwheat rush western white pine Mt. Hood pussypaws Shasta sedge pioneer rockcress	23 22 8 2 2 1 1 1
Terracelake-----	Tsuga mertensiana/Lupinus obtusilobus-Cistanthe umbellata var. umbellata (F022BI104CA)	mountain hemlock bluntlobe lupine sedge spike trisetum bluegrass mountain hemlock marumleaf buckwheat pioneer rockcress Mt. Hood pussypaws squirreltail western needlegrass	31 12 8 6 4 4 1 1
Xeric Vitricryands, cirque floor	Cirque floor (R022BI205CA)	bluntlobe lupine mountain hemlock Brewer's sedge Shasta sedge Parry's rush whitebark pine Mt. Hood pussypaws Ross' sedge spike trisetum sticky cinquefoil western needlegrass	50 7 4 3 1 1

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Table 12.—Canopy Cover—Continued

Map unit symbol and soil name	Ecological site	Characteristic vegetation	Canopy cover <u>Pct</u>
119: Aquic Dystroxerepts, debris flows	Active hydrothermal areas (R022BI216CA)	hairy brackenfern mountain hemlock California red fir sedge blue wildrye western needlegrass California red fir mountain hemlock mountain monardella squirreltail western white pine western white pine California brome California false hellebore lupine pinemat manzanita rush	25 22 17 8 4 4 2 2 2 2 2 1
Typic Dystroxerepts	Active hydrothermal areas (R022BI216CA)	pinemat manzanita California red fir mountain hemlock western white pine	15 5 5 5
120: Buttelake-----	Abies concolor-Pinus jeffreyi/Elymus elymoides (F022BI119CA)	Jeffrey pine white fir white fir bush chinquapin lettuce wirelettuce little prince's pine rubber rabbitbrush slender penstemon whiteveined wintergreen	45 30 3 2
Sunhoff-----	Abies magnifica-Abies concolor/Chrysolepis sempervirens (F022BI107CA)	white fir Jeffrey pine bush chinquapin California red fir white fir California red fir slender penstemon western needlegrass Jeffrey pine lettuce wirelettuce pioneer rockcress rubber rabbitbrush	30 24 10 6 3 1 1 1 1 1 1
Talved-----	Talus slope (R022BI200CA)	bush chinquapin oceanspray Jeffrey pine prickly hawkweed western snakeroot western needlegrass sedge squirreltail Sierra gooseberry bitter cherry scabland penstemon white fir whiteveined wintergreen	10 10 8 8 8 7 4 4 2 2 2

Soil Survey of Lassen Volcanic National Park, California

Table 12.—Canopy Cover—Continued

Map unit symbol and soil name	Ecological site	Characteristic vegetation	Canopy cover
			Pct
127:	Spring complex (R022BI211CA)	thinleaf alder	77
Aquepts-----		blue wildrye	20
		common cowparsnip	7
		Kentucky bluegrass	6
		California false hellebore	2
		fowl mannagrass	1
		sedge	1
		stickywilly	1
		sweetcicely	1
		Douglas' thistle	
		Pacific bleeding heart	
		brittle bladderfern	
		bugle hedgenettle	
		bull thistle	
		goosefoot	
		hairy brackenfern	
		small enchanter's nightshade	
		timothy	
	woolly sedge		
129:	Abies concolor-Calocedrus decurrens/Ceanothus cordulatus/Achnatherum (F022BI110CA)	white fir	54
Humic		California brome	5
Haploxerands,		incense cedar	5
colluvium		white fir	5
		incense cedar	3
		whitethorn ceanothus	3
		Jeffrey pine	2
		Ross' sedge	2
		white hawkweed	2
		blue wildrye	1
		lettuce wirelettuce	1
		sugar pine	1
		western needlegrass	1
		Brewer's aster	
		gooseberry currant	
		rockcress	
		shining willow	
130:		Frigid lacustrine flat (R022BI217CA)	Nebraska sedge
Histic	Northwest Territory sedge		15
Humaquepts,	capitate sedge		14
lake sediments	tufted hairgrass		10
	pullup muhly		8
	tundra aster		8
	western mountain aster		8
	Sierra rush		5
	mountain rush		5
	willowherb		2
	moss		
	willow		

Soil Survey of Lassen Volcanic National Park, California

Table 12.—Canopy Cover—Continued

Map unit symbol and soil name	Ecological site	Characteristic vegetation	Canopy cover <u>Pct</u>
136: Terracelake-----	Tsuga mertensiana-Abies magnifica/Lupinus obtusilobus- Eriogonum marifolium (F022BI111CA)	pinemat manzanita mountain hemlock mountain rush bluntlobe lupine western needlegrass western white pine California red fir sedge California red fir marumleaf buckwheat squirreltail King's sandwort Mt. Hood pussypaws bentgrass buckwheat mountain hemlock oceanspray rockcress spike trisetum western white pine	30 14 10 7 7 5 4 3 2 2 1
Xeric Vitricryands, cirque floor	Cirque floor (R022BI205CA)	bluntlobe lupine marumleaf buckwheat mountain hemlock Davis' knotweed Mt. Hood pussypaws squirreltail	52 2 2 1
137: Xeric Vitricryands	Windy peak (R022BI212CA)	rubber rabbitbrush oceanspray squirreltail granite prickly phlox marumleaf buckwheat dwarf alpinegold sulphur-flower buckwheat antelope bitterbrush mountain hemlock western needlegrass greenleaf manzanita thickstem aster whitebark pine Indian paintbrush Jeffrey pine Mt. Hood pussypaws beardtongue bush chinquapin rockcress	32 12 11 9 5 3 3 2 2 2 1 1 1

Soil Survey of Lassen Volcanic National Park, California

Table 12.—Canopy Cover—Continued

Map unit symbol and soil name	Ecological site	Characteristic vegetation	Canopy cover
			Pct
141: Humic Haploxerands	Abies concolor-Pinus jeffreyi/Arctostaphylos patula- Chrysolepis sempervirens (F022BI103CA)	greenleaf manzanita snowbrush ceanothus white fir bush chinquapin bitter cherry white fir	30 30 26 22 13
Typic Haploxerands	Abies concolor-Pinus jeffreyi/Arctostaphylos patula- Chrysolepis sempervirens (F022BI103CA)	Jeffrey pine incense cedar white fir Douglas-fir little prince's pine sedge bush chinquapin prostrate ceanothus white fir Sierra gooseberry greenleaf manzanita	34 20 10 4 2 2 1 1 1
Bearrubble-----	Abies concolor-Pinus jeffreyi/Arctostaphylos patula- Chrysolepis sempervirens (F022BI103CA)	greenleaf manzanita Jeffrey pine bush chinquapin white fir pinemat manzanita snowbrush ceanothus beardtongue	20 15 10 9 3 2 1
142: Cragwash-----	Abies concolor-Pinus jeffreyi/Arctostaphylos patula- Chrysolepis sempervirens (F022BI103CA)	white fir Jeffrey pine Idaho fescue white fir squirreltail mountain monardella sedge western needlegrass rubber rabbitbrush slender penstemon Ross' sedge marumleaf buckwheat spreading groundsmoke Jeffrey pine prostrate ceanothus snowbrush ceanothus	35 15 8 7 5 3 3 3 2 2 1 1 1 1
143: Andic Durixercepts	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale (F022BI115CA)	pinemat manzanita western white pine California red fir California red fir western white pine western needlegrass	85 18 17 5 5 1
144: Xeric Vitricryands, cirque floor	Cirque floor (R022BI205CA)	bluntlobe lupine Shasta buckwheat mountain hemlock Mt. Hood pussypaws marumleaf buckwheat Davis' knotweed broadleaf knotweed squirreltail	50 5 5 2 2 1 1

Soil Survey of Lassen Volcanic National Park, California

Table 12.—Canopy Cover—Continued

Map unit symbol and soil name	Ecological site	Characteristic vegetation	Canopy cover <u>Pct</u>
144: Humic Xeric Vitricryands	Tsuga mertensiana/Lupinus obtusilobus-Cistanthe umbellata var. umbellata (F022BI104CA)	mountain hemlock	36
		bluntlobe lupine	20
		Rocky Mountain pussytoes	12
		spike trisetum	10
		Ross' sedge	5
		bentgrass	5
		sedge	5
		western needlegrass	3
		marumleaf buckwheat	2
		mountain monardella	2
		Mt. Hood pussypaws	1
		mountain hemlock	1
		muhly	1
		toad rush	1
		Parry's rush	
		Sierra rush	
		sulphur-flower buckwheat	
whitebark pine			
145: Sueredo-----	Abies concolor-Pinus jeffreyi/Arctostaphylos patula- Chrysolepis sempervirens (F022BI103CA)	white fir	42
		Jeffrey pine	32
		white fir	6
		greenleaf manzanita	4
		squirreltail	3
		western needlegrass	3
		California red fir	2
		Ross' sedge	2
		Sierra lodgepole pine	2
		pinemat manzanita	2
		Jeffrey pine	1
		mountain monardella	1
		pinewoods lousewort	1
		sedge	1
		slender penstemon	1
		snowbrush ceanothus	1
		pioneer rockcress	
spreading groundsmoke			
sugar pine			
whiteveined wintergreen			
146: Sueredo-----	Abies concolor-Pinus jeffreyi/Arctostaphylos patula- Chrysolepis sempervirens (F022BI103CA)	white fir	40
		Jeffrey pine	12
		greenleaf manzanita	2
		white fir	2
		whiteveined wintergreen	2
		California red fir	1
		Jeffrey pine	1
		little prince's pine	1
		pinemat manzanita	1
		sticky currant	1
		western needlegrass	1
		oceanspray	
		pioneer rockcress	
sedge			

Soil Survey of Lassen Volcanic National Park, California

Table 12.—Canopy Cover—Continued

Map unit symbol and soil name	Ecological site	Characteristic vegetation	Canopy cover <u>Pct</u>
147: Summertown-----	Abies concolor-Pinus jeffreyi/Arctostaphylos patula- Chrysolepis sempervirens (F022BI103CA)	white fir bush chinquapin Jeffrey pine greenleaf manzanita snowbrush ceanothus sedge western needlegrass white fir bitter cherry Jeffrey pine sugar pine	32 26 11 11 8 4 2 2 1 1 1
148: Humic Haploxerands, lake terrace	Abies magnifica/Penstemon gracilentus-Lupinus arbustus (F022BI112CA)	Sierra lodgepole pine longspur lupine California red fir mountain monardella squirreltail slender penstemon western needlegrass Columbia needlegrass Mt. Hood pussypaws buckwheat marumleaf buckwheat western white pine California red fir Ross' sedge Sierra lodgepole pine sedge spreading groundsmoke pinewoods lousewort	25 25 12 12 5 4 4 3 2 2 2 2 1 1 1 1 1 1
Typic Endoaquands	Pinus contorta var. murrayana/Veratrum californicum var. californicum-Elymus glaucus (F022BI108CA)	Sierra lodgepole pine arrowleaf ragwort California false hellebore bigleaf lupine sedge sedge California red fir clover blue wildrye common yarrow meadow barley primrose monkeyflower two-lobed larkspur California brome Congdon's bulrush Sierra gooseberry oatgrass	45 25 20 20 16 15 8 4 3 3 3 3 3 2 3 2 1
149: Emeraldlake-----	Alpine slopes (R022BI207CA)	bluntlobe lupine mountain hemlock California red fir western white pine Parry's rush pinemat manzanita sedge woodrush mountain pride Indian paintbrush sulphur-flower buckwheat	50 7 3 3 2 2 2 2 1 1

Soil Survey of Lassen Volcanic National Park, California

Table 12.—Canopy Cover—Continued

Map unit symbol and soil name	Ecological site	Characteristic vegetation	Canopy cover <u>Pct</u>
150: Shadowlake-----	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale (F022BI115CA)	California red fir western white pine pinemat manzanita bush chinquapin greenleaf manzanita Jeffrey pine Parry's rush Ross' sedge currant mountain monardella oceanspray pioneer rockcress	30 25 20 10 10 1
Terracelake-----	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale (F022BI115CA)	pinemat manzanita California red fir western white pine Sierra lodgepole pine spike trisetum slender penstemon California red fir mountain pride squirreltail western needlegrass western white pine rosy pussytoes white fir Utah serviceberry rush sedge white hawkweed	31 25 15 4 4 3 2 2 2 2 2 1 1
Acroph-----	Glaciated mountain slopes (R022BI204CA)	pinemat manzanita California red fir mountain hemlock oceanspray western white pine bluntlobe lupine western needlegrass Mt. Hood pussypaws Ross' sedge buckwheat marumleaf buckwheat pioneer rockcress slender penstemon squirreltail	30 8 6 6 6 2 2 1 1 1 1 1 1 1

Soil Survey of Lassen Volcanic National Park, California

Table 12.—Canopy Cover—Continued

Map unit symbol and soil name	Ecological site	Characteristic vegetation	Canopy cover <u>Pct</u>
152: Terracelake-----	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale (F022BI115CA)	pinemat manzanita California red fir western white pine Sierra lodgepole pine spike trisetum slender penstemon California red fir mountain pride squirreltail western needlegrass western white pine rosy pussytoes white fir Utah serviceberry rush sedge white hawkweed	31 25 15 4 4 3 2 2 2 2 2 1 1
Shadowlake-----	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale (F022BI115CA)	California red fir western white pine pinemat manzanita bush chinquapin greenleaf manzanita Jeffrey pine Parry's rush Ross' sedge currant mountain monardella oceanspray pioneer rockcress	30 25 20 10 10 1
Acroph-----	Glaciated mountain slopes (R022BI204CA)	pinemat manzanita California red fir mountain hemlock oceanspray western white pine bluntlobe lupine western needlegrass Mt. Hood pussypaws Ross' sedge buckwheat marumleaf buckwheat pioneer rockcress slender penstemon squirreltail	30 8 6 6 6 2 2 1 1 1 1 1 1 1
153: Typic Vitrixerands	Abies concolor-Pinus jeffreyi/Arctostaphylos patula- Chrysolepis sempervirens (F022BI103CA)	Jeffrey pine Jeffrey pine California red fir goldenbush Sierra lodgepole pine western white pine lupine mountain monardella pioneer rockcress sedge sulphur-flower buckwheat wavyleaf Indian paintbrush western needlegrass white fir	27 3 2 2 1 1 1 1 1

Soil Survey of Lassen Volcanic National Park, California

Table 12.—Canopy Cover—Continued

Map unit symbol and soil name	Ecological site	Characteristic vegetation	Canopy cover <u>Pct</u>
153: Vitrandic Xerorthents, moraine	Abies concolor-Pinus jeffreyi/Arctostaphylos patula- Chrysolepis sempervirens (F022BI103CA)	white fir bush chinquapin mountain monardella Jeffrey pine squirreltail wax currant narrowleaf lupine greenleaf manzanita rubber rabbitbrush slender penstemon western needlegrass Indian paintbrush scarlet gilia white fir spreading groundsmoke spurry buckwheat California brome Mt. Hood pussypaws aster marumleaf buckwheat	25 15 12 10 8 8 7 5 3 3 3 2 2 2 1 1
154: Typic Vitrixerands	Abies concolor-Pinus jeffreyi/Arctostaphylos patula- Chrysolepis sempervirens (F022BI103CA)	Jeffrey pine Jeffrey pine California red fir goldenbush Sierra lodgepole pine western white pine lupine mountain monardella pioneer rockcress sedge sulphur-flower buckwheat wavyleaf Indian paintbrush western needlegrass white fir	27 3 2 2 1 1
Vitrandic Xerorthents, moraine	Abies concolor-Pinus jeffreyi/Arctostaphylos patula- Chrysolepis sempervirens (F022BI103CA)	white fir bush chinquapin mountain monardella Jeffrey pine squirreltail wax currant narrowleaf lupine greenleaf manzanita rubber rabbitbrush slender penstemon western needlegrass Indian paintbrush scarlet gilia white fir spreading groundsmoke spurry buckwheat California brome Mt. Hood pussypaws aster marumleaf buckwheat	25 15 12 10 8 8 7 5 3 3 3 2 2 2 1 1

Soil Survey of Lassen Volcanic National Park, California

Table 12.—Canopy Cover—Continued

Map unit symbol and soil name	Ecological site	Characteristic vegetation	Canopy cover <u>Pct</u>
155: Xeric Vitricryands, pyroclastic surge	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale (F022BI115CA)	California red fir lupine mountain monardella western needlegrass western white pine mountain hemlock pinemat manzanita	43 35 17 10 5 3
156: Xeric Vitricryands, pyroclastic surge	Abies magnifica-Pinus monticola/Arctostaphylos nevadensis/Achnatherum occidentale (F022BI115CA)	pinemat manzanita California red fir bush chinquapin California red fir greenleaf manzanita western white pine Jeffrey pine sedge western white pine	60 20 15 5 5 2 1 1
157: Typic Vitrixerands, very deep	Abies concolor-Pinus jeffreyi/Arctostaphylos patula- Chrysolepis sempervirens (F022BI103CA)	greenleaf manzanita snowbrush ceanothus bush chinquapin white fir Jeffrey pine California red fir whiteveined wintergreen Douglas-fir	45 30 25 22 7 2 1
158: Typic Vitrixerands, unglaciated	Pinus jeffreyi/Arctostaphylos patula (F022BI121CA)	pinemat manzanita bush chinquapin greenleaf manzanita snowbrush ceanothus Jeffrey pine California red fir ponderosa pine western white pine sugar pine Ross' sedge slender penstemon western needlegrass	40 20 15 10 5 4 4 4 3 1 1 1

Soil Survey of Lassen Volcanic National Park, California

Table 12.—Canopy Cover—Continued

Map unit symbol and soil name	Ecological site	Characteristic vegetation	Canopy cover <u>Pct</u>
160: Humic Haploxerands, stream terrace	Abies concolor-Calocedrus decurrens/Ceanothus cordulatus/Achnatherum (F022BI110CA)	white fir western needlegrass mountain monardella white fir Brewer's aster blue wildrye naked buckwheat silverleaf phacelia spreading groundsmoke white hawkweed	58 3 2 2 1 1 1 1
161: Typic Psammaquents	Sandy flood plains (R022BI213CA)	shining willow squirreltail western needlegrass sedge mountain rush Shasta buckwheat blue wildrye cryptantha California brome Idaho bentgrass meadow fescue rush slender hairgrass bearded melicgrass bull thistle dwarf mountain ragwort groundsmoke	60 18 18 10 9 7 5 5 3 3 3 2 2 1
162: Humic Haploxerands, outwash	Abies concolor-Pinus jeffreyi/Arctostaphylos patula- Chrysolepis sempervirens (F022BI103CA)	white fir sedge Jeffrey pine western needlegrass white fir	67 2 1
163: Vitrandic Cryofluvents	Cryic lacustrine flat (R022BI206CA)	Nebraska sedge Northwest Territory sedge mountain rush water sedge tundra aster spikerush clover mat muhly pullup muhly spikerush swordleaf rush tufted hairgrass Brewer's sedge primrose monkeyflower tinker's penny violet white marsh marigold willowherb	35 15 15 10 3 2 1 1 1 1 1 1 1

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Table 12.—Canopy Cover—Continued

Map unit symbol and soil name	Ecological site	Characteristic vegetation	Canopy cover
			Pct
164: Typic Petraquepts, bedrock	Spring complex (R022BI211CA)	thinleaf alder woollyhead parsnip streambank bird's-foot trefoil moss Douglas' thistle Parish's yampah California grass of Parnassus brittle bladderfern common yarrow seep monkeyflower tinker's penny tufted hairgrass Bigelow's sneezeweed Wolf's trisetum bentgrass sedge violet California false hellebore bedstraw ragwort rush giant red Indian paintbrush hairy brackenfern	17 15 12 10 4 4 3 3 3 3 3 2 2 2 2 1 1 1 1 1
Aquic Haploxerands	Abies concolor-Pinus contorta var. murrayana/Elymus glaucus (F022BI120CA)	Sierra lodgepole pine white fir white hawkweed sedge incense cedar little prince's pine spike trisetum western needlegrass white fir Jeffrey pine Sierra lodgepole pine incense cedar hairy brackenfern	24 24 12 11 8 5 5 5 5 1 1 1 1
Typic Petraquepts	Thermal seeps (R022BI218CA)	whitetip clover brown sedge California false hellebore Douglas' thistle Howell's yampah lakeshore sedge smooth horsetail chairmaker's bulrush bluejoint Jessica sticktight hardstem tule monkeyflower ragwort bentgrass field horsetail fowl mannagrass timothy mountain rush bugle hedgenettle Sierra lodgepole pine fringed willowherb glaucus willowherb panicled bulrush	18 15 12 12 10 10 10 8 6 5 5 5 5 3 3 3 3 2 1

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Table 12.—Canopy Cover—Continued

Map unit symbol and soil name	Ecological site	Characteristic vegetation	Canopy cover
			Pct
165: Aquandic Humaquepts	Frigid alluvial flat (R022BI202CA)	tufted hairgrass Kentucky bluegrass widefruit sedge Chamisso arnica mountain rush timothy California false hellebore sedge Rydberg's penstemon Lemmon's yampah chickweed cinquefoil fringed willowherb longstalk clover meadow barley threepetal bedstraw	30 25 10 8 8 8 2 2 1
Histic Humaquepts	Frigid alluvial flat (R022BI202CA)	Nebraska sedge mountain rush Douglas' thistle Kentucky bluegrass Rydberg's penstemon common dandelion knotweed longstalk clover meadow barley tufted hairgrass violet	80 5
Aquandic Endoaquepts	Frigid alluvial flat (R022BI202CA)	mountain rush sedge annual bluegrass Columbia needlegrass aster spreading groundsmoke common dandelion slender cinquefoil clover longstalk clover thinleaf alder	41 34 6 5 5 4 2 2
Terric Haplohemists	Frigid alluvial flat (R022BI202CA)	rush Nebraska sedge Northwest Territory sedge bulrush annual bluegrass longstalk clover timothy chickweed alpine laurel bentgrass California brome Douglas' thistle common dandelion Scouler's St. Johnswort bull thistle thinleaf alder	40 35 25 10 5 5 5 4 2 2 1 1 1

Soil Survey of Lassen Volcanic National Park, California

Table 12.—Canopy Cover—Continued

Map unit symbol and soil name	Ecological site	Characteristic vegetation	Canopy cover <u>Pct</u>
166: Aquic Haploxerands	Abies concolor-Pinus contorta var. murrayana/Elymus glaucus (F022BI120CA)	Sierra lodgepole pine white fir sugar pine white hawkweed sedge little prince's pine spike trisetum western needlegrass white fir incense cedar incense cedar Jeffrey pine Sierra lodgepole pine hairy brackenfern	24 24 12 12 11 5 5 5 5 3 2 1 1
Humic Haploxerands, outwash terrace	Abies concolor-Calocedrus decurrens/Ceanothus cordulatus/Achnatherum (F022BI110CA)	white fir California brome Jeffrey pine incense cedar white fir western needlegrass incense cedar whitethorn ceanothus Ross' sedge white hawkweed blue wildrye lettuce wirelettuce sugar pine Brewer's aster gooseberry currant rockcress violet	54 5 5 5 5 4 3 3 2 2 1 1 1 1 1 1 1
167: Emeraldlake-----	Alpine slopes (R022BI207CA)	bluntlobe lupine mountain hemlock whitebark pine marumleaf buckwheat Shasta buckwheat dwarf mountain ragwort pioneer rockcress Davidson's penstemon mountain hemlock California red fir Mt. Hood pussypaws shieldplant spurry buckwheat squirreltail	28 6 4 3 2 2 2 1 1 1 1 1 1 1
Readingpeak-----	Tsuga mertensiana-Pinus albicaulis/Holodiscus discolor/Lupinus obtusilobus- Polygonum davisiae (F022BI124CA)	mountain hemlock bluntlobe lupine Davis' knotweed whitebark pine western needlegrass mountain hemlock oceanspray marumleaf buckwheat pioneer rockcress	11 10 3 3 2 1 1 1

Soil Survey of Lassen Volcanic National Park, California

Table 12.—Canopy Cover—Continued

Map unit symbol and soil name	Ecological site	Characteristic vegetation	Canopy cover <u>Pct</u>
170: Emeraldlake-----	Alpine slopes (R022BI207CA)	bluntlobe lupine mountain hemlock whitebark pine marumleaf buckwheat dwarf mountain ragwort pioneer rockcress Davidson's penstemon mountain hemlock California red fir Mt. Hood pussypaws shieldplant squirreltail	28 6 4 3 2 2 1 1
Readingpeak-----	Alpine slopes (R022BI207CA)	mountain hemlock bluntlobe lupine Davis' knotweed whitebark pine western needlegrass mountain hemlock marumleaf buckwheat pioneer rockcress	11 10 6 3 2 1
171: Aquepts-----	Spring complex (R022BI211CA)	thinleaf alder blue wildrye bugle hedgenettle common cowparsnip Kentucky bluegrass California false hellebore fowl mannagrass sedge stickywilly sweetcicely woolly sedge Douglas' thistle Pacific bleeding heart brittle bladderfern bull thistle goosefoot hairy brackenfern small enchanter's nightshade timothy	77 20 7 7 6 2 1 1 1 1 1 1 1 1 1 1 1 1 1

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Table 12.—Canopy Cover—Continued

Map unit symbol and soil name	Ecological site	Characteristic vegetation	Canopy cover
			Pct
171: Typic Petraquepts, bedrock	Spring complex (R022BI211CA)	thinleaf alder woollyhead parsnip streambank bird's-foot trefoil moss Douglas' thistle Parish's yampah California grass of Parnassus brittle bladderfern common yarrow seep monkeyflower tinker's penny tufted hairgrass Bigelow's sneezeweed Wolf's trisetum bentgrass sedge violet California false hellebore bedstraw ragwort rush giant red Indian paintbrush hairy brackenfern	17 15 12 10 4 4 3 3 3 3 3 2 2 2 2 1 1 1 1 1 1
172: Badgerflat-----	Pinus jeffreyi-Pinus contorta var. murrayana/Monardella odoratissima (F022BI126CA)	Jeffrey pine Sierra lodgepole pine woolly mule-ears Sierra lodgepole pine narrowleaf lupine squirreltail western needlegrass mountain monardella rubber rabbitbrush sedge smooth brome white fir California red fir California stickseed Ross' sedge lettuce wirelettuce silverleaf phacelia spreading groundsmoke wax currant goosefoot violet sulphur-flower buckwheat	30 25 9 7 7 7 6 2 2 2 2 2 1 1 1 1 1 1 1 1

Soil Survey of Lassen Volcanic National Park, California

Table 12.—Canopy Cover—Continued

Map unit symbol and soil name	Ecological site	Characteristic vegetation	Canopy cover <u>Pct</u>
175: Shadowlake-----	Tsuga mertensiana-Abies magnifica/Lupinus obtusilobus- Eriogonum marifolium (F022BI111CA)	California red fir Sierra lodgepole pine California red fir Sierra lodgepole pine mountain hemlock sedge mountain hemlock Pacific lupine pinewoods lousewort squirreltail western needlegrass Mt. Hood pussypaws	34 17 5 5 5 4 2 2 2 2
Vitrandid Cryofluvents	Cryic lacustrine flat (R022BI206CA)	Nebraska sedge Northwest Territory sedge mountain rush water sedge tundra aster spikerush clover mat muhly pullup muhly spikerush swordleaf rush tufted hairgrass Brewer's sedge primrose monkeyflower tinker's penny violet white marsh marigold willowherb	35 15 15 10 3 2 1 1 1 1 1 1 1 1 1 1 1
176: Juniperlake-----	Abies concolor-Calocedrus decurrens/Ceanothus cordulatus/Achnatherum (F022BI110CA)	white fir incense cedar huckleberry oak Jeffrey pine white hawkweed Raynolds' sedge Kentucky bluegrass Ross' sedge blue wildrye incense cedar white fir beardtongue pinewoods lousewort sedge whiteveined wintergreen	36 28 18 6 6 3 2 2 2 2 2 1

Soil Survey of Lassen Volcanic National Park, California

Table 12.—Canopy Cover—Continued

Map unit symbol and soil name	Ecological site	Characteristic vegetation	Canopy cover <u>Pct</u>
177: Vitrandic Cryorthents, debris flows	Alpine slopes (R022BI207CA)	bluntlobe lupine mountain hemlock whitebark pine marumleaf buckwheat Shasta buckwheat dwarf mountain ragwort pioneer rockcress Davidson's penstemon mountain hemlock California red fir Mt. Hood pussypaws shieldplant spurry buckwheat squirreltail	28 6 4 3 2 2 1 1
202: Typic Xerorthents, tephra	Bedded Tephra Deposits (R022BI201CA)	Jeffrey pine marumleaf buckwheat sulphur-flower buckwheat sulphur-flower buckwheat Douglas' dustymaiden Sierra lodgepole pine pioneer rockcress silverleaf phacelia western needlegrass	1 1 1 1
Typic Xerorthents, welded	Bedded Tephra Deposits (R022BI201CA)	Jeffrey pine	1
203: Typic Xerorthents, tephra	Pinus jeffreyi-Abies concolor/Achnatherum occidentale ssp. occidentale- Elymus elymoides (F022BI100CA)	Jeffrey pine Sierra lodgepole pine marumleaf buckwheat western needlegrass pioneer rockcress silverleaf phacelia	8 2 2 1

Soil Survey of Lassen Volcanic National Park, California

Table 13.—Index of Common Names, Plant Symbols, and Scientific Names

(Plants displayed occur within the National Soils Information System (NASIS) plant tables used for the soil survey area. The scientific and common names are referenced at the USDA PLANTS database: plants.usda.gov)

Local common name	Plant symbol	Scientific name
abruptbeak sedge	CAAB2	Carex abrupta
alpine bentgrass	AGHU	Agrostis humilis
alpine laurel	KAMI	Kalmia microphylla
alpine leafybract aster	SYFOF	Symphotrichum foliaceum var. foliaceum
alpine timothy	PHAL2	Phleum alpinum
American alpine speedwell	VEWO2	Veronica wormskjoldii
American vetch	VIAM	Vicia americana
analogue sedge	CASI2	Carex simulata
annual bluegrass	POAN	Poa annua
antelope bitterbrush	PUTR2	Purshia tridentata
arrowleaf balsamroot	BASA3	Balsamorhiza sagittata
arrowleaf ragwort	SETR	Senecio triangularis
Ashland cinquefoil	POGLA2	Potentilla glandulosa ssp. ashlandica
aster	ASTER	Aster spp.
bearded melicgrass	MEAR3	Melica aristata
beardtongue	PENST	Penstemon spp.
bedstraw	GALIU	Galium spp.
bentgrass	AGROS2	Agrostis spp.
Bigelow's sneezeweed	HEBI	Helenium bigelovii
bigleaf lupine	LUPO2	Lupinus polyphyllus
bitter cherry	PREM	Prunus emarginata
black cottonwood	POBAT	Populus balsamifera ssp. trichocarpa
blister sedge	CAVE6	Carex vesicaria
blue dwarf fleabane	EREL4	Erigeron elegantulus
blue wildrye	ELGL	Elymus glaucus
bluegrass	POA	Poa spp.
bluejoint	CACA4	Calamagrostis canadensis
bluntlobe lupine	LUOB	Lupinus obtusilobus
Bolander's yampah	PEBO2	Perideridia bolanderi
Brewer's angelica	ANBR5	Angelica breweri
Brewer's aster	EUBR12	Eucephalus breweri
Brewer's cliffbrake	PEBR4	Pellaea breweri
Brewer's sedge	CABR12	Carex breweri
brittle bladderfern	CYFR2	Cystopteris fragilis
broadleaf knotweed	POMI2	Polygonum minimum
brome	BROMU	Bromus spp.
brown sedge	CASU6	Carex subfusca
buckwheat	ERIOG	Eriogonum spp.
bugle hedgenettle	STAJ	Stachys ajugoides
bull thistle	CIVU	Cirsium vulgare
bulrush	SCIRP	Scirpus spp.
bush chinquapin	CHSE11	Chrysolepis sempervirens
California brome	BRCA5	Bromus carinatus
California false hellebore	VECAC2	Veratrum californicum var. californicum
California grass of Parnassus	PACA18	Parnassia californica
California oatgrass	DACA3	Danthonia californica
California red fir	ABMA	Abies magnifica
California stickseed	HACA	Hackelia californica
California wawing	PTTEC2	Pteryxia terebinthina var. californica
capitate sedge	CACA13	Carex capitata
chairmaker's bulrush	SCAM6	Schoenoplectus americanus
Chamisso arnica	ARCH3	Arnica chamissonis
chickweed	STL0L7	Stellaria longipes spp. longipes
cinquefoil	POTEN	Potentilla spp.
clover	TRIFO	Trifolium spp.
cobwebby Indian paintbrush	CAAR11	Castilleja arachnoidea
Columbia needlegrass	ACNE9	Achnatherum nelsonii
common cowparsnip	HEMA80	Heracleum maximum
common dandelion	TAOF	Taraxacum officinale

Soil Survey of Lassen Volcanic National Park, California

Table 13.—Index of Common Names, Plant Symbols, and Scientific Names—Continued

Local common name	Plant symbol	Scientific name
common mullein	VETH	Verbascum thapsus
common rush	JUEF	Juncus effusus
common St. Johnswort	HYPE	Hypericum perforatum
common yarrow	ACMI2	Achillea millefolium
Congdon's bulrush	SCCO	Scirpus congdonii
cryptantha	CRYPT	Cryptantha spp.
currant	RIBES	Ribes spp.
cushion buckwheat	EROV	Eriogonum ovalifolium
Davidson's penstemon	PEDA2	Penstemon davidsonii
Davis' knotweed	PODA	Polygonum davisiae
Douglas' dustymaiden	CHDO	Chaenactis douglasii
Douglas' knotweed	PODO4	Polygonum douglasii
Douglas' sagewort	ARDO3	Artemisia douglasiana
Douglas' thistle	CIDO2	Cirsium douglasii
Douglas-fir	PSME	Pseudotsuga menziesii
dusky onion	ALCA2	Allium campanulatum
dwarf alpinegold	HUNA	Hulsea nana
dwarf mountain ragwort	SEFR3	Senecio fremontii
fescue	FESTU	Festuca spp.
fescue	VULPI	Vulpia spp.
field horsetail	EQAR	Equisetum arvense
fireweed	CHANC	Chamerion angustifolium ssp. circumvagum
fowl mannagrass	GLST	Glyceria striata
foxtail muhly	MUAN	Muhlenbergia andina
fragrant bedstraw	GATR3	Galium triflorum
fringed willowherb	EPCI	Epilobium ciliatum
giant red Indian paintbrush	CAMI12	Castilleja miniata
glaucus willowherb	EPGL	Epilobium glaberrimum
golden sedge	CAAU3	Carex aurea
goldenbush	ERICA2	Ericameria spp.
gooseberry currant	RIMO2	Ribes montigenum
goosefoot	CHENO	Chenopodium spp.
goosefoot violet	VIPU4	Viola purpurea
granite prickly phlox	LIPU11	Linanthus pungens
Gray's bedstraw	GAGR2	Galium grayanum
Gray's licorice-root	LIGR	Ligusticum grayi
Greene's goldenbush	ERGR16	Ericameria greenei
greenleaf manzanita	ARPA6	Arctostaphylos patula
groundsmoke	GAYOP	Gayophytum spp.
hairy brackenfern	PTAQP2	Pteridium aquilinum var. pubescens
Hansen's clover	TRLOH	Trifolium longipes ssp. hansenii
hardstem tule	SCACO4	Scirpus acutus var. occidentalis
high mountain cinquefoil	POFL3	Potentilla flabellifolia
Holboell's rockcress	ARHO2	Arabis holboellii
Howell's yampah	PEHO5	Perideridia howellii
huckleberry oak	QUVA	Quercus vacciniifolia
Idaho bentgrass	AGID	Agrostis idahoensis
Idaho fescue	FEID	Festuca idahoensis
incense cedar	CADE27	Calocedrus decurrens
Indian paintbrush	CASTI2	Castilleja spp.
Indian warrior	PEDE	Pedicularis densiflora
Jeffrey pine	PIJE	Pinus jeffreyi
Jepson's willow	SAJE	Salix jepsonii
Jessica sticktight	HAMI	Hackelia micrantha
Kentucky bluegrass	POPR	Poa pratensis
King's sandwort	ARKI	Arenaria kingii
knotweed	POLYG4	Polygonum spp.
lakeshore sedge	CALE8	Carex lenticularis
Lemmon's rockcress	ARLE	Arabis lemmonii
Lemmon's willow	SALE	Salix lemmonii
Lemmon's yampah	PELE5	Perideridia lemmonii
lettuce wirelettuce	STLA	Stephanomeria lactucina
little prince's pine	CHME	Chimaphila menziesii
littleleaf sedge	CALU6	Carex luzulifolia

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Table 13.—Index of Common Names, Plant Symbols, and Scientific Names—Continued

Local common name	Plant symbol	Scientific name
longhorn steer's-head	DIUN	<i>Dicentra uniflora</i>
longspur lupine	LUAR6	<i>Lupinus arbustus</i>
longstalk clover	TRLO	<i>Trifolium longipes</i>
lupine	LUPIN	<i>Lupinus</i> spp.
manyrib sedge	CAMU6	<i>Carex multicosata</i>
marumleaf buckwheat	ERMA4	<i>Eriogonum marifolium</i>
mat muhly	MURI	<i>Muhlenbergia richardsonis</i>
meadow barley	HOBR2	<i>Hordeum brachyantherum</i>
meadow fescue	SCPR4	<i>Schedonorus pratensis</i>
milk kelloggia	KEGA	<i>Kelloggia galioides</i>
monkeyflower	MIMUL	<i>Mimulus</i> spp.
moss	2MOSS	
mountain hemlock	TSME	<i>Tsuga mertensiana</i>
mountain monardella	MOOD	<i>Monardella odoratissima</i>
mountain pride	PENE3	<i>Penstemon newberryi</i>
mountain rush	JUARL	<i>Juncus arcticus</i> ssp. <i>littoralis</i>
Mt. Hood pussypaws	CIUMU	<i>Cistanthe umbellata</i> var. <i>umbellata</i>
muhly	MUHLE	<i>Muhlenbergia</i> spp.
muskflower	MIMO3	<i>Mimulus moschatus</i>
naked buckwheat	ERNU3	<i>Eriogonum nudum</i>
narrowleaf lupine	LUAN4	<i>Lupinus angustifolius</i>
Nebraska sedge	CANE2	<i>Carex nebrascensis</i>
Nevada dusty maiden	CHNE	<i>Chaenactis douglasii</i>
Northwest Territory sedge	CAUT	<i>Carex utriculata</i>
oatgrass	TRISE	<i>Trisetum</i> spp.
oceanspray	HODI	<i>Holodiscus discolor</i>
oniongrass	MEBU	<i>Melica bulbosa</i>
orchardgrass	DAGL	<i>Dactylis glomerata</i>
Oregon checkerbloom	SIORS	<i>Sidalcea oregana</i> ssp. <i>spicata</i>
Pacific bleeding heart	DIFO	<i>Dicentra formosa</i>
Pacific lupine	LULE2	<i>Lupinus lepidus</i>
pale false mannagrass	TOPA6	<i>Torreyochloa pallida</i>
panicled bulrush	SCMI2	<i>Scirpus microcarpus</i>
Parish's yampah	PEPA21	<i>Perideridia parishii</i>
Parry's rabbitbrush	ERPA30	<i>Ericameria parryi</i>
Parry's rush	JUPA	<i>Juncus parryi</i>
pinemat manzanita	ARNE	<i>Arctostaphylos nevadensis</i>
pinewoods lousewort	PESE2	<i>Pedicularis semibarbata</i>
pioneer rockcress	ARPL	<i>Arabis platysperma</i>
Plumas County beardtongue	PENE2	<i>Penstemon neotericus</i>
ponderosa pine	PIPO	<i>Pinus ponderosa</i>
prickly hawkweed	HIHO	<i>Hieracium horridum</i>
primrose monkeyflower	MIPR	<i>Mimulus primuloides</i>
Pringle's bluegrass	POPR2	<i>Poa pringlei</i>
prostrate ceanothus	CEPR	<i>Ceanothus prostratus</i>
pullup muhly	MUFI2	<i>Muhlenbergia filiformis</i>
purple monkeyflower	MILE2	<i>Mimulus lewisii</i>
quaking aspen	POTR5	<i>Populus tremuloides</i>
rabbitbush	ERBL2	<i>Ericameria bloomeri</i>
ragwort	SENEC	<i>Senecio</i> spp.
rattail fescue	VUMY	<i>Vulpia myuros</i>
rayless ragwort	SEAR4	<i>Senecio aronicoides</i>
Raynolds' sedge	CARA6	<i>Carex raynoldsii</i>
red fescue	FERU2	<i>Festuca rubra</i>
rockcress	ARABI2	<i>Arabis</i> spp.
Rocky Mountain pussytoes	ANME2	<i>Antennaria media</i>
rose thistle	CIAN	<i>Cirsium andersonii</i>
Ross' sedge	CAR05	<i>Carex rossii</i>
rosy pussytoes	ANRO2	<i>Antennaria rosea</i>
rough bentgrass	AGSC5	<i>Agrostis scabra</i>
rubber rabbitbrush	ERNAS2	<i>Ericameria nauseosa</i> ssp. <i>nauseosa</i> var. <i>speciosa</i>
rush	JUNCU	<i>Juncus</i> spp.
Rydberg's penstemon	PERY	<i>Penstemon rydbergii</i>
Sacramento waxdogbane	CYHU	<i>Cycladenia humilis</i>

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Table 13.—Index of Common Names, Plant Symbols, and Scientific Names—Continued

Local common name	Plant symbol	Scientific name
scabland penstemon	PEDE4	Penstemon deustus
scarlet gilia	IPAG	Ipomopsis aggregata
Scouler's St. Johnswort	HYSCS2	Hypericum scouleri ssp. scouleri
sedge	CAREX	Carex spp.
seep monkeyflower	MIGU	Mimulus guttatus
Shasta buckwheat	ERPY2	Eriogonum pyrolifolium
Shasta knotweed	POSH	Polygonum shastense
Shasta sedge	CAST7	Carex straminiformis
shieldplant	STTO3	Streptanthus tortuosus
shining willow	SALU	Salix lucida
Sierra gooseberry	RIRO	Ribes roezlii
Sierra lodgepole pine	PICOM	Pinus contorta var. murrayana
Sierra rush	JUNE	Juncus nevadensis
Sierra stickseed	HANE	Hackelia nervosa
silverleaf phacelia	PHHA	Phacelia hastata
silverpuffs	MICRO6	Microseris spp.
slender cinquefoil	POGR9	Potentilla gracilis
slender cinquefoil	POGRF2	Potentilla gracilis var. fastigiata
slender hairgrass	DEEL	Deschampsia elongata
slender penstemon	PEGR4	Penstemon gracilentus
small enchanter's nightshade	CIALP2	Circaea alpina ssp. pacifica
small floating mannagrass	GLBO	Glyceria borealis
smallwing sedge	CAMI7	Carex microptera
smokey mariposa	CALE3	Calochortus leichtlinii
smooth brome	BRIN2	Bromus inermis
smooth horsetail	EQLA	Equisetum laevigatum
snowbrush ceanothus	CEVE	Ceanothus velutinus
snowplant	SASA5	Sarcodes sanguinea
spike trisetum	TRSP2	Trisetum spicatum
spikerush	ELEOC	Eleocharis spp.
spreading dogbane	APAN2	Apocynum androsaemifolium
spreading groundsmoke	GADI2	Gayophytum diffusum
spreading phlox	PHDI3	Phlox diffusa
spurry buckwheat	ERSP6	Eriogonum spergulinum
squirreltail	ELEL5	Elymus elymoides
sticky cinquefoil	POGL9	Potentilla glandulosa
sticky currant	RIVI3	Ribes viscosissimum
stickywilly	GAAP2	Galium aparine
stonecrop	SEDUM	Sedum spp.
streambank bird's-foot trefoil	LOOB2	Lotus oblongifolius
sugar pine	PILA	Pinus lambertiana
Suksdorf's silene	SISU	Silene suksdorfii
sulphur-flower buckwheat	ERPO16	Eriogonum umbellatum
sulphur-flower buckwheat	ERUM	Eriogonum umbellatum
sweetcicely	OSBE	Osmorhiza berteroi
swordleaf rush	JUEN	Juncus ensifolius
thickstem aster	EUN9	Eurybia integrifolia
thinleaf alder	ALINT	Alnus incana ssp. tenuifolia
threepetal bedstraw	GATR2	Galium trifidum
timothy	PHPR3	Phleum pratense
tinker's penny	HYAN2	Hypericum anagalloides
toad rush	JUBU	Juncus bufonius
Torrey maple	ACGLT2	Acer glabrum var. torreyi
Torrey's blue eyed Mary	COTO	Collinsia torreyi
trefoil	LOTUS	Lotus spp.
tufted hairgrass	DECEC2	Deschampsia cespitosa spp. cespitosa
tundra aster	ORALA3	Oreostemma alpigenum var. andersonii
two-lobed larkspur	DENU2	Delphinium nuttallianum
Utah serviceberry	AMUT	Amelanchier utahensis
violet	VIOLA	Viola spp.
Virginia strawberry	FRVI	Fragaria virginiana
water sedge	CAAQ	Carex aquatilis
Waterton Lakes cryptantha	CRS03	Cryptantha sobolifera
wavyleaf Indian paintbrush	CAAP4	Castilleja applegatei

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Table 13.—Index of Common Names, Plant Symbols, and Scientific Names—Continued

Local common name	Plant symbol	Scientific name
wax currant	RICE	Ribes cereum
waxy checkerbloom	SIGL2	Sidalcea glaucescens
western blue-eyed grass	SIBE	Sisyrinchium bellum
western columbine	AQFO	Aquilegia formosa
western mountain aster	SYSPS	Symphyotrichum spathulatum var. spathulatum
western needlegrass	ACOC3	Achnatherum occidentale
western pearly everlasting	ANMA	Anaphalis margaritacea
western rush	JUOC2	Juncus occidentalis
western snakeroot	AGOC2	Ageratina occidentalis
western white pine	PIMO3	Pinus monticola
white fir	ABCO	Abies concolor
white hawkweed	HAL2	Hieracium albiflorum
white marsh marigold	CALE4	Caltha leptosepala
whitebark pine	PIAL	Pinus albicaulis
whitestem gooseberry	RIIN2	Ribes inerme
whitestem gooseberry	RIINI	Ribes inerme var. inerme
whitethorn ceanothus	CECO	Ceanothus cordulatus
whitetip clover	TRVA	Trifolium variegatum
whiteveined wintergreen	PYPI2	Pyrola picta
Whitney's sedge	CAWH	Carex whitneyi
widefruit sedge	CAAN15	Carex angustata
wild onion	ALLIU	Allium spp.
willow	SALIX	Salix spp.
willowherb	EPILO	Epilobium spp.
Wolf's trisetum	TRW03	Trisetum wolfii
woodrush	LUZUL	Luzula spp.
woolly mule-ears	WYMO	Wyethia mollis
woolly sedge	CAPE42	Carex pellita
woollyhead parsnip	SPCA5	Sphenosciadium capitellatum
yampah	PERID	Perideridia spp.
zigzag groundsmoke	GAHE3	Gayophytum heterozygum

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Table 14.—Index of Plant Symbols, Common Names, and Scientific Names

(Plants displayed occur within the National Soils Information System (NASIS) plant tables used for the soil survey area. The scientific and common names are referenced at the USDA PLANTS database: plants.usda.gov)

Plant symbol	Local common name	Scientific name
2MOSS	moss	
ABCO	white fir	<i>Abies concolor</i>
ABMA	California red fir	<i>Abies magnifica</i>
ACGLT2	Torrey maple	<i>Acer glabrum</i> var. <i>torreyi</i>
ACMI2	common yarrow	<i>Achillea millefolium</i>
ACNE9	Columbia needlegrass	<i>Achnatherum nelsonii</i>
ACOC3	western needlegrass	<i>Achnatherum occidentale</i>
AGHU	alpine bentgrass	<i>Agrostis humilis</i>
AGID	Idaho bentgrass	<i>Agrostis idahoensis</i>
AGOC2	western snakeroot	<i>Ageratina occidentalis</i>
AGROS2	bentgrass	<i>Agrostis</i> spp.
AGSC5	rough bentgrass	<i>Agrostis scabra</i>
ALCA2	dusky onion	<i>Allium campanulatum</i>
ALINT	thinleaf alder	<i>Alnus incana</i> ssp. <i>tenuifolia</i>
ALLIU	wild onion	<i>Allium</i> spp.
AMUT	Utah serviceberry	<i>Amelanchier utahensis</i>
ANBR5	Brewer's angelica	<i>Angelica breweri</i>
ANMA	western pearly everlasting	<i>Anaphalis margaritacea</i>
ANME2	Rocky Mountain pussytoes	<i>Antennaria media</i>
ANRO2	rosy pussytoes	<i>Antennaria rosea</i>
APAN2	spreading dogbane	<i>Apocynum androsaemifolium</i>
AQFO	western columbine	<i>Aquilegia formosa</i>
ARABI2	rockcress	<i>Arabis</i> spp.
ARCH3	Chamisso arnica	<i>Arnica chamissonis</i>
ARDO3	Ar Douglas' sagewort	<i>Artemisia douglasiana</i>
ARHO2	Holboell's rockcress	<i>Arabis holboellii</i>
ARKI	King's sandwort	<i>Arenaria kingii</i>
ARLE	Lemmon's rockcress	<i>Arabis lemmonii</i>
ARNE	pinemat manzanita	<i>Arctostaphylos nevadensis</i>
ARPA6	greenleaf manzanita	<i>Arctostaphylos patula</i>
ARPL	pioneer rockcress	<i>Arabis platysperma</i>
ASTER	aster	<i>Aster</i> spp.
BASA3	arrowleaf balsamroot	<i>Balsamorhiza sagittata</i>
BRCA5	California brome	<i>Bromus carinatus</i>
BRIN2	smooth brome	<i>Bromus inermis</i>
BROMU	brome	<i>Bromus</i> spp.
CAAB2	abruptbeak sedge	<i>Carex abrupta</i>
CAAN15	widefruit sedge	<i>Carex angustata</i>
CAAP4	wavyleaf Indian paintbrush	<i>Castilleja applegatei</i>
CAAQ	water sedge	<i>Carex aquatilis</i>
CAAR11	cobwebby Indian paintbrush	<i>Castilleja arachnoidea</i>
CAAU3	golden sedge	<i>Carex aurea</i>
CABR12	Brewer's sedge	<i>Carex breweri</i>
CACA13	capitate sedge	<i>Carex capitata</i>
CACA4	bluejoint	<i>Calamagrostis canadensis</i>
CADE27	incense cedar	<i>Calocedrus decurrens</i>
CALE3	smokey mariposa	<i>Calochortus leichtlinii</i>
CALE4	white marsh marigold	<i>Caltha leptosepala</i>
CALE8	lakeshore sedge	<i>Carex lenticularis</i>
CALU6	littleleaf sedge	<i>Carex luzulifolia</i>
CAMI12	giant red Indian paintbrush	<i>Castilleja miniata</i>
CAMI7	smallwing sedge	<i>Carex microptera</i>
CAMU6	manyrib sedge	<i>Carex multicosata</i>
CANE2	Nebraska sedge	<i>Carex nebrascensis</i>
CAPE42	woolly sedge	<i>Carex peltita</i>
CARA6	Raynolds' sedge	<i>Carex raynoldsii</i>
CAREX	sedge	<i>Carex</i> spp.
CAR05	Ross' sedge	<i>Carex rossii</i>
CAR05	Ross' sedge	<i>Carex rossii</i>

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Table 14.—Index of Plant Symbols, Common Names, and Scientific Names—Continued

Plant symbol	Local common name	Scientific name
CAR05	Ross' sedge	Carex rossii
CASI2	analogue sedge	Carex simulata
CAST7	Shasta sedge	Carex straminiformis
CASTI2	Indian paintbrush	Castilleja spp.
CASU6	brown sedge	Carex subfusca
CAUT	Northwest Territory sedge	Carex utriculata
CAVE6	blister sedge	Carex vesicaria
CAWH	Whitney's sedge	Carex whitneyi
CECO	whitethorn ceanothus	Ceanothus cordulatus
CEPR	prostrate ceanothus	Ceanothus prostratus
CEVE	snowbrush ceanothus	Ceanothus velutinus
CHANC	fireweed	Chamerion angustifolium ssp. circumvagum
CHDO	Douglas' dustymaiden	Chaenactis douglasii
CHENO	goosefoot	Chenopodium spp.
CHME	little prince's pine	Chimaphila menziesii
CHNE	Nevada dustymaiden	Chaenactis douglasii
CHSE11	bush chinquapin	Chrysolepis sempervirens
CIALP2	small enchanter's nightshade	Circaea alpina ssp. pacifica
CIAN	rose thistle	Cirsium andersonii
CIDO2	Douglas' thistle	Cirsium douglasii
CIUMU	Mt. Hood pussypaws	Cistanthe umbellata var. umbellata
CIVU	bull thistle	Cirsium vulgare
COTO	Torrey's blue eyed Mary	Collinsia torreyi
CRS03	Waterton Lakes cryptantha	Cryptantha sobolifera
CRYPT	cryptantha	Cryptantha spp.
CYFR2	brittle bladderfern	Cystopteris fragilis
CYHU	Sacramento waxydogbane	Cycladenia humilis
DACA3	California oatgrass	Danthonia californica
DAGL	orchardgrass	Dactylis glomerata
DECEC2	tufted hairgrass	Deschampsia cespitosa ssp. cespitosa
DEEL	slender hairgrass	Deschampsia elongata
DENU2	two-lobed larkspur	Delphinium nuttallianum
DIFO	Pacific bleeding heart	Dicentra formosa
DIUN	longhorn steer's-head	Dicentra uniflora
ELEL5	squirreltail	Elymus elymoides
ELEOC	spikerush	Eleocharis spp.
ELGL	blue wildrye	Elymus glaucus
EPCI	fringed willowherb	Epilobium ciliatum
EPGL	glaucus willowherb	Epilobium glaberrimum
EPILO	willowherb	Epilobium spp.
EQAR	field horsetail	Equisetum arvense
EQLA	smooth horsetail	Equisetum laevigatum
ERBL2	rabbitbush	Ericameria bloomeri
EREL4	blue dwarf fleabane	Erigeron elegantulus
ERGR16	Greene's goldenbush	Ericameria greenei
ERICA2	goldenbush	Ericameria spp.
ERIOG	buckwheat	Eriogonum spp.
ERMA4	marumleaf buckwheat	Eriogonum marifolium
ERNAS2	rubber rabbitbrush	Ericameria nauseosa ssp. nauseosa var. speciosa
ERNU3	naked buckwheat	Eriogonum nudum
EROV	cushion buckwheat	Eriogonum ovalifolium
ERPA30	Parry's rabbitbrush	Ericameria parryi
ERPO16	sulphur-flower buckwheat	Eriogonum umbellatum
ERP2	Shasta buckwheat	Eriogonum pyrolifolium
ERSP6	spurry buckwheat	Eriogonum spergulinum
ERUM	sulphur-flower buckwheat	Eriogonum umbellatum
EUBR12	Brewer's aster	Eucephalus breweri
EUIN9	thickstem aster	Eurybia integrifolia
FEID	Idaho fescue	Festuca idahoensis
FERU2	red fescue	Festuca rubra
FESTU	fescue	Festuca spp.
FRVI	Virginia strawberry	Fragaria virginiana
GAAP2	stickywilly	Galium aparine
GADI2	spreading groundsmoke	Gayophytum diffusum

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Table 14.—Index of Plant Symbols, Common Names, and Scientific Names—Continued

Plant symbol	Local common name	Scientific name
GAGR2	Gray's bedstraw	Galium grayanum
GAHE3	zigzag groundsmoke	Gayophytum heterozygum
GALIU	bedstraw	Galium spp.
GATR2	threepetal bedstraw	Galium trifidum
GATR3	fragrant bedstraw	Galium triflorum
GAYOP	groundsmoke	Gayophytum spp.
GLEBO	small floating mannagrass	Glyceria borealis
GLST	fowl mannagrass	Glyceria striata
HACA	California stickseed	Hackelia californica
HAMI	Jessica sticktight	Hackelia micrantha
HANE	Sierra stickseed	Hackelia nervosa
HEBI	Bigelow's sneezeweed	Helenium bigelovii
HEMA80	common cowparsnip	Heracleum maximum
HIAL2	white hawkweed	Hieracium albiflorum
HIHO	prickly hawkweed	Hieracium horridum
HOBR2	meadow barley	Hordeum brachyantherum
HODI	oceanspray	Holodiscus discolor
HUNA	dwarf alpinegold	Hulsea nana
HYAN2	tinker's penny	Hypericum anagalloides
HYPE	common St. Johnswort	Hypericum perforatum
HYSCS2	Scouler's St. Johnswort	Hypericum scouleri ssp. scouleri
IPAG	scarlet gilia	Ipomopsis aggregata
JUARL	mountain rush	Juncus arcticus ssp. littoralis
JUBU	toad rush	Juncus bufonius
JUEF	common rush	Juncus effusus
JUEN	swordleaf rush	Juncus ensifolius
JUNCU	rush	Juncus spp.
JUNE	Sierra rush	Juncus nevadensis
JUOC2	western rush	Juncus occidentalis
JUPA	Parry's rush	Juncus parryi
KAMI	alpine laurel	Kalmia microphylla
KEGA	milk kelloggia	Kelloggia galioides
LIGR	Gray's licorice-root	Ligusticum grayi
LIPU11	granite prickly phlox	Linanthus pungens
LOOB2	streambank bird's-foot trefoil	Lotus oblongifolius
LOTUS	trefoil	Lotus spp.
LUAN4	narrowleaf lupine	Lupinus angustifolius
LUAR6	longspur lupine	Lupinus arbustus
LULE2	Pacific lupine	Lupinus lepidus
LUOB	bluntlobe lupine	Lupinus obtusilobus
LUPIN	lupine	Lupinus spp.
LUPO2	bigleaf lupine	Lupinus polyphyllus
LUZUL	woodrush	Luzula spp.
MEAR3	bearded melicgrass	Melica aristata
MEBU	oniongrass	Melica bulbosa
MICRO6	silverpuffs	Microseris spp.
MIGU	seep monkeyflower	Mimulus guttatus
MILE2	purple monkeyflower	Mimulus lewisii
MIMO3	muskflower	Mimulus moschatus
MIMUL	monkeyflower	Mimulus spp.
MIPR	primrose monkeyflower	Mimulus primuloides
MOOD	mountain monardella	Monardella odoratissima
MUAN	foxtail muhly	Muhlenbergia andina
MUFI2	pullup muhly	Muhlenbergia filiformis
MUHLE	muhly	Muhlenbergia spp.
MURI	mat muhly	Muhlenbergia richardsonis
ORALA3	tundra aster	Oreostemma alpigenum var. andersonii
OSBE	sweetcicely	Osmorhiza berteroi
PACA18	California grass of Parnassus	Parnassia californica
PEBO2	Bolander's yampah	Perideridia bolanderi
PEBR4	Brewer's cliffbrake	Pellaea breweri
PEDA2	Davidson's penstemon	Penstemon davidsonii
PEDE	Indian warrior	Pedicularis densiflora
PEDE4	scabland penstemon	Penstemon deustus

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Table 14.—Index of Plant Symbols, Common Names, and Scientific Names—Continued

Plant symbol	Local common name	Scientific name
PEGR4	slender penstemon	Penstemon gracilentus
PEH05	Howell's yampah	Perideridia howellii
PELE5	Lenmon's yampah	Perideridia lemmonii
PENE2	Plumas County beardtongue	Penstemon neotericus
PENE3	mountain pride	Penstemon newberryi
PENST	beardtongue	Penstemon spp.
PEPA21	Parish's yampah	Perideridia parishii
PERID	yampah	Perideridia spp.
PERY	Rydberg's penstemon	Penstemon rydbergii
PESE2	pinewoods lousewort	Pedicularis semibarbata
PHAL2	alpine timothy	Phleum alpinum
PHDI3	spreading phlox	Phlox diffusa
PHHA	silverleaf phacelia	Phacelia hastata
PHPR3	timothy	Phleum pratense
PIAL	whitebark pine	Pinus albicaulis
PICOM	Sierra lodgepole pine	Pinus contorta var. murrayana
PIJE	Jeffrey pine	Pinus jeffreyi
PILA	sugar pine	Pinus lambertiana
PIMO3	western white pine	Pinus monticola
PIPO	ponderosa pine	Pinus ponderosa
POA	bluegrass	Poa spp.
POAN	annual bluegrass	Poa annua
POBAT	black cottonwood	Populus balsamifera ssp. trichocarpa
PODA	Davis' knotweed	Polygonum davisiae
PODO4	Douglas' knotweed	Polygonum douglasii
POFL3	high mountain cinquefoil	Potentilla flabellifolia
POGL9	sticky cinquefoil	Potentilla glandulosa
POGLA2	Ashland cinquefoil	Potentilla glandulosa ssp. ashlandica
POGR9	slender cinquefoil	Potentilla gracilis
POGRF2	slender cinquefoil	Potentilla gracilis var. fastigiata
POLYG4	knotweed	Polygonum spp.
POMI2	broadleaf knotweed	Polygonum minimum
POPR	Kentucky bluegrass	Poa pratensis
POPR2	Pringle's bluegrass	Poa pringlei
POSH	Shasta knotweed	Polygonum shastense
POTEN	cinquefoil	Potentilla spp.
POTR5	quaking aspen	Populus tremuloides
PREM	bitter cherry	Prunus emarginata
PSME	Douglas-fir	Pseudotsuga menziesii
PTAQF2	hairy brackenfern	Pteridium aquilinum var. pubescens
PTTEC2	California wavewing	Pteryxia terebinthina var. californica
PUTR2	antelope bitterbrush	Purshia tridentata
PYPI2	whiteveined wintergreen	Pyrola picta
QUVA	huckleberry oak	Quercus vacciniifolia
RIBES	currant	Ribes spp.
RICE	wax currant	Ribes cereum
RIIN2	whitestem gooseberry	Ribes inerme
RIINI	whitestem gooseberry	Ribes inerme var. inerme
RIMO2	gooseberry currant	Ribes montigenum
RIRO	Sierra gooseberry	Ribes roezlii
RIVI3	sticky currant	Ribes viscosissimum
SAJE	Jepson's willow	Salix jepsonii
SALE	Lenmon's willow	Salix lemmonii
SALIX	willow	Salix spp.
SALU	shining willow	Salix lucida
SASA5	snowplant	Sarcodes sanguinea
SCACO4	hardstem tule	Scirpus acutus var. occidentalis
SCAM6	chairmaker's bulrush	Schoenoplectus americanus
SCCO	Congdon's bulrush	Scirpus congdonii
SCIRP	bulrush	Scirpus spp.
SCMI2	panicled bulrush	Scirpus microcarpus
SCPR4	meadow fescue	Schedonorus pratensis
SEAR4	rayless ragwort	Senecio aronicoides
SEDUM	stonecrop	Sedum spp.

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Table 14.—Index of Plant Symbols, Common Names, and Scientific Names—Continued

Plant symbol	Local common name	Scientific name
SEFR3	dwarf mountain ragwort	Senecio fremontii
SENEC	ragwort	Senecio spp.
SETR	arrowleaf ragwort	Senecio triangularis
SIBE	western blue-eyed grass	Sisyrinchium bellum
SIGL2	waxy checkerbloom	Sidalcea glaucescens
SIORS	Oregon checkerbloom	Sidalcea oregana ssp. spicata
SISU	Suksdorf's silene	Silene suksdorfii
SPCA5	woollyhead parsnip	Sphenosciadium capitellatum
STAJ	bugle hedgenettle	Stachys ajugoides
STLA	lettuce wirelettuce	Stephanomeria lactucina
STLOL7	chickweed	Stellaria longipes spp. longipes
STO3	shieldplant	Streptanthus tortuosus
SYFOP	alpine leafybract aster	Symphyotrichum foliaceum var. foliaceum
SYSPS	western mountain aster	Symphyotrichum spathulatum var. spathulatum
TAOF	common dandelion	Taraxacum officinale
TOPA6	pale false mannagrass	Torreyochloa pallida
TRIFO	clover	Trifolium spp.
TRISE	oatgrass	Trisetum spp.
TRLO	longstalk clover	Trifolium longipes
TRLOH	Hansen's clover	Trifolium longipes ssp. hansenii
TRSP2	spike trisetum	Trisetum spicatum
TRVA	whitetip clover	Trifolium variegatum
TRWO3	Wolf's trisetum	Trisetum wolfii
TSME	mountain hemlock	Tsuga mertensiana
VECAC2	California false hellebore	Veratrum californicum var. californicum
VETH	common mullein	Verbascum thapsus
VEWO2	American alpine speedwell	Veronica wormskjoldii
VIAM	American vetch	Vicia americana
VIOLA	violet	Viola spp.
VIPU4	goosefoot violet	Viola purpurea
VULPI	fescue	Vulpia spp.
VUMY	rattail fescue	Vulpia myuros
WYMO	woolly mule-ears	Wyethia mollis

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Table 15.—Hazard of Erosion and Suitability for Roads

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Pct. of map unit	Hazard of erosion		Hazard of erosion on roads and trails		Suitability for roads (natural surface)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
100: Buttelake-----	85	Slight		Moderate Slope/erodibility	0.50	Moderately suited Slope Sandiness	0.50 0.50
101: Buttewash-----	85	Slight		Slight		Moderately suited Sandiness	0.50
102: Ashbutte-----	65	Very severe Slope/erodibility	0.95	Severe Slope/erodibility	0.95	Poorly suited Slope Sandiness	1.00 0.50
Vitrandic Xerorthents-----	25	Severe Slope/erodibility	0.75	Severe Slope/erodibility	0.95	Poorly suited Slope Sandiness Rock fragments	1.00 0.50 0.50
103: Scoured-----	75	Slight		Slight		Poorly suited Rock fragments	1.00
104: Scoured-----	55	Moderate Slope/erodibility	0.50	Moderate Slope/erodibility	0.50	Poorly suited Rock fragments Slope	1.00 1.00
Juniperlake-----	20	Moderate Slope/erodibility	0.50	Severe Slope/erodibility	0.95	Poorly suited Slope Rock fragments	1.00 0.50
Rock outcrop-----	15	Not rated		Not rated		Not rated	
105: Juniperlake-----	85	Moderate Slope/erodibility	0.50	Severe Slope/erodibility	0.95	Poorly suited Slope Rock fragments	1.00 0.50
106: Cenplat-----	70	Moderate Slope/erodibility	0.50	Moderate Slope/erodibility	0.50	Poorly suited Rock fragments Slope Sandiness	1.00 1.00 0.50
107: Badgerflat-----	40	Moderate Slope/erodibility	0.50	Moderate Slope/erodibility	0.50	Poorly suited Rock fragments Slope Sandiness	1.00 1.00 0.50

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Table 15.—Hazard of Erosion and Suitability for Roads—Continued

Map symbol and soil name	Pct. of map unit	Hazard of erosion		Hazard of erosion on roads and trails		Suitability for roads (natural surface)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
107: Cenplat-----	35	Moderate Slope/erodibility	0.50	Severe Slope/erodibility	0.95	Poorly suited Rock fragments Slope Sandiness	1.00 1.00 0.50
108: Typic Xerorthents---	80	Slight		Slight		Moderately suited Sandiness	0.50
109: Prospectpeak-----	85	Slight		Moderate Slope/erodibility	0.50	Moderately suited Rock fragments Slope Sandiness	0.50 0.50 0.50
110: Bearrubble-----	50	Slight		Slight		Poorly suited Rock fragments Slope Sandiness	1.00 0.50 0.50
Rubble land-----	35	Not rated		Not rated		Not rated	
111: Vitrandic Xerorthents, debris fan-----	95	Slight		Slight		Moderately suited Rock fragments Slope Sandiness	0.50 0.50 0.50
112: Cascadesprings-----	85	Moderate Slope/erodibility	0.50	Moderate Slope/erodibility	0.50	Poorly suited Slope Sandiness Rock fragments	1.00 0.50 0.50
113: Terracelake-----	35	Moderate Slope/erodibility	0.50	Severe Slope/erodibility	0.95	Poorly suited Slope Rock fragments	1.00 0.50
Emeraldlake-----	25	Severe Slope/erodibility	0.75	Severe Slope/erodibility	0.95	Poorly suited Slope Rock fragments Sandiness	1.00 1.00 0.50
Readingpeak-----	20	Severe Slope/erodibility	0.75	Severe Slope/erodibility	0.95	Poorly suited Slope Rock fragments Sandiness	1.00 1.00 0.50
Rock outcrop-----	10	Not rated		Not rated		Not rated	
114: Emeraldlake-----	25	Very severe Slope/erodibility	0.95	Severe Slope/erodibility	0.95	Poorly suited Slope Rock fragments Sandiness	1.00 1.00 0.50

Soil Survey of Lassen Volcanic National Park, California

Table 15.—Hazard of Erosion and Suitability for Roads—Continued

Map symbol and soil name	Pct. of map unit	Hazard of erosion		Hazard of erosion on roads and trails		Suitability for roads (natural surface)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
114: Terracelake-----	23	Very severe Slope/erodibility	0.95	Severe Slope/erodibility	0.95	Poorly suited Slope Rock fragments	1.00 0.50
Readingpeak-----	20	Very severe Slope/erodibility	0.95	Severe Slope/erodibility	0.95	Poorly suited Slope Rock fragments Sandiness	1.00 1.00 0.50
Rock outcrop-----	15	Not rated		Not rated		Not rated	
Rubble land-----	12	Not rated		Not rated		Not rated	
115: Shadowlake-----	85	Slight		Slight		Well suited	
116: Xeric Vitricryands, tephra over till---	30	Moderate Slope/erodibility	0.50	Moderate Slope/erodibility	0.50	Poorly suited Rock fragments Slope Sandiness	1.00 1.00 0.50
Terracelake-----	25	Moderate Slope/erodibility	0.50	Severe Slope/erodibility	0.95	Poorly suited Slope Rock fragments	1.00 0.50
Rock outcrop-----	15	Not rated		Not rated		Not rated	
Xeric Vitricryands, cirque floor-----	15	Slight		Moderate Slope/erodibility	0.50	Moderately suited Rock fragments Slope	0.50 0.50
117: Humic Haploxerands, moist lake terrace-	90	Slight		Slight		Moderately suited Slope Sandiness	0.50 0.50
118: Typic Dystroxerepts, landslides-----	90	Slight		Moderate Slope/erodibility	0.50	Poorly suited Rock fragments Slope	1.00 0.50
119: Diamondpeak-----	30	Moderate Slope/erodibility	0.50	Severe Slope/erodibility	0.95	Poorly suited Slope Low strength	1.00 0.50
Brokeoff-----	25	Moderate Slope/erodibility	0.50	Severe Slope/erodibility	0.95	Poorly suited Slope Rock fragments	1.00 0.50
Endoaquepts-----	14	Severe Slope/erodibility	0.75	Severe Slope/erodibility	0.95	Poorly suited Slope Wetness Rock fragments	1.00 1.00 0.50

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Table 15.—Hazard of Erosion and Suitability for Roads—Continued

Map symbol and soil name	Pct. of map unit	Hazard of erosion		Hazard of erosion on roads and trails		Suitability for roads (natural surface)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
119: Aquic Dystrocherepts, debris flows-----	11	Moderate Slope/erodibility	0.50	Severe Slope/erodibility	0.95	Poorly suited Slope Wetness Low strength	1.00 1.00 0.50
Typic Dystrocherepts-	10	Very severe Slope/erodibility	0.95	Severe Slope/erodibility	0.95	Poorly suited Slope	1.00
120: Buttelake-----	65	Severe Slope/erodibility	0.75	Severe Slope/erodibility	0.95	Poorly suited Slope Sandiness	1.00 0.50
Sunhoff-----	15	Moderate Slope/erodibility	0.50	Severe Slope/erodibility	0.95	Poorly suited Slope Rock fragments	1.00 0.50
Talved-----	10	Very severe Slope/erodibility	0.95	Severe Slope/erodibility	0.95	Poorly suited Rock fragments Slope Sandiness	1.00 1.00 0.50
122: Xeric Vitricryands, colluvium-----	35	Very severe Slope/erodibility	0.95	Severe Slope/erodibility	0.95	Poorly suited Slope Sandiness Rock fragments	1.00 0.50 0.50
Xeric Vitricryands, ash over cinders---	30	Moderate Slope/erodibility	0.50	Severe Slope/erodibility	0.95	Poorly suited Rock fragments Slope	1.00 1.00
Xeric Vitricryands, bedrock-----	20	Slight		Moderate Slope/erodibility	0.50	Poorly suited Rock fragments Slope	1.00 1.00
125: Humic Haploxerands, stream terrace----	55	Slight		Slight		Moderately suited Slope	0.50
Aquandic Humaquepts, flood plains-----	40	Slight		Slight		Poorly suited Flooding Low strength Wetness	1.00 1.00 1.00
126: Kingsiron-----	45	Very severe Slope/erodibility	0.95	Severe Slope/erodibility	0.95	Poorly suited Slope Rock fragments Sandiness	1.00 1.00 0.50

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Table 15.—Hazard of Erosion and Suitability for Roads—Continued

Map symbol and soil name	Pct. of map unit	Hazard of erosion		Hazard of erosion on roads and trails		Suitability for roads (natural surface)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
126: Dittmar-----	20	Moderate Slope/erodibility	0.50	Severe Slope/erodibility	0.95	Poorly suited Slope Rock fragments Sandiness	1.00 0.50 0.50
Rock outcrop-----	15	Not rated		Not rated		Not rated	
127: Humic Haploxerands, strath terrace-----	65	Slight		Moderate Slope/erodibility	0.50	Moderately suited Slope	0.50
Aquepts-----	15	Moderate Slope/erodibility	0.50	Moderate Slope/erodibility	0.50	Poorly suited Rock fragments Slope Wetness	1.00 1.00 0.50
129: Humic Haploxerands, colluvium-----	80	Moderate Slope/erodibility	0.50	Moderate Slope/erodibility	0.50	Poorly suited Rock fragments Slope	1.00 1.00
130: Histic Humaquepts, lake sediments-----	55	Slight		Slight		Poorly suited Ponding Wetness Low strength	1.00 1.00 0.50
Histic Humaquepts, frequently flooded-	30	Slight		Slight		Poorly suited Flooding Wetness	1.00 1.00
Typic Endoaquands---	15	Slight		Slight		Poorly suited Flooding Wetness	1.00 1.00
132: Vitrandic Cryorthents, debris flows-----	90	Slight		Moderate Slope/erodibility	0.50	Poorly suited Rock fragments Slope Sandiness	1.00 0.50 0.50
133: Vitrandic Xerofluvents-----	55	Slight		Slight		Moderately suited Rock fragments	0.50
Typic Endoaquents---	30	Slight		Slight		Poorly suited Flooding Wetness Sandiness Rock fragments	1.00 0.50 0.50 0.50

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Table 15.—Hazard of Erosion and Suitability for Roads—Continued

Map symbol and soil name	Pct. of map unit	Hazard of erosion		Hazard of erosion on roads and trails		Suitability for roads (natural surface)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
134: Chaos-----	85	Slight		Slight		Poorly suited Rock fragments Slope Sandiness	1.00 0.50 0.50
136: Terracelake-----	45	Moderate Slope/erodibility	0.50	Severe Slope/erodibility	0.95	Poorly suited Slope Rock fragments	1.00 0.50
Rock outcrop-----	20	Not rated		Not rated		Not rated	
Xeric Vitricryands, cirque floor-----	15	Moderate Slope/erodibility	0.50	Moderate Slope/erodibility	0.50	Poorly suited Slope Rock fragments	1.00 0.50
137: Xeric Vitricryands--	75	Slight		Moderate Slope/erodibility	0.50	Poorly suited Rock fragments Slope	1.00 0.50
Rock outcrop, rhyodacite-----	20	Not rated		Not rated		Not rated	
138: Vitrandic Xerofluvents, debris flows-----	80	Slight		Slight		Moderately suited Low strength	0.50
Typic Endoaquents---	10	Slight		Slight		Poorly suited Flooding Wetness Sandiness Rock fragments	1.00 0.50 0.50 0.50
139: Duric Vitraquands---	60	Slight		Slight		Well suited	
Typic Endoaquands---	20	Slight		Slight		Poorly suited Flooding Wetness	1.00 1.00
Aquandic Cryaquents-	15	Slight		Slight		Poorly suited Flooding Wetness Low strength	1.00 0.50 0.50
140: Vitrixerands-----	90	Slight		Slight		Moderately suited Sandiness Rock fragments	0.50 0.50
141: Humic Haploxerands--	40	Moderate Slope/erodibility	0.50	Moderate Slope/erodibility	0.50	Poorly suited Slope	1.00

Soil Survey of Lassen Volcanic National Park, California

Table 15.—Hazard of Erosion and Suitability for Roads—Continued

Map symbol and soil name	Pct. of map unit	Hazard of erosion		Hazard of erosion on roads and trails		Suitability for roads (natural surface)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
141: Typic Haploxerands--	35	Moderate Slope/erodibility	0.50	Severe Slope/erodibility	0.95	Poorly suited Rock fragments Slope	1.00 1.00
Bearrubble-----	15	Slight		Slight		Poorly suited Rock fragments Slope Sandiness	1.00 0.50 0.50
Rubble land-----	10	Not rated		Not rated		Not rated	
142: Cragwash-----	85	Slight		Slight		Moderately suited Sandiness	0.50
143: Andic Durixerpts---	95	Slight		Moderate Slope/erodibility	0.50	Moderately suited Slope Sandiness Rock fragments	0.50 0.50 0.50
144: Xeric Vitricryands, cirque floor-----	55	Slight		Moderate Slope/erodibility	0.50	Moderately suited Rock fragments Slope	0.50 0.50
Humic Xeric Vitricryands-----	30	Moderate Slope/erodibility	0.50	Severe Slope/erodibility	0.95	Poorly suited Rock fragments Slope	1.00 1.00
145: Sueredo-----	85	Slight		Slight		Poorly suited Rock fragments Slope	1.00 0.50
146: Sueredo-----	90	Severe Slope/erodibility	0.75	Severe Slope/erodibility	0.95	Poorly suited Slope Rock fragments	1.00 1.00
147: Summertown-----	85	Moderate Slope/erodibility	0.50	Moderate Slope/erodibility	0.50	Poorly suited Slope Rock fragments	1.00 0.50
148: Humic Haploxerands, lake terrace-----	70	Slight		Slight		Moderately suited Rock fragments	0.50
Typic Endoaquands---	15	Slight		Slight		Poorly suited Flooding Wetness	1.00 1.00

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Table 15.—Hazard of Erosion and Suitability for Roads—Continued

Map symbol and soil name	Pct. of map unit	Hazard of erosion		Hazard of erosion on roads and trails		Suitability for roads (natural surface)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
149: Rubble land-----	45	Not rated		Not rated		Not rated	
Rock outcrop, cliffs	30	Not rated		Not rated		Not rated	
Emeraldlake-----	15	Very severe Slope/erodibility	0.95	Severe Slope/erodibility	0.95	Poorly suited Slope Rock fragments Sandiness	1.00 1.00 0.50
150: Shadowlake-----	40	Severe Slope/erodibility	0.75	Severe Slope/erodibility	0.95	Poorly suited Slope	1.00
Terracelake-----	30	Severe Slope/erodibility	0.75	Severe Slope/erodibility	0.95	Poorly suited Slope Rock fragments	1.00 0.50
Acroph-----	15	Very severe Slope/erodibility	0.95	Severe Slope/erodibility	0.95	Poorly suited Slope Rock fragments	1.00 0.50
Rock outcrop-----	10	Not rated		Not rated		Not rated	
151: Terracelake-----	40	Moderate Slope/erodibility	0.50	Severe Slope/erodibility	0.95	Poorly suited Slope Rock fragments	1.00 0.50
Acroph-----	20	Severe Slope/erodibility	0.75	Severe Slope/erodibility	0.95	Poorly suited Slope Rock fragments	1.00 0.50
Rock outcrop-----	15	Not rated		Not rated		Not rated	
Shadowlake-----	15	Moderate Slope/erodibility	0.50	Severe Slope/erodibility	0.95	Poorly suited Slope	1.00
152: Terracelake-----	35	Slight		Slight		Moderately suited Rock fragments Slope	0.50 0.50
Shadowlake-----	30	Slight		Moderate Slope/erodibility	0.50	Moderately suited Slope	0.50
Acroph-----	15	Slight		Moderate Slope/erodibility	0.50	Moderately suited Rock fragments Slope	0.50 0.50
Rock outcrop-----	10	Not rated		Not rated		Not rated	
153: Typic Vitriixerands--	50	Slight		Moderate Slope/erodibility	0.50	Moderately suited Rock fragments Slope	0.50 0.50

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Table 15.—Hazard of Erosion and Suitability for Roads—Continued

Map symbol and soil name	Pct. of map unit	Hazard of erosion		Hazard of erosion on roads and trails		Suitability for roads (natural surface)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
153: Vitrandic Xerorthents, moraine-----	45	Moderate Slope/erodibility	0.50	Severe Slope/erodibility	0.95	Poorly suited Slope Rock fragments	1.00 0.50
154: Typic Vitriixerands--	45	Severe Slope/erodibility	0.75	Severe Slope/erodibility	0.95	Poorly suited Slope Rock fragments	1.00 0.50
Vitrandic Xerorthents, moraine-----	35	Severe Slope/erodibility	0.75	Severe Slope/erodibility	0.95	Poorly suited Slope Rock fragments	1.00 0.50
155: Xeric Vitricryands, pyroclastic surge--	90	Moderate Slope/erodibility	0.50	Moderate Slope/erodibility	0.50	Poorly suited Slope Rock fragments Sandiness	1.00 0.50 0.50
156: Xeric Vitricryands, pyroclastic surge--	90	Severe Slope/erodibility	0.75	Severe Slope/erodibility	0.95	Poorly suited Slope Rock fragments Sandiness	1.00 0.50 0.50
157: Typic Vitriixerands, very deep-----	90	Slight		Slight		Poorly suited Rock fragments Slope	1.00 0.50
158: Typic Vitriixerands, unglaciated-----	75	Slight		Severe Slope/erodibility	0.95	Poorly suited Slope	1.00
Rock outcrop, rhyodacite-----	20	Not rated		Not rated		Not rated	
159: Typic Vitriixerands, bouldery-----	40	Moderate Slope/erodibility	0.50	Severe Slope/erodibility	0.95	Poorly suited Rock fragments Slope Sandiness	1.00 1.00 0.50
Typic Vitriixerands, tephra over colluvium-----	35	Very severe Slope/erodibility	0.95	Severe Slope/erodibility	0.95	Poorly suited Slope Rock fragments	1.00 1.00
Rubble land-----	15	Not rated		Not rated		Not rated	

Soil Survey of Lassen Volcanic National Park, California

Table 15.—Hazard of Erosion and Suitability for Roads—Continued

Map symbol and soil name	Pct. of map unit	Hazard of erosion		Hazard of erosion on roads and trails		Suitability for roads (natural surface)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
160: Aeric Endoaquents---	45	Slight		Slight		Moderately suited Flooding Rock fragments	0.50 0.50
Humic Haploxerands, stream terrace-----	35	Slight		Slight		Well suited	
Riverwash-----	15	Not rated		Not rated		Not rated	
161: Typic Psammaquents--	95	Slight		Slight		Poorly suited Wetness Flooding Sandiness	1.00 0.50 0.50
162: Humic Haploxerands, outwash-----	95	Slight		Slight		Moderately suited Rock fragments	0.50
163: Vitrandic Cryofluvents-----	65	Slight		Slight		Poorly suited Ponding Wetness	1.00 1.00
Aquandic Cryaquents-	30	Slight		Slight		Poorly suited Flooding Wetness Low strength	1.00 0.50 0.50
164: Aquepts-----	35	Slight		Moderate Slope/erodibility	0.50	Poorly suited Rock fragments Slope Wetness	1.00 0.50 0.50
Typic Petraquepts, bedrock-----	25	Moderate Slope/erodibility	0.50	Moderate Slope/erodibility	0.50	Poorly suited Slope Wetness Rock fragments	1.00 1.00 0.50
Aquic Haploxerands--	20	Slight		Moderate Slope/erodibility	0.50	Moderately suited Slope	0.50
Typic Petraquepts---	10	Slight		Severe Slope/erodibility	0.95	Poorly suited Low strength Wetness Slope	1.00 0.50 0.50
165: Aquandic Humaquepts-	35	Slight		Slight		Poorly suited Ponding Wetness	1.00 1.00
Histic Humaquepts---	25	Slight		Slight		Poorly suited Wetness Low strength	1.00 0.50

Soil Survey of Lassen Volcanic National Park, California

Table 15.—Hazard of Erosion and Suitability for Roads—Continued

Map symbol and soil name	Pct. of map unit	Hazard of erosion		Hazard of erosion on roads and trails		Suitability for roads (natural surface)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
165: Aquandic Endoaquepts	20	Slight		Moderate Slope/erodibility	0.50	Well suited	
Terric Haplohemists-	15	Slight		Slight		Poorly suited Ponding Wetness	1.00 1.00
166: Aquic Haploxerands--	50	Slight		Slight		Well suited	
Humic Haploxerands, outwash terrace----	40	Moderate Slope/erodibility	0.50	Severe Slope/erodibility	0.95	Poorly suited Slope Rock fragments	1.00 0.50
167: Emeraldlake-----	35	Severe Slope/erodibility	0.75	Severe Slope/erodibility	0.95	Poorly suited Slope Rock fragments Sandiness	1.00 1.00 0.50
Readingpeak-----	20	Very severe Slope/erodibility	0.95	Severe Slope/erodibility	0.95	Poorly suited Slope Rock fragments Sandiness	1.00 1.00 0.50
Terracelake-----	15	Very severe Slope/erodibility	0.95	Severe Slope/erodibility	0.95	Poorly suited Slope Rock fragments	1.00 0.50
Rock outcrop, dacite	15	Not rated		Not rated		Not rated	
168: Vitrixerands, low elevation-----	90	Slight		Slight		Moderately suited Sandiness Rock fragments	0.50 0.50
169: Sueredo-----	55	Moderate Slope/erodibility	0.50	Severe Slope/erodibility	0.95	Poorly suited Slope Rock fragments	1.00 1.00
Rock outcrop, cliffs	20	Not rated		Not rated		Not rated	
Scoured-----	15	Very severe Slope/erodibility	0.95	Severe Slope/erodibility	0.95	Poorly suited Slope Rock fragments	1.00 1.00
170: Rock outcrop, rhyodacite-----	35	Not rated		Not rated		Not rated	
Emeraldlake-----	20	Very severe Slope/erodibility	0.95	Severe Slope/erodibility	0.95	Poorly suited Slope Rock fragments Sandiness	1.00 1.00 0.50

Soil Survey of Lassen Volcanic National Park, California

Table 15.—Hazard of Erosion and Suitability for Roads—Continued

Map symbol and soil name	Pct. of map unit	Hazard of erosion		Hazard of erosion on roads and trails		Suitability for roads (natural surface)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
170: Rubble land-----	18	Not rated		Not rated		Not rated	
Readingpeak-----	15	Very severe Slope/erodibility	0.95	Severe Slope/erodibility	0.95	Poorly suited Slope Rock fragments Sandiness	1.00 1.00 0.50
171: Aquepts-----	50	Severe Slope/erodibility	0.75	Severe Slope/erodibility	0.95	Poorly suited Rock fragments Slope Wetness	1.00 1.00 0.50
Typic Petraquepts, bedrock-----	35	Severe Slope/erodibility	0.75	Severe Slope/erodibility	0.95	Poorly suited Wetness Slope Rock fragments	1.00 1.00 0.50
172: Badgerflat-----	90	Slight		Slight		Poorly suited Rock fragments Slope Sandiness	1.00 0.50 0.50
173: Badgerwash-----	90	Slight		Slight		Moderately suited Rock fragments Sandiness	0.50 0.50
174: Vitrandic Cryorthents-----	60	Slight		Moderate Slope/erodibility	0.50	Moderately suited Rock fragments Slope Sandiness	0.50 0.50 0.50
Readingpeak-----	20	Severe Slope/erodibility	0.75	Severe Slope/erodibility	0.95	Poorly suited Rock fragments Slope Sandiness	1.00 1.00 0.50
Rock outcrop-----	10	Not rated		Not rated		Not rated	
175: Shadowlake-----	75	Slight		Moderate Slope/erodibility	0.50	Moderately suited Slope	0.50
Vitrandic Cryofluvents-----	15	Slight		Slight		Poorly suited Ponding Wetness	1.00 1.00
176: Juniperlake, bouldery-----	85	Moderate Slope/erodibility	0.50	Moderate Slope/erodibility	0.50	Poorly suited Slope Rock fragments	1.00 0.50

Soil Survey of Lassen Volcanic National Park, California

Table 15.—Hazard of Erosion and Suitability for Roads—Continued

Map symbol and soil name	Pct. of map unit	Hazard of erosion		Hazard of erosion on roads and trails		Suitability for roads (natural surface)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
177: Vitrandic Cryorthents, debris flows, high elevation-----	85	Moderate Slope/erodibility	0.50	Severe Slope/erodibility	0.95	Poorly suited Slope Rock fragments Sandiness	1.00 1.00 0.50
200: Cinder land-----	100	Not rated		Not rated		Not rated	
201: Lava flows-----	100	Not rated		Not rated		Not rated	
202: Typic Xerorthents, tephra-----	85	Slight		Moderate Slope/erodibility	0.50	Moderately suited Slope	0.50
Typic Xerorthents, welded-----	10	Moderate Slope/erodibility	0.50	Moderate Slope/erodibility	0.50	Poorly suited Slope Sandiness	1.00 0.50
203: Typic Xerorthents, tephra-----	90	Slight		Severe Slope/erodibility	0.95	Moderately suited Slope	0.50
205: Beaches-----	100	Not rated		Not rated		Not rated	
W: Water-----	100	Not rated		Not rated		Not rated	

Soil Survey of Lassen Volcanic National Park, California

Table 16.—Planting and Harvesting

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Pct. of map unit	Suitability for hand planting		Suitability for mechanical planting		Suitability for use of harvesting equipment	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
100: Buttelake-----	85	Moderately suited Sandiness	0.50	Moderately suited Slope Sandiness Rock fragments	0.50 0.50 0.50	Moderately suited Sandiness	0.50
101: Buttewash-----	85	Moderately suited Sandiness	0.50	Moderately suited Sandiness	0.50	Moderately suited Sandiness	0.50
102: Ashbutte-----	65	Moderately suited Rock fragments Sandiness Slope	0.50 0.50 0.50	Unsuited Slope Rock fragments Sandiness	1.00 0.75 0.50	Poorly suited Slope Sandiness	1.00 0.50
Vitrandic Xerorthents-----	25	Moderately suited Rock fragments Sandiness Slope	0.50 0.50 0.50	Unsuited Slope Rock fragments Sandiness	1.00 0.75 0.50	Poorly suited Slope Sandiness Rock fragments	1.00 0.50 0.50
103: Scoured-----	75	Poorly suited Rock fragments	0.75	Unsuited Rock fragments Slope	1.00 0.50	Poorly suited Rock fragments	1.00
104: Scoured-----	55	Poorly suited Rock fragments	0.75	Unsuited Rock fragments Slope	1.00 0.75	Poorly suited Rock fragments Slope	1.00 0.50
Juniperlake-----	20	Moderately suited Rock fragments	0.50	Unsuited Slope Rock fragments	1.00 0.75	Moderately suited Rock fragments Slope	0.50 0.50
Rock outcrop-----	15	Not rated		Not rated		Not rated	
105: Juniperlake-----	85	Moderately suited Rock fragments	0.50	Unsuited Slope Rock fragments	1.00 0.75	Moderately suited Rock fragments Slope	0.50 0.50
106: Cenplat-----	70	Poorly suited Rock fragments Sandiness	0.75 0.50	Unsuited Rock fragments Sandiness Slope	1.00 0.50 0.50	Poorly suited Rock fragments Sandiness	1.00 0.50

Soil Survey of Lassen Volcanic National Park, California

Table 16.—Planting and Harvesting—Continued

Map symbol and soil name	Pct. of map unit	Suitability for hand planting		Suitability for mechanical planting		Suitability for use of harvesting equipment	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
107: Badgerflat-----	40	Poorly suited Rock fragments Sandiness	0.75 0.50	Unsuited Rock fragments Slope Sandiness	1.00 0.75 0.50	Poorly suited Rock fragments Slope Sandiness	1.00 0.50 0.50
Cenplat-----	35	Poorly suited Rock fragments Sandiness	0.75 0.50	Unsuited Rock fragments Slope Sandiness	1.00 1.00 0.50	Poorly suited Rock fragments Slope Sandiness	1.00 0.50 0.50
108: Typic Xerorthents---	80	Moderately suited Rock fragments Sandiness	0.50 0.50	Moderately suited Rock fragments Sandiness	0.50 0.50	Moderately suited Sandiness	0.50
109: Prospectpeak-----	85	Moderately suited Rock fragments Sandiness	0.50 0.50	Unsuited Rock fragments Slope Sandiness	1.00 0.50 0.50	Moderately suited Rock fragments Sandiness	0.50 0.50
110: Bearrubble-----	50	Poorly suited Rock fragments Sandiness	0.75 0.50	Unsuited Rock fragments Slope Sandiness	1.00 0.50 0.50	Poorly suited Rock fragments Sandiness	1.00 0.50
Rubble land-----	35	Not rated		Not rated		Not rated	
111: Vitrandic Xerorthents, debris fan-----	95	Poorly suited Rock fragments Sandiness	0.75 0.50	Unsuited Rock fragments Slope Sandiness	1.00 0.50 0.50	Moderately suited Rock fragments Sandiness	0.50 0.50
112: Cascadesprings-----	85	Moderately suited Rock fragments Sandiness	0.50 0.50	Poorly suited Rock fragments Slope Sandiness	0.75 0.50 0.50	Moderately suited Sandiness Rock fragments	0.50 0.50
113: Terracelake-----	35	Moderately suited Rock fragments	0.50	Unsuited Slope Rock fragments	1.00 0.75	Moderately suited Rock fragments Slope	0.50 0.50
Emeraldlake-----	25	Unsuited Rock fragments Sandiness Slope	1.00 0.50 0.50	Unsuited Rock fragments Slope Sandiness	1.00 1.00 0.50	Poorly suited Rock fragments Slope Sandiness	1.00 1.00 0.50

Soil Survey of Lassen Volcanic National Park, California

Table 16.—Planting and Harvesting—Continued

Map symbol and soil name	Pct. of map unit	Suitability for hand planting		Suitability for mechanical planting		Suitability for use of harvesting equipment	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
113: Readingpeak-----	20	Unsuited Rock fragments Sandiness Slope	1.00 0.50 0.50	Unsuited Rock fragments Slope Sandiness	1.00 1.00 0.50	Poorly suited Rock fragments Slope Sandiness	1.00 1.00 0.50
Rock outcrop-----	10	Not rated		Not rated		Not rated	
114: Emeraldlake-----	25	Unsuited Rock fragments Slope Sandiness	1.00 0.50 0.50	Unsuited Slope Rock fragments Sandiness	1.00 1.00 0.50	Poorly suited Rock fragments Slope Sandiness	1.00 1.00 0.50
Terracelake-----	23	Moderately suited Rock fragments Slope	0.50 0.50	Unsuited Slope Rock fragments	1.00 0.75	Poorly suited Slope Rock fragments	1.00 0.50
Readingpeak-----	20	Unsuited Rock fragments Slope Sandiness	1.00 0.50 0.50	Unsuited Rock fragments Slope Sandiness	1.00 1.00 0.50	Poorly suited Rock fragments Slope Sandiness	1.00 1.00 0.50
Rock outcrop-----	15	Not rated		Not rated		Not rated	
Rubble land-----	12	Not rated		Not rated		Not rated	
115: Shadowlake-----	85	Moderately suited Rock fragments	0.50	Poorly suited Rock fragments	0.75	Well suited	
116: Xeric Vitricryands, tephra over till---	30	Poorly suited Rock fragments Sandiness	0.75 0.50	Unsuited Rock fragments Slope Sandiness	1.00 0.75 0.50	Poorly suited Rock fragments Sandiness Slope	1.00 0.50 0.50
Terracelake-----	25	Moderately suited Rock fragments	0.50	Unsuited Slope Rock fragments	1.00 0.75	Moderately suited Rock fragments Slope	0.50 0.50
Rock outcrop-----	15	Not rated		Not rated		Not rated	
Xeric Vitricryands, cirque floor-----	15	Moderately suited Rock fragments	0.50	Poorly suited Rock fragments Slope	0.75 0.50	Moderately suited Rock fragments	0.50
117: Humic Haploxerands, moist lake terrace-	90	Moderately suited Rock fragments	0.50	Moderately suited Rock fragments Slope	0.50 0.50	Moderately suited Sandiness	0.50

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Table 16.—Planting and Harvesting—Continued

Map symbol and soil name	Pct. of map unit	Suitability for hand planting		Suitability for mechanical planting		Suitability for use of harvesting equipment	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
118: Typic Dystroxerepts, landslides-----	90	Poorly suited Rock fragments	0.75	Unsuited Rock fragments Slope	1.00 0.50	Poorly suited Rock fragments	1.00
119: Diamondpeak-----	30	Moderately suited Stickiness; high plasticity index	0.50	Unsuited Slope Rock fragments Stickiness; high plasticity index	1.00 0.50 0.50	Moderately suited Slope Low strength	0.50 0.50
Brokeoff-----	25	Moderately suited Rock fragments Slope Stickiness; high plasticity index	0.50 0.50 0.50	Unsuited Slope Rock fragments Stickiness; high plasticity index	1.00 0.75 0.50	Moderately suited Slope Rock fragments	0.50 0.50
Endoaquepts-----	14	Moderately suited Slope Stickiness; high plasticity index Rock fragments	0.50 0.50 0.50	Unsuited Slope Rock fragments Stickiness; high plasticity index	1.00 0.75 0.50	Poorly suited Slope Rock fragments	1.00 0.50
Aquic Dystroxerepts, debris flows-----	11	Moderately suited Stickiness; high plasticity index Rock fragments	0.50 0.50	Poorly suited Slope Rock fragments Stickiness, high plasticity index	0.75 0.75 0.50	Moderately suited Low strength	0.50
Typic Dystroxerepts-	10	Moderately suited Slope Rock fragments	0.50 0.50	Unsuited Slope Rock fragments	1.00 0.75	Poorly suited Slope	1.00
120: Buttelake-----	65	Moderately suited Sandiness Slope	0.50 0.50	Unsuited Slope Sandiness Rock fragments	1.00 0.50 0.50	Poorly suited Slope Sandiness	1.00 0.50
Sunhoff-----	15	Moderately suited Rock fragments Slope	0.50 0.50	Unsuited Slope Rock fragments	1.00 1.00	Moderately suited Slope Rock fragments	0.50 0.50
Talved-----	10	Unsuited Rock fragments Sandiness Slope	1.00 0.50 0.50	Unsuited Rock fragments Slope Sandiness	1.00 1.00 0.50	Poorly suited Rock fragments Slope Sandiness	1.00 1.00 0.50
122: Xeric Vitricryands, colluvium-----	35	Moderately suited Sandiness Rock fragments Slope	0.50 0.50 0.50	Unsuited Slope Rock fragments Sandiness	1.00 0.75 0.50	Poorly suited Slope Sandiness Rock fragments	1.00 0.50 0.50

Soil Survey of Lassen Volcanic National Park, California

Table 16.—Planting and Harvesting—Continued

Map symbol and soil name	Pct. of map unit	Suitability for hand planting		Suitability for mechanical planting		Suitability for use of harvesting equipment	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
122: Xeric Vitricryands, ash over cinders---	30	Poorly suited Rock fragments	0.75	Unsuited Rock fragments Slope	1.00 0.75	Poorly suited Rock fragments Slope	1.00 0.50
Xeric Vitricryands, bedrock-----	20	Poorly suited Rock fragments	0.75	Unsuited Rock fragments Slope	1.00 0.50	Poorly suited Rock fragments	1.00
125: Humic Haploxerands, stream terrace----	55	Well suited		Moderately suited Rock fragments Slope	0.50 0.50	Well suited	
Aquandic Humaquepts, flood plains-----	40	Moderately suited Rock fragments	0.50	Moderately suited Rock fragments	0.50	Poorly suited Low strength Wetness	1.00 1.00
126: Kingsiron-----	45	Poorly suited Rock fragments Sandiness Slope	0.75 0.50 0.50	Unsuited Slope Rock fragments Sandiness	1.00 1.00 0.50	Poorly suited Rock fragments Slope Sandiness	1.00 1.00 0.50
Dittmar-----	20	Poorly suited Rock fragments	0.75	Unsuited Slope Rock fragments	1.00 1.00	Moderately suited Slope Rock fragments Sandiness	0.50 0.50 0.50
Rock outcrop-----	15	Not rated		Not rated		Not rated	
127: Humic Haploxerands, strath terrace----	65	Well suited		Moderately suited Slope Rock fragments	0.50 0.50	Well suited	
Aquepts-----	15	Poorly suited Rock fragments	0.75	Unsuited Rock fragments Slope	1.00 0.50	Poorly suited Wetness Rock fragments	1.00 1.00
129: Humic Haploxerands, colluvium-----	80	Moderately suited Rock fragments	0.50	Poorly suited Rock fragments Slope	0.75 0.75	Poorly suited Rock fragments Slope	1.00 0.50
130: Histic Humaquepts, lake sediments----	55	Well suited		Well suited		Poorly suited Wetness Low strength	1.00 0.50

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Table 16.—Planting and Harvesting—Continued

Map symbol and soil name	Pct. of map unit	Suitability for hand planting		Suitability for mechanical planting		Suitability for use of harvesting equipment	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
130: Histic Humaquepts, frequently flooded-	30	Well suited		Well suited		Poorly suited Wetness	1.00
Typic Endoaquands---	15	Well suited		Well suited		Poorly suited Wetness	1.00
132: Vitrandic Cryorthents, debris flows-----	90	Moderately suited Rock fragments Sandiness	0.50 0.50	Poorly suited Rock fragments Slope Sandiness	0.75 0.50 0.50	Poorly suited Rock fragments Sandiness	1.00 0.50
133: Vitrandic Xerofluvents-----	55	Moderately suited Rock fragments	0.50	Moderately suited Rock fragments	0.50	Moderately suited Rock fragments	0.50
Typic Endoaquents---	30	Poorly suited Rock fragments Sandiness	0.75 0.50	Unsuited Rock fragments Sandiness	1.00 0.50	Poorly suited Wetness Sandiness Rock fragments	1.00 0.50 0.50
134: Chaos-----	85	Unsuited Rock fragments Sandiness	1.00 0.50	Unsuited Rock fragments Slope Sandiness	1.00 0.50 0.50	Poorly suited Rock fragments Sandiness	1.00 0.50
136: Terracelake-----	45	Moderately suited Rock fragments	0.50	Unsuited Slope Rock fragments	1.00 0.75	Moderately suited Rock fragments Slope	0.50 0.50
Rock outcrop-----	20	Not rated		Not rated		Not rated	
Xeric Vitricryands, cirque floor-----	15	Moderately suited Rock fragments	0.50	Poorly suited Rock fragments Slope	0.75 0.50	Moderately suited Rock fragments	0.50
137: Xeric Vitricryands--	75	Unsuited Rock fragments	1.00	Unsuited Rock fragments Slope	1.00 0.50	Poorly suited Rock fragments	1.00
Rock outcrop, rhyodacite-----	20	Not rated		Not rated		Not rated	
138: Vitrandic Xerofluvents, debris flows-----	80	Well suited		Well suited		Moderately suited Low strength	0.50

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Table 16.—Planting and Harvesting—Continued

Map symbol and soil name	Pct. of map unit	Suitability for hand planting		Suitability for mechanical planting		Suitability for use of harvesting equipment	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
138: Typic Endoaquents---	10	Poorly suited Rock fragments Sandiness	0.75 0.50	Unsuited Rock fragments Sandiness	1.00 0.50	Poorly suited Wetness Sandiness Rock fragments	1.00 0.50 0.50
139: Duric Vitraquands---	60	Well suited		Moderately suited Rock fragments	0.50	Well suited	
Typic Endoaquands---	20	Well suited		Well suited		Poorly suited Wetness	1.00
Aquandic Cryaquents-	15	Moderately suited Stickiness; high plasticity index	0.50	Moderately suited Stickiness; high plasticity index	0.50	Poorly suited Wetness Low strength	1.00 0.50
140: Vitrixerands-----	90	Moderately suited Rock fragments	0.50	Poorly suited Rock fragments	0.75	Moderately suited Sandiness Rock fragments	0.50 0.50
141: Humic Haploxerands--	40	Moderately suited Rock fragments	0.50	Unsuited Rock fragments Slope	1.00 0.75	Moderately suited Slope	0.50
Typic Haploxerands--	35	Poorly suited Rock fragments	0.75	Unsuited Rock fragments Slope	1.00 1.00	Poorly suited Rock fragments Slope	1.00 0.50
Bearrubble-----	15	Poorly suited Rock fragments Sandiness	0.75 0.50	Unsuited Rock fragments Slope Sandiness	1.00 0.50 0.50	Poorly suited Rock fragments Sandiness	1.00 0.50
Rubble land-----	10	Not rated		Not rated		Not rated	
142: Cragwash-----	85	Moderately suited Sandiness	0.50	Moderately suited Slope Rock fragments Sandiness	0.50 0.50 0.50	Moderately suited Sandiness	0.50
143: Andic Durixercepts---	95	Moderately suited Sandiness Rock fragments	0.50 0.50	Unsuited Rock fragments Slope Sandiness	1.00 0.50 0.50	Moderately suited Sandiness Rock fragments	0.50 0.50
144: Xeric Vitricryands, cirque floor-----	55	Moderately suited Rock fragments	0.50	Poorly suited Rock fragments Slope	0.75 0.50	Moderately suited Rock fragments	0.50

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Table 16.—Planting and Harvesting—Continued

Map symbol and soil name	Pct. of map unit	Suitability for hand planting		Suitability for mechanical planting		Suitability for use of harvesting equipment	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
144: Humic Xeric Vitricryands-----	30	Poorly suited Rock fragments	0.75	Unsuited Rock fragments Slope	1.00 1.00	Poorly suited Rock fragments Slope	1.00 0.50
145: Sueredo-----	85	Moderately suited Rock fragments	0.50	Poorly suited Rock fragments Slope	0.75 0.50	Poorly suited Rock fragments	1.00
146: Sueredo-----	90	Moderately suited Rock fragments Slope	0.50 0.50	Unsuited Slope Rock fragments	1.00 0.75	Poorly suited Slope Rock fragments	1.00 1.00
147: Summertown-----	85	Moderately suited Rock fragments	0.50	Poorly suited Slope Rock fragments	0.75 0.75	Moderately suited Rock fragments Slope	0.50 0.50
148: Humic Haploxerands, lake terrace-----	70	Moderately suited Rock fragments	0.50	Unsuited Rock fragments	1.00	Moderately suited Rock fragments	0.50
Typic Endoaquands---	15	Well suited		Well suited		Poorly suited Wetness	1.00
149: Rubble land-----	45	Not rated		Not rated		Not rated	
Rock outcrop, cliffs	30	Not rated		Not rated		Not rated	
Emeraldlake-----	15	Unsuited Rock fragments Slope Sandiness	1.00 0.50 0.50	Unsuited Slope Rock fragments Sandiness	1.00 1.00 0.50	Poorly suited Rock fragments Slope Sandiness	1.00 1.00 0.50
150: Shadowlake-----	40	Moderately suited Rock fragments Slope	0.50 0.50	Unsuited Slope Rock fragments	1.00 0.75	Poorly suited Slope	1.00
Terracelake-----	30	Moderately suited Rock fragments Slope	0.50 0.50	Unsuited Slope Rock fragments	1.00 0.75	Poorly suited Slope Rock fragments	1.00 0.50
Acroph-----	15	Moderately suited Rock fragments Slope	0.50 0.50	Unsuited Slope Rock fragments	1.00 0.75	Poorly suited Slope Rock fragments	1.00 0.50
Rock outcrop-----	10	Not rated		Not rated		Not rated	

Soil Survey of Lassen Volcanic National Park, California

Table 16.—Planting and Harvesting—Continued

Map symbol and soil name	Pct. of map unit	Suitability for hand planting		Suitability for mechanical planting		Suitability for use of harvesting equipment	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
151: Terracelake-----	40	Moderately suited Rock fragments	0.50	Unsuited Slope Rock fragments	1.00 0.75	Moderately suited Rock fragments Slope	0.50 0.50
Acroph-----	20	Moderately suited Rock fragments Slope	0.50 0.50	Unsuited Slope Rock fragments	1.00 0.75	Poorly suited Slope Rock fragments	1.00 0.50
Rock outcrop-----	15	Not rated		Not rated		Not rated	
Shadowlake-----	15	Moderately suited Rock fragments	0.50	Poorly suited Rock fragments Slope	0.75 0.75	Moderately suited Slope	0.50
152: Terracelake-----	35	Moderately suited Rock fragments	0.50	Poorly suited Rock fragments Slope	0.75 0.50	Moderately suited Rock fragments	0.50
Shadowlake-----	30	Moderately suited Rock fragments	0.50	Poorly suited Rock fragments Slope	0.75 0.50	Well suited	
Acroph-----	15	Moderately suited Rock fragments	0.50	Poorly suited Rock fragments Slope	0.75 0.50	Moderately suited Rock fragments	0.50
Rock outcrop-----	10	Not rated		Not rated		Not rated	
153: Typic Vitrixerands--	50	Poorly suited Rock fragments	0.75	Unsuited Rock fragments Slope	1.00 0.50	Moderately suited Rock fragments	0.50
Vitrandic Xerorthents, moraine-----	45	Well suited		Poorly suited Slope Rock fragments	0.75 0.50	Moderately suited Rock fragments	0.50
154: Typic Vitrixerands--	45	Poorly suited Rock fragments Slope	0.75 0.50	Unsuited Slope Rock fragments	1.00 1.00	Poorly suited Slope Rock fragments	1.00 0.50
Vitrandic Xerorthents, moraine-----	35	Moderately suited Slope	0.50	Unsuited Slope Rock fragments	1.00 0.50	Poorly suited Slope Rock fragments	1.00 0.50
155: Xeric Vitricryands, pyroclastic surge--	90	Moderately suited Sandiness Rock fragments	0.50 0.50	Poorly suited Slope Rock fragments Sandiness	0.75 0.75 0.50	Moderately suited Rock fragments Sandiness	0.50 0.50

Soil Survey of Lassen Volcanic National Park, California

Table 16.—Planting and Harvesting—Continued

Map symbol and soil name	Pct. of map unit	Suitability for hand planting		Suitability for mechanical planting		Suitability for use of harvesting equipment	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
156: Xeric Vitricryands, pyroclastic surge--	90	Moderately suited Sandiness	0.50	Unsuited Slope	1.00	Poorly suited Slope	1.00
		Slope	0.50	Rock fragments	0.75	Rock fragments	0.50
		Rock fragments	0.50	Sandiness	0.50	Sandiness	0.50
157: Typic Vitriixerands, very deep-----	90	Moderately suited Rock fragments	0.50	Poorly suited Rock fragments	0.75	Poorly suited Rock fragments	1.00
				Slope	0.50		
158: Typic Vitriixerands, unglaciaded-----	75	Moderately suited Rock fragments	0.50	Moderately suited Slope	0.50	Well suited	
				Rock fragments	0.50		
Rock outcrop, rhyodacite-----	20	Not rated		Not rated		Not rated	
159: Typic Vitriixerands, bouldery-----	40	Unsuited Rock fragments	1.00	Unsuited Rock fragments	1.00	Poorly suited Rock fragments	1.00
		Sandiness	0.50	Slope	1.00	Slope	0.50
		Slope	0.50	Sandiness	0.50	Sandiness	0.50
Typic Vitriixerands, tephra over colluvium-----	35	Moderately suited Slope	0.50	Unsuited Slope	1.00	Poorly suited Rock fragments	1.00
		Rock fragments	0.50	Rock fragments	0.75	Slope	1.00
Rubble land-----	15	Not rated		Not rated		Not rated	
160: Aeric Endoaquents---	45	Poorly suited Rock fragments	0.75	Unsuited Rock fragments	1.00	Moderately suited Rock fragments	0.50
Humic Haploxerands, stream terrace-----	35	Well suited		Moderately suited Rock fragments	0.50	Well suited	
Riverwash-----	15	Not rated		Not rated		Not rated	
161: Typic Psammaquents--	95	Moderately suited Sandiness	0.50	Moderately suited Sandiness	0.50	Moderately suited Sandiness	0.50
				Rock fragments	0.50		
162: Humic Haploxerands, outwash-----	95	Moderately suited Rock fragments	0.50	Poorly suited Rock fragments	0.75	Moderately suited Rock fragments	0.50

Soil Survey of Lassen Volcanic National Park, California

Table 16.—Planting and Harvesting—Continued

Map symbol and soil name	Pct. of map unit	Suitability for hand planting		Suitability for mechanical planting		Suitability for use of harvesting equipment	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
163: Vitrandic Cryofluvents-----	65	Poorly suited Stickiness; high plasticity index	0.75	Poorly suited Stickiness; high plasticity index Rock fragments	0.75 0.50	Poorly suited Wetness	1.00
Aquandic Cryaquepts-	30	Moderately suited Stickiness; high plasticity index	0.50	Moderately suited Stickiness; high plasticity index	0.50	Poorly suited Wetness Low strength	1.00 0.50
164: Aquepts-----	35	Poorly suited Rock fragments	0.75	Unsuited Rock fragments Slope	1.00 0.50	Poorly suited Wetness Rock fragments	1.00 1.00
Typic Petraquepts, bedrock-----	25	Moderately suited Wetness Rock fragments	0.50 0.50	Poorly suited Slope Wetness Rock fragments	0.75 0.75 0.75	Poorly suited Wetness Rock fragments Slope	1.00 0.50 0.50
Aquic Haploxerands--	20	Well suited		Moderately suited Slope Rock fragments	0.50 0.50	Well suited	
Typic Petraquepts---	10	Well suited		Moderately suited Slope	0.50	Poorly suited Low strength Wetness	1.00 1.00
165: Aquandic Humaquepts-	35	Well suited		Moderately suited Rock fragments	0.50	Poorly suited Wetness	1.00
Histic Humaquepts---	25	Well suited		Well suited		Poorly suited Wetness Low strength	1.00 0.50
Aquandic Endoaquepts	20	Well suited		Well suited		Moderately suited Wetness	0.50
Terric Haplohemists-	15	Well suited		Well suited		Poorly suited Wetness	1.00
166: Aquic Haploxerands--	50	Well suited		Moderately suited Rock fragments	0.50	Well suited	
Humic Haploxerands, outwash terrace----	40	Moderately suited Rock fragments	0.50	Poorly suited Rock fragments Slope	0.75 0.50	Moderately suited Rock fragments	0.50
167: Emeraldlake-----	35	Unsuited Rock fragments Slope Sandiness	1.00 0.50 0.50	Unsuited Slope Rock fragments Sandiness	1.00 1.00 0.50	Poorly suited Rock fragments Slope Sandiness	1.00 1.00 0.50

Soil Survey of Lassen Volcanic National Park, California

Table 16.—Planting and Harvesting—Continued

Map symbol and soil name	Pct. of map unit	Suitability for hand planting		Suitability for mechanical planting		Suitability for use of harvesting equipment	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
167: Readingpeak-----	20	Unsuited Rock fragments	1.00	Unsuited Slope	1.00	Poorly suited Rock fragments	1.00
		Slope	0.50	Rock fragments	1.00	Slope	1.00
		Sandiness	0.50	Sandiness	0.50	Sandiness	0.50
Terracelake-----	15	Moderately suited Rock fragments	0.50	Unsuited Slope	1.00	Poorly suited Slope	1.00
		Slope	0.50	Rock fragments	0.75	Rock fragments	0.50
Rock outcrop, dacite	15	Not rated		Not rated		Not rated	
168: Vitrixerands, low elevation-----	90	Moderately suited Rock fragments	0.50	Poorly suited Rock fragments	0.75	Moderately suited Sandiness	0.50
						Rock fragments	0.50
169: Sueredo-----	55	Moderately suited Rock fragments	0.50	Unsuited Slope	1.00	Poorly suited Rock fragments	1.00
		Slope	0.50	Rock fragments	0.75	Slope	0.50
Rock outcrop, cliffs	20	Not rated		Not rated		Not rated	
Scoured-----	15	Poorly suited Rock fragments	0.75	Unsuited Rock fragments	1.00	Poorly suited Rock fragments	1.00
		Slope	0.50	Slope	1.00	Slope	1.00
170: Rock outcrop, rhyodacite-----	35	Not rated		Not rated		Not rated	
Emeraldlake-----	20	Unsuited Rock fragments	1.00	Unsuited Slope	1.00	Poorly suited Rock fragments	1.00
		Slope	0.50	Rock fragments	1.00	Slope	1.00
		Sandiness	0.50	Sandiness	0.50	Sandiness	0.50
Rubble land-----	18	Not rated		Not rated		Not rated	
Readingpeak-----	15	Unsuited Rock fragments	1.00	Unsuited Rock fragments	1.00	Poorly suited Rock fragments	1.00
		Slope	0.50	Slope	1.00	Slope	1.00
		Sandiness	0.50	Sandiness	0.50	Sandiness	0.50
171: Aquepts-----	50	Poorly suited Rock fragments	0.75	Unsuited Rock fragments	1.00	Poorly suited Wetness	1.00
		Slope	0.50	Slope	1.00	Rock fragments	1.00
						Slope	1.00
Typic Petraquepts, bedrock-----	35	Moderately suited Rock fragments	0.50	Unsuited Slope	1.00	Poorly suited Wetness	1.00
		Slope	0.50	Rock fragments	0.75	Slope	1.00
						Rock fragments	0.50

Soil Survey of Lassen Volcanic National Park, California

Table 16.—Planting and Harvesting—Continued

Map symbol and soil name	Pct. of map unit	Suitability for hand planting		Suitability for mechanical planting		Suitability for use of harvesting equipment	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
172: Badgerflat-----	90	Poorly suited Rock fragments Sandiness	0.75 0.50	Unsuited Rock fragments Slope Sandiness	1.00 0.50 0.50	Poorly suited Rock fragments Sandiness	1.00 0.50
173: Badgerwash-----	90	Moderately suited Rock fragments Sandiness	0.50 0.50	Poorly suited Rock fragments Sandiness	0.75 0.50	Moderately suited Rock fragments Sandiness	0.50 0.50
174: Vitrandic Cryorthents-----	60	Poorly suited Rock fragments Sandiness	0.75 0.50	Unsuited Rock fragments Slope Sandiness	1.00 0.50 0.50	Moderately suited Rock fragments Sandiness	0.50 0.50
Readingpeak-----	20	Unsuited Rock fragments Sandiness Slope	1.00 0.50 0.50	Unsuited Rock fragments Slope Sandiness	1.00 1.00 0.50	Poorly suited Rock fragments Slope Sandiness	1.00 1.00 0.50
Rock outcrop-----	10	Not rated		Not rated		Not rated	
175: Shadowlake-----	75	Moderately suited Rock fragments	0.50	Poorly suited Rock fragments Slope	0.75 0.50	Well suited	
Vitrandic Cryofluvents-----	15	Poorly suited Stickiness; high plasticity index	0.75	Poorly suited Stickiness; high plasticity index Rock fragments	0.75 0.50	Poorly suited Wetness	1.00
176: Juniperlake, bouldery-----	85	Moderately suited Rock fragments	0.50	Poorly suited Rock fragments Slope	0.75 0.75	Moderately suited Rock fragments Slope	0.50 0.50
177: Vitrandic Cryorthents, debris flows, high elevation-----	85	Moderately suited Rock fragments Sandiness	0.50 0.50	Poorly suited Rock fragments Slope Sandiness	0.75 0.75 0.50	Poorly suited Rock fragments Slope Sandiness	1.00 0.50 0.50
200: Cinder land-----	100	Not rated		Not rated		Not rated	
201: Lava flows-----	100	Not rated		Not rated		Not rated	

Soil Survey of Lassen Volcanic National Park, California

Table 16.—Planting and Harvesting—Continued

Map symbol and soil name	Pct. of map unit	Suitability for hand planting		Suitability for mechanical planting		Suitability for use of harvesting equipment	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
202: Typic Xerorthents, tephra-----	85	Moderately suited Sandiness	0.50	Moderately suited Slope Rock fragments Sandiness	0.50 0.50 0.50	Well suited	
Typic Xerorthents, welded-----	10	Unsuited Restrictive layer Sandiness Rock fragments	1.00 0.50 0.50	Poorly suited Rock fragments Slope Sandiness Restrictive layer	0.75 0.50 0.50 0.50	Moderately suited Sandiness	0.50
203: Typic Xerorthents, tephra-----	90	Moderately suited Sandiness	0.50	Moderately suited Slope Rock fragments Sandiness	0.50 0.50 0.50	Well suited	
205: Beaches-----	100	Not rated		Not rated		Not rated	
W: Water-----	100	Not rated		Not rated		Not rated	

Soil Survey of Lassen Volcanic National Park, California

Table 17.--Site Preparation

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Pct. of map unit	Mechanical site preparation (deep)		Mechanical site preparation (surface)	
		Rating class and limiting features	Value	Rating class and limiting features	Value
100: Buttelake-----	85	Well suited		Well suited	
101: Buttewash-----	85	Well suited		Well suited	
102: Ashbutte-----	65	Unsuited Slope	1.00	Unsuited Slope	1.00
Vitrandic Xerorthents-----	25	Unsuited Slope Rock fragments	1.00 0.50	Unsuited Slope Rock fragments	1.00 0.50
103: Scoured-----	75	Unsuited Rock fragments Restrictive layer	1.00 0.50	Unsuited Rock fragments	1.00
104: Scoured-----	55	Unsuited Rock fragments Slope Restrictive layer	1.00 0.50 0.50	Unsuited Rock fragments Slope	1.00 0.50
Juniperlake-----	20	Poorly suited Rock fragments Slope	0.50 0.50	Poorly suited Rock fragments Slope	0.50 0.50
Rock outcrop-----	15	Not rated		Not rated	
105: Juniperlake-----	85	Poorly suited Rock fragments Slope	0.50 0.50	Poorly suited Rock fragments Slope	0.50 0.50
106: Cenplat-----	70	Unsuited Rock fragments Slope Restrictive layer	1.00 0.50 0.50	Unsuited Rock fragments Slope	1.00 0.50
107: Badgerflat-----	40	Unsuited Rock fragments Slope	1.00 0.50	Unsuited Rock fragments Slope	1.00 0.50
Cenplat-----	35	Unsuited Rock fragments Slope	1.00 0.50	Unsuited Rock fragments Slope	1.00 0.50

Soil Survey of Lassen Volcanic National Park, California

Table 17.--Site Preparation--Continued

Map symbol and soil name	Pct. of map unit	Mechanical site preparation (deep)		Mechanical site preparation (surface)	
		Rating class and limiting features	Value	Rating class and limiting features	Value
108: Typic Xerorthents---	80	Well suited		Poorly suited Rock fragments	0.50
109: Prospectpeak-----	85	Poorly suited Rock fragments	0.50	Poorly suited Rock fragments	0.50
110: Bearthrubble-----	50	Unsuited Rock fragments	1.00	Unsuited Rock fragments	1.00
Rubble land-----	35	Not rated		Not rated	
111: Vitrandic Xerorthents, debris fan-----	95	Poorly suited Rock fragments	0.50	Poorly suited Rock fragments	0.50
112: Cascadesprings-----	85	Poorly suited Slope Rock fragments	0.50 0.50	Poorly suited Slope Rock fragments	0.50 0.50
113: Terracelake-----	35	Poorly suited Slope Rock fragments	0.50 0.50	Poorly suited Slope Rock fragments	0.50 0.50
Emeraldlake-----	25	Unsuited Slope Rock fragments	1.00 1.00	Unsuited Slope Rock fragments	1.00 1.00
Readingpeak-----	20	Unsuited Slope Rock fragments	1.00 1.00	Unsuited Slope Rock fragments	1.00 1.00
Rock outcrop-----	10	Not rated		Not rated	
114: Emeraldlake-----	25	Unsuited Slope Rock fragments	1.00 1.00	Unsuited Slope Rock fragments	1.00 1.00
Terracelake-----	23	Unsuited Slope Rock fragments	1.00 0.50	Unsuited Slope Rock fragments	1.00 0.50
Readingpeak-----	20	Unsuited Slope Rock fragments	1.00 1.00	Unsuited Slope Rock fragments	1.00 1.00
Rock outcrop-----	15	Not rated		Not rated	
Rubble land-----	12	Not rated		Not rated	
115: Shadowlake-----	85	Well suited		Well suited	

Soil Survey of Lassen Volcanic National Park, California

Table 17.—Site Preparation—Continued

Map symbol and soil name	Pct. of map unit	Mechanical site preparation (deep)		Mechanical site preparation (surface)	
		Rating class and limiting features	Value	Rating class and limiting features	Value
116: Xeric Vitricryands, tephra over till---	30	Poorly suited Rock fragments Slope	0.50 0.50	Unsuited Rock fragments Slope	1.00 0.50
Terracelake-----	25	Poorly suited Rock fragments Slope	0.50 0.50	Poorly suited Rock fragments Slope	0.50 0.50
Rock outcrop-----	15	Not rated		Not rated	
Xeric Vitricryands, cirque floor-----	15	Poorly suited Rock fragments	0.50	Poorly suited Rock fragments	0.50
117: Humic Haploxerands, moist lake terrace-	90	Well suited		Poorly suited Rock fragments	0.50
118: Typic Dystroxerepts, landslides-----	90	Poorly suited Rock fragments	0.50	Unsuited Rock fragments	1.00
119: Diamondpeak-----	30	Poorly suited Slope	0.50	Poorly suited Slope	0.50
Brokeoff-----	25	Poorly suited Slope Rock fragments	0.50 0.50	Poorly suited Slope Rock fragments	0.50 0.50
Endoaquepts-----	14	Unsuited Slope	1.00	Unsuited Slope Rock fragments	1.00 0.50
Aquic Dystroxerepts, debris flows-----	11	Poorly suited Slope	0.50	Poorly suited Slope Rock fragments	0.50 0.50
Typic Dystroxerepts-	10	Unsuited Slope	1.00	Unsuited Slope Rock fragments	1.00 0.50
120: Buttelake-----	65	Unsuited Slope	1.00	Unsuited Slope	1.00
Sunhoff-----	15	Poorly suited Slope Rock fragments	0.50 0.50	Poorly suited Slope Rock fragments	0.50 0.50
Talved-----	10	Unsuited Rock fragments Slope	1.00 1.00	Unsuited Rock fragments Slope	1.00 1.00

Soil Survey of Lassen Volcanic National Park, California

Table 17.—Site Preparation—Continued

Map symbol and soil name	Pct. of map unit	Mechanical site preparation (deep)		Mechanical site preparation (surface)	
		Rating class and limiting features	Value	Rating class and limiting features	Value
122: Xeric Vitricryands, colluvium-----	35	Unsuited Slope Rock fragments	1.00 0.50	Unsuited Slope Rock fragments	1.00 0.50
Xeric Vitricryands, ash over cinders---	30	Unsuited Rock fragments Slope	1.00 0.50	Unsuited Rock fragments Slope	1.00 0.50
Xeric Vitricryands, bedrock-----	20	Unsuited Rock fragments Restrictive layer	1.00 0.50	Unsuited Rock fragments	1.00
125: Humic Haploxerands, stream terrace-----	55	Well suited		Well suited	
Aquandic Humaquepts, flood plains-----	40	Unsuited Wetness	1.00	Poorly suited Rock fragments	0.50
126: Kingsiron-----	45	Unsuited Slope Rock fragments	1.00 1.00	Unsuited Slope Rock fragments	1.00 1.00
Dittmar-----	20	Unsuited Restrictive layer Slope Rock fragments	1.00 0.50 0.50	Poorly suited Slope Rock fragments	0.50 0.50
Rock outcrop-----	15	Not rated		Not rated	
127: Humic Haploxerands, strath terrace-----	65	Unsuited Rock fragments	1.00	Well suited	
Aquepts-----	15	Unsuited Wetness Rock fragments Slope	1.00 1.00 0.50	Unsuited Rock fragments Slope	1.00 0.50
129: Humic Haploxerands, colluvium-----	80	Poorly suited Rock fragments Slope	0.50 0.50	Unsuited Rock fragments Slope	1.00 0.50
130: Histic Humaquepts, lake sediments-----	55	Unsuited Wetness	1.00	Well suited	
Histic Humaquepts, frequently flooded-	30	Unsuited Wetness	1.00	Well suited	

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Table 17.--Site Preparation--Continued

Map symbol and soil name	Pct. of map unit	Mechanical site preparation (deep)		Mechanical site preparation (surface)	
		Rating class and limiting features	Value	Rating class and limiting features	Value
130: Typic Endoaquands---	15	Unsuited Wetness	1.00	Well suited	
132: Vitrandic Cryorthents, debris flows-----	90	Poorly suited Rock fragments	0.50	Unsuited Rock fragments	1.00
133: Vitrandic Xerofluvents-----	55	Well suited		Poorly suited Rock fragments	0.50
Typic Endoaquents---	30	Unsuited Wetness	1.00	Poorly suited Rock fragments	0.50
134: Chaos-----	85	Well suited		Unsuited Rock fragments	1.00
136: Terracelake-----	45	Poorly suited Rock fragments Slope	0.50 0.50	Poorly suited Rock fragments Slope	0.50 0.50
Rock outcrop-----	20	Not rated		Not rated	
Xeric Vitricryands, cirque floor-----	15	Poorly suited Rock fragments Slope	0.50 0.50	Poorly suited Rock fragments Slope	0.50 0.50
137: Xeric Vitricryands--	75	Unsuited Rock fragments	1.00	Unsuited Rock fragments	1.00
Rock outcrop, rhyodacite-----	20	Not rated		Not rated	
138: Vitrandic Xerofluvents, debris flows-----	80	Well suited		Well suited	
Typic Endoaquents---	10	Unsuited Wetness	1.00	Poorly suited Rock fragments	0.50
139: Duric Vitraquands---	60	Well suited		Well suited	
Typic Endoaquands---	20	Unsuited Wetness	1.00	Well suited	
Aquandic Cryaquents-	15	Unsuited Wetness	1.00	Well suited	

Soil Survey of Lassen Volcanic National Park, California

Table 17.—Site Preparation—Continued

Map symbol and soil name	Pct. of map unit	Mechanical site preparation (deep)		Mechanical site preparation (surface)	
		Rating class and limiting features	Value	Rating class and limiting features	Value
140: Vitrixerands-----	90	Well suited		Poorly suited Rock fragments	0.50
141: Humic Haploxerands--	40	Poorly suited Slope Rock fragments	0.50 0.50	Poorly suited Slope Rock fragments	0.50 0.50
Typic Haploxerands--	35	Unsuited Rock fragments Slope	1.00 0.50	Unsuited Rock fragments Slope	1.00 0.50
Bearrubble-----	15	Unsuited Rock fragments	1.00	Unsuited Rock fragments	1.00
Rubble land-----	10	Not rated		Not rated	
142: Cragwash-----	85	Well suited		Well suited	
143: Andic Durixerepts---	95	Well suited		Poorly suited Rock fragments	0.50
144: Xeric Vitricryands, cirque floor-----	55	Poorly suited Rock fragments	0.50	Poorly suited Rock fragments	0.50
Humic Xeric Vitricryands-----	30	Unsuited Rock fragments Slope	1.00 0.50	Unsuited Rock fragments Slope	1.00 0.50
145: Sueredo-----	85	Poorly suited Rock fragments	0.50	Unsuited Rock fragments	1.00
146: Sueredo-----	90	Unsuited Slope Rock fragments	1.00 0.50	Unsuited Slope Rock fragments	1.00 1.00
147: Summertown-----	85	Poorly suited Slope Rock fragments	0.50 0.50	Poorly suited Rock fragments Slope	0.50 0.50
148: Humic Haploxerands, lake terrace-----	70	Poorly suited Rock fragments	0.50	Poorly suited Rock fragments	0.50
Typic Endoaquands---	15	Unsuited Wetness	1.00	Well suited	

Soil Survey of Lassen Volcanic National Park, California

Table 17.—Site Preparation—Continued

Map symbol and soil name	Pct. of map unit	Mechanical site preparation (deep)		Mechanical site preparation (surface)	
		Rating class and limiting features	Value	Rating class and limiting features	Value
149: Rubble land-----	45	Not rated		Not rated	
Rock outcrop, cliffs	30	Not rated		Not rated	
Emeraldlake-----	15	Unsuited Slope Rock fragments	1.00 1.00	Unsuited Slope Rock fragments	1.00 1.00
150: Shadowlake-----	40	Unsuited Slope	1.00	Unsuited Slope	1.00
Terracelake-----	30	Unsuited Slope Rock fragments	1.00 0.50	Unsuited Slope Rock fragments	1.00 0.50
Acroph-----	15	Unsuited Restrictive layer Slope Rock fragments	1.00 1.00 0.50	Unsuited Slope Rock fragments	1.00 0.50
Rock outcrop-----	10	Not rated		Not rated	
151: Terracelake-----	40	Poorly suited Slope Rock fragments	0.50 0.50	Poorly suited Slope Rock fragments	0.50 0.50
Acroph-----	20	Unsuited Restrictive layer Slope Rock fragments	1.00 1.00 0.50	Unsuited Slope Rock fragments	1.00 0.50
Rock outcrop-----	15	Not rated		Not rated	
Shadowlake-----	15	Poorly suited Slope	0.50	Poorly suited Slope	0.50
152: Terracelake-----	35	Poorly suited Rock fragments	0.50	Poorly suited Rock fragments	0.50
Shadowlake-----	30	Well suited		Well suited	
Acroph-----	15	Unsuited Restrictive layer Rock fragments	1.00 0.50	Poorly suited Rock fragments	0.50
Rock outcrop-----	10	Not rated		Not rated	
153: Typic Vitriixerands--	50	Poorly suited Rock fragments	0.50	Poorly suited Rock fragments	0.50
Vitrandic Xerorthents, moraine-----	45	Poorly suited Slope	0.50	Poorly suited Rock fragments Slope	0.50 0.50

Soil Survey of Lassen Volcanic National Park, California

Table 17.—Site Preparation—Continued

Map symbol and soil name	Pct. of map unit	Mechanical site preparation (deep)		Mechanical site preparation (surface)	
		Rating class and limiting features	Value	Rating class and limiting features	Value
154: Typic Vitrixerands--	45	Unsuited Slope Rock fragments	1.00 0.50	Unsuited Slope Rock fragments	1.00 0.50
Vitrandic Xerorthents, moraine-----	35	Unsuited Slope	1.00	Unsuited Slope Rock fragments	1.00 0.50
155: Xeric Vitricryands, pyroclastic surge--	90	Poorly suited Slope Rock fragments	0.50 0.50	Poorly suited Rock fragments Slope	0.50 0.50
156: Xeric Vitricryands, pyroclastic surge--	90	Unsuited Slope Rock fragments	1.00 0.50	Unsuited Slope Rock fragments	1.00 0.50
157: Typic Vitrixerands, very deep-----	90	Poorly suited Rock fragments	0.50	Unsuited Rock fragments	1.00
158: Typic Vitrixerands, unglaciated-----	75	Well suited		Well suited	
Rock outcrop, rhyodacite-----	20	Not rated		Not rated	
159: Typic Vitrixerands, bouldery-----	40	Unsuited Rock fragments Slope	1.00 0.50	Unsuited Rock fragments Slope	1.00 0.50
Typic Vitrixerands, tephra over colluvium-----	35	Unsuited Slope Rock fragments	1.00 0.50	Unsuited Slope Rock fragments	1.00 1.00
Rubble land-----	15	Not rated		Not rated	
160: Aeric Endoaquents---	45	Poorly suited Rock fragments	0.50	Poorly suited Rock fragments	0.50
Humic Haploxerands, stream terrace----	35	Well suited		Well suited	
Riverwash-----	15	Not rated		Not rated	
161: Typic Psammaquents--	95	Well suited		Well suited	

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Table 17.—Site Preparation—Continued

Map symbol and soil name	Pct. of map unit	Mechanical site preparation (deep)		Mechanical site preparation (surface)	
		Rating class and limiting features	Value	Rating class and limiting features	Value
162: Humic Haploxerands, outwash-----	95	Poorly suited Rock fragments	0.50	Poorly suited Rock fragments	0.50
163: Vitrandic Cryofluvents-----	65	Unsuited Wetness	1.00	Poorly suited Stickiness; high plasticity index	0.50
Aquandic Cryaquepts-	30	Unsuited Wetness	1.00	Well suited	
164: Aquepts-----	35	Unsuited Wetness Rock fragments	1.00 1.00	Unsuited Rock fragments	1.00
Typic Petraquepts, bedrock-----	25	Unsuited Wetness Restrictive layer Slope Rock fragments	1.00 0.50 0.50 0.50	Poorly suited Wetness Rock fragments Slope	0.50 0.50 0.50
Aquic Haploxerands--	20	Well suited		Well suited	
Typic Petraquepts---	10	Unsuited Wetness	1.00	Well suited	
165: Aquandic Humaquepts-	35	Unsuited Wetness	1.00	Well suited	
Histic Humaquepts---	25	Unsuited Wetness	1.00	Well suited	
Aquandic Endoaquepts	20	Unsuited Wetness	1.00	Well suited	
Terric Haplohemists-	15	Unsuited Wetness	1.00	Well suited	
166: Aquic Haploxerands--	50	Well suited		Well suited	
Humic Haploxerands, outwash terrace----	40	Poorly suited Slope Rock fragments	0.50 0.50	Poorly suited Slope Rock fragments	0.50 0.50
167: Emeraldlake-----	35	Unsuited Slope Rock fragments	1.00 1.00	Unsuited Slope Rock fragments	1.00 1.00
Readingpeak-----	20	Unsuited Slope Rock fragments	1.00 1.00	Unsuited Slope Rock fragments	1.00 1.00

Soil Survey of Lassen Volcanic National Park, California

Table 17.—Site Preparation—Continued

Map symbol and soil name	Pct. of map unit	Mechanical site preparation (deep)		Mechanical site preparation (surface)	
		Rating class and limiting features	Value	Rating class and limiting features	Value
167: Terracelake-----	15	Unsuited Slope Rock fragments	1.00 0.50	Unsuited Slope Rock fragments	1.00 0.50
Rock outcrop, dacite	15	Not rated		Not rated	
168: Vitrixerands, low elevation-----	90	Well suited		Poorly suited Rock fragments	0.50
169: Sueredo-----	55	Poorly suited Slope Rock fragments	0.50 0.50	Unsuited Rock fragments Slope	1.00 0.50
Rock outcrop, cliffs	20	Not rated		Not rated	
Scoured-----	15	Unsuited Slope Rock fragments Restrictive layer	1.00 1.00 0.50	Unsuited Slope Rock fragments	1.00 1.00
170: Rock outcrop, rhyodacite-----	35	Not rated		Not rated	
Emeraldlake-----	20	Unsuited Slope Rock fragments	1.00 1.00	Unsuited Slope Rock fragments	1.00 1.00
Rubble land-----	18	Not rated		Not rated	
Readingpeak-----	15	Unsuited Slope Rock fragments	1.00 1.00	Unsuited Slope Rock fragments	1.00 1.00
171: Aquepts-----	50	Unsuited Wetness Rock fragments Slope	1.00 1.00 1.00	Unsuited Rock fragments Slope	1.00 1.00
Typic Petraquepts, bedrock-----	35	Unsuited Wetness Slope Restrictive layer Rock fragments	1.00 1.00 0.50 0.50	Unsuited Slope Rock fragments	1.00 0.50
172: Badgerflat-----	90	Unsuited Rock fragments	1.00	Unsuited Rock fragments	1.00
173: Badgerwash-----	90	Poorly suited Rock fragments	0.50	Poorly suited Rock fragments	0.50

Soil Survey of Lassen Volcanic National Park, California

Table 17.—Site Preparation—Continued

Map symbol and soil name	Pct. of map unit	Mechanical site preparation (deep)		Mechanical site preparation (surface)	
		Rating class and limiting features	Value	Rating class and limiting features	Value
174: Vitrandic Cryorthents-----	60	Poorly suited Rock fragments	0.50	Poorly suited Rock fragments	0.50
Readingpeak-----	20	Unsuited Rock fragments Slope	1.00 1.00	Unsuited Rock fragments Slope	1.00 1.00
Rock outcrop-----	10	Not rated		Not rated	
175: Shadowlake-----	75	Well suited		Well suited	
Vitrandic Cryofluvents-----	15	Unsuited Wetness	1.00	Poorly suited Stickiness; high plasticity index	0.50
176: Juniperlake, bouldery-----	85	Poorly suited Rock fragments Slope	0.50 0.50	Poorly suited Rock fragments Slope	0.50 0.50
177: Vitrandic Cryorthents, debris flows, high elevation-----	85	Poorly suited Slope Rock fragments	0.50 0.50	Unsuited Rock fragments Slope	1.00 0.50
200: Cinder land-----	100	Not rated		Not rated	
201: Lava flows-----	100	Not rated		Not rated	
202: Typic Xerorthents, tephra-----	85	Well suited		Well suited	
Typic Xerorthents, welded-----	10	Unsuited Restrictive layer Slope	1.00 0.50	Poorly suited Slope Restrictive layer Rock fragments	0.50 0.50 0.50
203: Typic Xerorthents, tephra-----	90	Well suited		Well suited	
205: Beaches-----	100	Not rated		Not rated	
W: Water-----	100	Not rated		Not rated	

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Table 18.—Site Restoration

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Pct. of map unit	Potential for damage to soil by fire		Potential for seedling mortality	
		Rating class and limiting features	Value	Rating class and limiting features	Value
100: Buttelake-----	85	Moderate Texture/surface depth/rock fragments	0.50	High Available water	1.00
101: Buttewash-----	85	Moderate Texture/surface depth/rock fragments	0.50	High Available water	1.00
102: Ashbutte-----	65	High Texture/slope/ surface depth	1.00	Low	
Vitrandid Xerorthents-----	25	High Texture/slope/ surface depth/ rock fragments	1.00	High Available water	1.00
103: Scoured-----	75	High Texture/surface depth/rock fragments	1.00	High Available water	1.00
104: Scoured-----	55	Moderate Texture/surface depth/rock fragments	0.50	Moderate Available water	0.50
Juniperlake-----	20	Moderate Texture/slope/ surface depth/ rock fragments	0.50	Moderate Available water	0.50
Rock outcrop-----	15	Not rated		Not rated	
105: Juniperlake-----	85	Moderate Texture/slope/ surface depth/ rock fragments	0.50	Moderate Available water	0.50
106: Cenplat-----	70	Moderate Texture/surface depth/rock fragments	0.50	High Available water	1.00

Soil Survey of Lassen Volcanic National Park, California

Table 18.—Site Restoration—Continued

Map symbol and soil name	Pct. of map unit	Potential for damage to soil by fire		Potential for seedling mortality	
		Rating class and limiting features	Value	Rating class and limiting features	Value
107: Badgerflat-----	40	Moderate Texture/surface depth/rock fragments	0.50	High Available water	1.00
Cenplat-----	35	High Texture/slope/ surface depth	1.00	High Available water	1.00
108: Typic Xerorthents---	80	Moderate Texture/surface depth/rock fragments	0.50	High Available water	1.00
109: Prospectpeak-----	85	High Texture/surface depth/rock fragments	1.00	High Available water	1.00
110: Bearrubble-----	50	High Texture/surface depth/rock fragments	1.00	High Available water	1.00
Rubble land-----	35	Not rated		Not rated	
111: Vitrandic Xerorthents, debris fan-----	95	High Texture/surface depth/rock fragments	1.00	High Available water	1.00
112: Cascadesprings-----	85	Low Texture/surface depth/rock fragments	0.10	High Available water	1.00
113: Terracelake-----	35	Moderate Texture/slope/ surface depth/ rock fragments	0.50	High Available water	1.00
Emeraldlake-----	25	High Texture/slope/ surface depth/ rock fragments	1.00	High Available water	1.00
Readingpeak-----	20	High Texture/slope/ surface depth/ rock fragments	1.00	High Available water	1.00
Rock outcrop-----	10	Not rated		Not rated	

Soil Survey of Lassen Volcanic National Park, California

Table 18.—Site Restoration—Continued

Map symbol and soil name	Pct. of map unit	Potential for damage to soil by fire		Potential for seedling mortality	
		Rating class and limiting features	Value	Rating class and limiting features	Value
114: Emeraldlake-----	25	Moderate Texture/slope/ surface depth/ rock fragments	0.50	Moderate Available water	0.50
Terracelake-----	23	Moderate Texture/slope/ surface depth/ rock fragments	0.50	Low	
Readingpeak-----	20	Moderate Texture/slope/ surface depth/ rock fragments	0.50	Moderate Available water	0.50
Rock outcrop-----	15	Not rated		Not rated	
Rubble land-----	12	Not rated		Not rated	
115: Shadowlake-----	85	Low Texture/surface depth/rock fragments	0.10	High Available water	1.00
116: Xeric Vitricryands, tephra over till---	30	Moderate Texture/surface depth/rock fragments	0.50	High Available water Soil reaction	1.00 0.50
Terracelake-----	25	Moderate Texture/slope/ surface depth/ rock fragments	0.50	High Available water	1.00
Rock outcrop-----	15	Not rated		Not rated	
Xeric Vitricryands, cirque floor-----	15	High Texture/surface depth/rock fragments	1.00	High Available water	1.00
117: Humic Haploxerands, moist lake terrace-	90	Moderate Texture/surface depth/rock fragments	0.50	High Available water	1.00
118: Typic Dystroxerepts, landslides-----	90	Moderate Texture/surface depth/rock fragments	0.50	Moderate Available water Soil reaction	0.50 0.50

Soil Survey of Lassen Volcanic National Park, California

Table 18.—Site Restoration—Continued

Map symbol and soil name	Pct. of map unit	Potential for damage to soil by fire		Potential for seedling mortality	
		Rating class and limiting features	Value	Rating class and limiting features	Value
119: Diamondpeak-----	30	Moderate Texture/slope/ surface depth/ rock fragments	0.50	High Available water	1.00
Brokeoff-----	25	Low		High Available water	1.00
Endoaquepts-----	14	Moderate Texture/slope/ surface depth/ rock fragments	0.50	High Wetness	1.00
Aquic Dystroxerepts, debris flows-----	11	Moderate Texture/surface depth/rock fragments	0.50	High Wetness Soil reaction	1.00 0.50
Typic Dystroxerepts-	10	Moderate Texture/slope/ surface depth/ rock fragments	0.50	High Available water Soil reaction	1.00 0.50
120: Buttelake-----	65	High Texture/slope/ surface depth	1.00	High Available water	1.00
Sunhoff-----	15	High Texture/slope/ rock fragments	1.00	High Available water	1.00
Talved-----	10	High Texture/slope/ surface depth	1.00	High Available water	1.00
122: Xeric Vitricryands, colluvium-----	35	High Texture/slope/ surface depth/ rock fragments	1.00	High Available water	1.00
Xeric Vitricryands, ash over cinders---	30	Moderate Texture/surface depth/rock fragments	0.50	High Available water	1.00
Xeric Vitricryands, bedrock-----	20	High Texture/surface depth/rock fragments	1.00	High Available water	1.00

Soil Survey of Lassen Volcanic National Park, California

Table 18.—Site Restoration—Continued

Map symbol and soil name	Pct. of map unit	Potential for damage to soil by fire		Potential for seedling mortality	
		Rating class and limiting features	Value	Rating class and limiting features	Value
125: Humic Haploxerands, stream terrace-----	55	Moderate Texture/surface depth/rock fragments	0.50	High Available water	1.00
Aquandic Humaquepts, flood plains-----	40	Moderate Texture/surface depth/rock fragments	0.50	High Wetness	1.00
126: Kingsiron-----	45	High Texture/slope/ surface depth/ rock fragments	1.00	High Available water	1.00
Dittmar-----	20	Moderate Texture/surface depth/rock fragments	0.50	High Available water	1.00
Rock outcrop-----	15	Not rated		Not rated	
127: Humic Haploxerands, strath terrace-----	65	High Texture/surface depth/rock fragments	1.00	High Available water	1.00
Aquepts-----	15	Moderate Texture/surface depth/rock fragments	0.50	High Wetness	1.00
129: Humic Haploxerands, colluvium-----	80	Moderate Texture/surface depth/rock fragments	0.50	High Available water	1.00
130: Histic Humaquepts, lake sediments-----	55	Moderate Texture/surface depth/rock fragments	0.50	High Wetness	1.00
Histic Humaquepts, frequently flooded-	30	High Texture/rock fragments	1.00	High Wetness Available water	1.00 0.50
Typic Endoaquands---	15	Low Texture/rock fragments	0.10	High Wetness	1.00

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Table 18.—Site Restoration—Continued

Map symbol and soil name	Pct. of map unit	Potential for damage to soil by fire		Potential for seedling mortality	
		Rating class and limiting features	Value	Rating class and limiting features	Value
132: Vitrandic Cryorthents, debris flows-----	90	High Texture/surface depth/rock fragments	1.00	High Available water	1.00
133: Vitrandic Xerofluvents-----	55	High Texture/surface depth/rock fragments	1.00	Low	
Typic Endoaquents---	30	High Texture/rock fragments	1.00	High Wetness	1.00
134: Chaos-----	85	High Texture/surface depth/rock fragments	1.00	High Available water	1.00
136: Terracelake-----	45	Low Texture/surface depth/rock fragments	0.10	Low	
Rock outcrop-----	20	Not rated		Not rated	
Xeric Vitricryands, cirque floor-----	15	Moderate Texture/surface depth/rock fragments	0.50	High Available water	1.00
137: Xeric Vitricryands--	75	High Texture/surface depth/rock fragments	1.00	High Available water	1.00
Rock outcrop, rhyodacite-----	20	Not rated		Not rated	
138: Vitrandic Xerofluvents, debris flows-----	80	Moderate Texture/surface depth/rock fragments	0.50	High Available water Wetness	1.00 0.50
Typic Endoaquents---	10	High Texture/rock fragments	1.00	High Wetness	1.00

Soil Survey of Lassen Volcanic National Park, California

Table 18.—Site Restoration—Continued

Map symbol and soil name	Pct. of map unit	Potential for damage to soil by fire		Potential for seedling mortality	
		Rating class and limiting features	Value	Rating class and limiting features	Value
139: Duric Vitraquands---	60	Moderate Texture/surface depth/rock fragments	0.50	High Wetness Available water	1.00 1.00
Typic Endoaquands---	20	Low Texture/rock fragments	0.10	High Wetness	1.00
Aquandic Cryaquents-	15	Low Texture/rock fragments	0.10	High Wetness	1.00
140: Vitrixerands-----	90	Low Texture/surface depth/rock fragments	0.10	High Available water	1.00
141: Humic Haploxerands--	40	Low Texture/surface depth/rock fragments	0.10	Moderate Available water	0.50
Typic Haploxerands--	35	Moderate Texture/slope/ surface depth/ rock fragments	0.50	Moderate Available water	0.50
Bearrubble-----	15	Moderate Texture/surface depth/rock fragments	0.50	High Available water	1.00
Rubble land-----	10	Not rated		Not rated	
142: Cragwash-----	85	Moderate Texture/surface depth/rock fragments	0.50	High Available water	1.00
143: Andic Durixerepts---	95	Moderate Texture/surface depth/rock fragments	0.50	High Available water	1.00
144: Xeric Vitricryands, cirque floor-----	55	High Texture/surface depth/rock fragments	1.00	High Available water	1.00

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Table 18.—Site Restoration—Continued

Map symbol and soil name	Pct. of map unit	Potential for damage to soil by fire		Potential for seedling mortality	
		Rating class and limiting features	Value	Rating class and limiting features	Value
144: Humic Xeric Vitricryands-----	30	Moderate Texture/slope/ surface depth/ rock fragments	0.50	High Available water	1.00
145: Sueredo-----	85	Moderate Texture/surface depth/rock fragments	0.50	High Available water	1.00
146: Sueredo-----	90	High Texture/slope/ surface depth	1.00	Moderate Available water	0.50
147: Summertown-----	85	High Texture/surface depth/rock fragments	1.00	High Available water	1.00
148: Humic Haploxerands, lake terrace-----	70	Low Texture/surface depth/rock fragments	0.10	High Available water	1.00
Typic Endoaquands---	15	Low Texture/rock fragments	0.10	High Wetness	1.00
149: Rubble land-----	45	Not rated		Not rated	
Rock outcrop, cliffs	30	Not rated		Not rated	
Emeraldlake-----	15	High Texture/slope/ surface depth/ rock fragments	1.00	High Available water	1.00
150: Shadowlake-----	40	Moderate Texture/slope/ surface depth/ rock fragments	0.50	High Available water	1.00
Terracelake-----	30	Moderate Texture/slope/ surface depth/ rock fragments	0.50	High Available water	1.00
Acroph-----	15	High Texture/slope/ surface depth	1.00	High Available water	1.00
Rock outcrop-----	10	Not rated		Not rated	

Soil Survey of Lassen Volcanic National Park, California

Table 18.—Site Restoration—Continued

Map symbol and soil name	Pct. of map unit	Potential for damage to soil by fire		Potential for seedling mortality	
		Rating class and limiting features	Value	Rating class and limiting features	Value
151: Terracelake-----	40	Moderate Texture/slope/ surface depth/ rock fragments	0.50	Low	
Acroph-----	20	High Texture/slope/ surface depth	1.00	Moderate Available water	0.50
Rock outcrop-----	15	Not rated		Not rated	
Shadowlake-----	15	Low Texture/surface depth/rock fragments	0.10	Moderate Available water	0.50
152: Terracelake-----	35	Low Texture/surface depth/rock fragments	0.10	Moderate Available water	0.50
Shadowlake-----	30	Low Texture/surface depth/rock fragments	0.10	High Available water	1.00
Acroph-----	15	Moderate Texture/surface depth/rock fragments	0.50	High Available water	1.00
Rock outcrop-----	10	Not rated		Not rated	
153: Typic Vitriixerands--	50	High Texture/surface depth/rock fragments	1.00	High Available water	1.00
Vitrandic Xerorthents, moraine-----	45	Moderate Texture/surface depth/rock fragments	0.50	Moderate Available water	0.50
154: Typic Vitriixerands--	45	High Texture/slope/ surface depth	1.00	Moderate Available water	0.50
Vitrandic Xerorthents, moraine-----	35	High Texture/slope/ surface depth/ rock fragments	1.00	Moderate Available water	0.50

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Table 18.—Site Restoration—Continued

Map symbol and soil name	Pct. of map unit	Potential for damage to soil by fire		Potential for seedling mortality	
		Rating class and limiting features	Value	Rating class and limiting features	Value
155: Xeric Vitricryands, pyroclastic surge--	90	High Texture/surface depth/rock fragments	1.00	Moderate Available water	0.50
156: Xeric Vitricryands, pyroclastic surge--	90	High Texture/slope/ surface depth	1.00	Moderate Available water	0.50
157: Typic Vitriixerands, very deep-----	90	Moderate Texture/surface depth/rock fragments	0.50	High Available water	1.00
158: Typic Vitriixerands, unglaciaded-----	75	Moderate Texture/surface depth/rock fragments	0.50	High Available water	1.00
Rock outcrop, rhyodacite-----	20	Not rated		Not rated	
159: Typic Vitriixerands, bouldery-----	40	High Texture/slope/ surface depth	1.00	Moderate Available water	0.50
Typic Vitriixerands, tephra over colluvium-----	35	Moderate Texture/slope/ surface depth/ rock fragments	0.50	Moderate Available water	0.50
Rubble land-----	15	Not rated		Not rated	
160: Aeric Endoaquents---	45	Moderate Texture/surface depth/rock fragments	0.50	High Available water Wetness	1.00 1.00
Humic Haploxerands, stream terrace-----	35	Low Texture/surface depth/rock fragments	0.10	High Available water	1.00
Riverwash-----	15	Not rated		Not rated	

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Table 18.—Site Restoration—Continued

Map symbol and soil name	Pct. of map unit	Potential for damage to soil by fire		Potential for seedling mortality	
		Rating class and limiting features	Value	Rating class and limiting features	Value
161: Typic Psammaquents--	95	High Texture/surface depth/rock fragments	1.00	High Wetness	1.00
162: Humic Haploxerands, outwash-----	95	Low Texture/rock fragments	0.10	High Available water	1.00
163: Vitrandic Cryofluvents-----	65	Moderate Texture/rock fragments	0.50	High Wetness	1.00
Aquandic Cryaquepts-	30	Low Texture/rock fragments	0.10	High Wetness	1.00
164: Aquepts-----	35	Moderate Texture/surface depth/rock fragments	0.50	High Wetness	1.00
Typic Petraquepts, bedrock-----	25	Moderate Texture/rock fragments	0.50	High Wetness	1.00
Aquic Haploxerands--	20	Low Texture/surface depth/rock fragments	0.10	Moderate Wetness Available water	0.50 0.50
Typic Petraquepts---	10	Low Texture/surface depth/rock fragments	0.10	High Wetness	1.00
165: Aquandic Humaquepts-	35	Low Texture/rock fragments	0.10	High Wetness	1.00
Histic Humaquepts---	25	Moderate Texture/surface depth/rock fragments	0.50	High Wetness	1.00
Aquandic Endoaquepts	20	Moderate Texture/surface depth/rock fragments	0.50	Moderate Wetness Available water	0.50 0.50
Terric Haplohemists-	15	Low		High Wetness	1.00

Soil Survey of Lassen Volcanic National Park, California

Table 18.—Site Restoration—Continued

Map symbol and soil name	Pct. of map unit	Potential for damage to soil by fire		Potential for seedling mortality	
		Rating class and limiting features	Value	Rating class and limiting features	Value
166: Aquic Haploxerands--	50	Low Texture/surface depth/rock fragments	0.10	Moderate Wetness Available water	0.50 0.50
Humic Haploxerands, outwash terrace----	40	Low Texture/surface depth/rock fragments	0.10	High Available water	1.00
167: Emeraldlake-----	35	High Texture/slope/ surface depth/ rock fragments	1.00	High Available water	1.00
Readingpeak-----	20	High Texture/slope/ surface depth/ rock fragments	1.00	High Available water	1.00
Terracelake-----	15	Moderate Texture/slope/ surface depth/ rock fragments	0.50	High Available water	1.00
Rock outcrop, dacite	15	Not rated		Not rated	
168: Vitrixerands, low elevation-----	90	Moderate Texture/surface depth/rock fragments	0.50	High Available water	1.00
169: Sueredo-----	55	High Texture/slope/ surface depth	1.00	High Available water	1.00
Rock outcrop, cliffs	20	Not rated		Not rated	
Scoured-----	15	High Texture/slope/ surface depth	1.00	High Available water	1.00
170: Rock outcrop, rhyodacite-----	35	Not rated		Not rated	
Emeraldlake-----	20	High Texture/slope/ surface depth/ rock fragments	1.00	High Available water	1.00
Rubble land-----	18	Not rated		Not rated	

Soil Survey of Lassen Volcanic National Park, California

Table 18.—Site Restoration—Continued

Map symbol and soil name	Pct. of map unit	Potential for damage to soil by fire		Potential for seedling mortality	
		Rating class and limiting features	Value	Rating class and limiting features	Value
170: Readingpeak-----	15	High Texture/slope/ surface depth/ rock fragments	1.00	High Available water	1.00
171: Aquepts-----	50	Moderate Texture/slope/ surface depth/ rock fragments	0.50	High Wetness	1.00
Typic Petraquepts, bedrock-----	35	Moderate Texture/slope/ rock fragments	0.50	High Wetness	1.00
172: Badgerflat-----	90	Moderate Texture/surface depth/rock fragments	0.50	High Available water	1.00
173: Badgerwash-----	90	Moderate Texture/surface depth/rock fragments	0.50	High Available water	1.00
174: Vitrandic Cryorthents-----	60	High Texture/surface depth/rock fragments	1.00	High Available water	1.00
Readingpeak-----	20	Moderate Texture/slope/ surface depth/ rock fragments	0.50	Moderate Available water	0.50
Rock outcrop-----	10	Not rated		Not rated	
175: Shadowlake-----	75	Moderate Texture/surface depth/rock fragments	0.50	High Available water	1.00
Vitrandic Cryofluvents-----	15	Moderate Texture/rock fragments	0.50	High Wetness	1.00
176: Juniperlake, bouldery-----	85	Low Texture/surface depth/rock fragments	0.10	Moderate Available water	0.50

Soil Survey of Lassen Volcanic National Park, California

Table 18.—Site Restoration—Continued

Map symbol and soil name	Pct. of map unit	Potential for damage to soil by fire		Potential for seedling mortality	
		Rating class and limiting features	Value	Rating class and limiting features	Value
177: Vitrandic Cryorthents, debris flows, high elevation-----	85	High Texture/surface depth/rock fragments	1.00	Moderate Available water	0.50
200: Cinder land-----	100	Not rated		Not rated	
201: Lava flows-----	100	Not rated		Not rated	
202: Typic Xerorthents, tephra-----	85	High Texture/rock fragments	1.00	High Available water	1.00
Typic Xerorthents, welded-----	10	High Texture/surface depth/rock fragments	1.00	High Available water	1.00
203: Typic Xerorthents, tephra-----	90	High Texture/rock fragments	1.00	High Available water	1.00
205: Beaches-----	100	Not rated		Not rated	
W: Water-----	100	Not rated		Not rated	

Soil Survey of Lassen Volcanic National Park, California

Table 19.--Recreational Development, Part I

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. The rating is based on the limitation with the highest value. Only three highest value limitations are listed. There may be more limitations. Fine-earth fractions and coarse fragments are reported on a weight basis. A brief summary of rating criteria and abbreviations are listed on the last page of this report)

Map symbol and soil name	Pct. of map unit	Picnic areas		Camp areas	
		Limitation	Value	Limitation	Value
100: Buttelake-----	85	Limitations Very dusty Slopes 8 to 15%	1.00 0.16	Limitations Very dusty Slopes 8 to 15%	1.00 0.16
101: Buttewash-----	85	Limitations Very dusty	1.00	Limitations Very dusty	1.00
102: Ashbutte-----	65	Limitations Slopes > 15% Very dusty Fragments >10" .1 to 3%	1.00 1.00 0.76	Limitations Slopes > 15% Very dusty Fragments >10" .1 to 3%	1.00 1.00 0.76
Vitrantic Xerorthents---	25	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00
103: Scoured-----	75	Limitations Very dusty Fragments >10" >3%	1.00 1.00	Limitations Very dusty Fragments >10" >3%	1.00 1.00
104: Scoured-----	55	Limitations Very dusty Fragments >10" >3% Slopes > 15%	1.00 1.00 1.00	Limitations Very dusty Fragments >10" >3% Slopes > 15%	1.00 1.00 1.00
Juniperlake-----	20	Limitations Very dusty Fragments >10" >3% Slopes > 15%	1.00 1.00 1.00	Limitations Very dusty Fragments >10" >3% Slopes > 15%	1.00 1.00 1.00
Rock outcrop-----	15	Not rated		Not rated	
105: Juniperlake-----	85	Limitations Very dusty Fragments >10" >3% Slopes > 15%	1.00 1.00 1.00	Limitations Very dusty Fragments >10" >3% Slopes > 15%	1.00 1.00 1.00
106: Cenplat-----	70	Limitations Very dusty Fragments >10" >3% Slopes > 15%	1.00 1.00 1.00	Limitations Very dusty Fragments >10" >3% Slopes > 15%	1.00 1.00 1.00

Soil Survey of Lassen Volcanic National Park, California

Table 19.--Recreational Development, Part I--Continued

Map symbol and soil name	Pct. of map unit	Picnic areas		Camp areas	
		Limitation	Value	Limitation	Value
107: Badgerflat-----	40	Limitations Very dusty Fragments >10" >3% Slopes > 15%	1.00 1.00 1.00	Limitations Very dusty Fragments >10" >3% Slopes > 15%	1.00 1.00 1.00
Cenplat-----	35	Limitations Very dusty Fragments >10" >3% Slopes > 15%	1.00 1.00 1.00	Limitations Very dusty Fragments >10" >3% Slopes > 15%	1.00 1.00 1.00
108: Typic Xerorthents-----	80	Limitations Very dusty	1.00	Limitations Very dusty	1.00
109: Prospectpeak-----	85	Limitations Very dusty Fragments >10" >3% Slopes 8 to 15%	1.00 1.00 0.16	Limitations Very dusty Fragments >10" >3% Slopes 8 to 15%	1.00 1.00 0.16
110: Bearrubble-----	50	Limitations Very dusty Fragments >10" >3% Slopes 8 to 15%	1.00 1.00 0.04	Limitations Very dusty Fragments >10" >3% Slopes 8 to 15%	1.00 1.00 0.04
Rubble land-----	35	Not rated		Not rated	
111: Vitrandic Xerorthents, debris fan-----	95	Limitations Very dusty Fragments (<3") > 50% Fragments >10" >3%	1.00 1.00 1.00	Limitations Very dusty Fragments (<3") > 50% Fragments >10" >3%	1.00 1.00 1.00
112: Cascadesprings-----	85	Limitations Very dusty Fragments >10" >3% Slopes > 15%	1.00 1.00 1.00	Limitations Very dusty Fragments >10" >3% Slopes > 15%	1.00 1.00 1.00
113: Terracelake-----	35	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00
Emeraldlake-----	25	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00
Readingpeak-----	20	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00
Rock outcrop-----	10	Not rated		Not rated	

Soil Survey of Lassen Volcanic National Park, California

Table 19.--Recreational Development, Part I--Continued

Map symbol and soil name	Pct. of map unit	Picnic areas		Camp areas	
		Limitation	Value	Limitation	Value
114: Emeraldlake-----	25	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00
Terracelake-----	23	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00
Readingpeak-----	20	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00
Rock outcrop-----	15	Not rated		Not rated	
Rubble land-----	12	Not rated		Not rated	
115: Shadowlake-----	85	Limitations Very dusty Fragments >10" .1 to 3%	1.00 0.19	Limitations Very dusty Fragments >10" .1 to 3%	1.00 0.19
116: Xeric Vitricryands, tephra over till-----	30	Limitations Very dusty Fragments >10" >3% Slopes > 15%	1.00 1.00 1.00	Limitations Very dusty Fragments >10" >3% Slopes > 15%	1.00 1.00 1.00
Terracelake-----	25	Limitations Very dusty Slopes > 15% Fragments >10" >3%	1.00 1.00 1.00	Limitations Very dusty Slopes > 15% Fragments >10" >3%	1.00 1.00 1.00
Rock outcrop-----	15	Not rated		Not rated	
Xeric Vitricryands, cirque floor-----	15	Limitations Very dusty Fragments >10" >3% Fragments (<3") > 50%	1.00 1.00 1.00	Limitations Very dusty Fragments >10" >3% Fragments (<3") > 50%	1.00 1.00 1.00
117: Humic Haploxerands, moist lake terrace-----	90	Limitations Very dusty Saturation from 12 to 30" depth Depth to pan between 20 and 40"	1.00 0.68 0.42	Limitations Very dusty Saturation from 18 to 30" depth Depth to pan between 20 and 40"	1.00 0.95 0.42
118: Typic Dystroxerepts, landslides-----	90	Limitations Fragments >10" >3% Very dusty Slopes 8 to 15%	1.00 1.00 0.16	Limitations Fragments >10" >3% Very dusty Slopes 8 to 15%	1.00 1.00 0.16

Soil Survey of Lassen Volcanic National Park, California

Table 19.--Recreational Development, Part I--Continued

Map symbol and soil name	Pct. of map unit	Picnic areas		Camp areas	
		Limitation	Value	Limitation	Value
119: Diamondpeak-----	30	Limitations Slopes > 15% Very dusty Permeability is .06-.6"/hr	1.00 1.00 0.46	Limitations Slopes > 15% Very dusty Permeability is .06-.6"/hr	1.00 1.00 0.46
Brokeoff-----	25	Limitations Fragments >10" >3% Slopes > 15% Very dusty	1.00 1.00 1.00	Limitations Fragments >10" >3% Slopes > 15% Very dusty	1.00 1.00 1.00
Endoaquepts-----	14	Limitations Saturation < 12" depth Slopes > 15% Very dusty	1.00 1.00 1.00	Limitations Saturation < 18" depth Slopes > 15% Very dusty	1.00 1.00 1.00
Aquic Dystroxepts, debris flows-----	11	Limitations Saturation < 12" depth Slopes > 15% Fragments >10" .1 to 3%	1.00 1.00 0.76	Limitations Saturation < 18" depth Slopes > 15% Fragments >10" .1 to 3%	1.00 1.00 0.76
Typic Dystroxepts-----	10	Limitations Slopes > 15% Fragments (<3") 25-50% Fragments >10" .1 to 3%	1.00 0.97 0.76	Limitations Slopes > 15% Fragments (<3") 25-50% Fragments >10" .1 to 3%	1.00 0.97 0.76
120: Buttelake-----	65	Limitations Slopes > 15% Very dusty	1.00 1.00	Limitations Slopes > 15% Very dusty	1.00 1.00
Sunhoff-----	15	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00
Talved-----	10	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00
122: Xeric Vitricryands, colluvium-----	35	Limitations Fragments (<3") > 50% Very dusty Slopes > 15%	1.00 1.00 1.00	Limitations Fragments (<3") > 50% Very dusty Slopes > 15%	1.00 1.00 1.00
Xeric Vitricryands, ash over cinders-----	30	Limitations Very dusty Fragments >10" >3% Slopes > 15%	1.00 1.00 1.00	Limitations Very dusty Fragments >10" >3% Slopes > 15%	1.00 1.00 1.00
Xeric Vitricryands, bedrock-----	20	Limitations Very dusty Fragments >10" >3% Slopes 8 to 15%	1.00 1.00 0.84	Limitations Very dusty Fragments >10" >3% Slopes 8 to 15%	1.00 1.00 0.84

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Table 19.—Recreational Development, Part I—Continued

Map symbol and soil name	Pct. of map unit	Picnic areas		Camp areas	
		Limitation	Value	Limitation	Value
125: Humic Haploxerands, stream terrace-----	55	Limitations Very dusty	1.00	Limitations Very dusty	1.00
Aquandic Humaquepts, flood plains-----	40	Limitations Saturation < 12" depth Very dusty Frequent flooding	1.00 1.00 0.50	Limitations Saturation < 18" depth Flooding > rare Very dusty	1.00 1.00 1.00
126: Kingsiron-----	45	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00
Dittmar-----	20	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00
Rock outcrop-----	15	Not rated		Not rated	
127: Humic Haploxerands, strath ferrace-----	65	Limitations Very dusty Slopes 8 to 15%	1.00 0.63	Limitations Very dusty Slopes 8 to 15%	1.00 0.63
Aquepts-----	15	Limitations Saturation < 12" depth Fragments >10" >3% Slopes > 15%	1.00 1.00 1.00	Limitations Saturation < 18" depth Fragments >10" >3% Slopes > 15%	1.00 1.00 1.00
129: Humic Haploxerands, colluvium-----	80	Limitations Very dusty Fragments >10" >3% Slopes > 15%	1.00 1.00 1.00	Limitations Very dusty Fragments >10" >3% Slopes > 15%	1.00 1.00 1.00
130: Histic Humaquepts, lake sediments-----	55	Limitations Saturation < 12" depth Ponded (any duration) Very dusty	1.00 1.00 1.00	Limitations Saturation < 18" depth Ponded (any duration) Very dusty	1.00 1.00 1.00
Histic Humaquepts, frequently flooded-----	30	Limitations Saturation < 12" depth Very dusty Frequent flooding	1.00 1.00 0.50	Limitations Saturation < 18" depth Flooding > rare Very dusty	1.00 1.00 1.00
Typic Endoaquands-----	15	Limitations Saturation < 12" depth Frequent flooding	1.00 0.50	Limitations Saturation < 18" depth Flooding > rare	1.00 1.00

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Table 19.--Recreational Development, Part I--Continued

Map symbol and soil name	Pct. of map unit	Picnic areas		Camp areas	
		Limitation	Value	Limitation	Value
132: Vitrandic Cryorthents, debris flows-----	90	Limitations Very dusty Fragments >10" >3% Fragments (<3") > 50%	1.00 1.00 1.00	Limitations Very dusty Fragments >10" >3% Fragments (<3") > 50%	1.00 1.00 1.00
133: Vitrandic Xerofluvents--	55	Limitations Very dusty Fragments >10" .1 to 3%	1.00 0.76	Limitations Very dusty Fragments >10" .1 to 3%	1.00 0.76
Typic Endoaquents-----	30	Limitations Saturation < 12" depth Surface sand fractions > 90% by wt. Fragments (<3") > 50%	1.00 1.00 1.00	Limitations Saturation < 18" depth Flooding > rare Surface sand fractions > 90% by wt.	1.00 1.00 1.00
134: Chaos-----	85	Limitations Very dusty Fragments >10" .1 to 3%	1.00 0.76	Limitations Very dusty Fragments >10" .1 to 3%	1.00 0.76
136: Terracelake-----	45	Limitations Very dusty Slopes > 15% Fragments >10" >3%	1.00 1.00 1.00	Limitations Very dusty Slopes > 15% Fragments >10" >3%	1.00 1.00 1.00
Rock outcrop-----	20	Not rated		Not rated	
Xeric Vitricryands, cirque floor-----	15	Limitations Very dusty Fragments >10" >3% Fragments (<3") > 50%	1.00 1.00 1.00	Limitations Very dusty Fragments >10" >3% Fragments (<3") > 50%	1.00 1.00 1.00
137: Xeric Vitricryands-----	75	Limitations Very dusty Fragments >10" >3% Surface sand fractions 70 - 90% by wt.	1.00 1.00 0.59	Limitations Very dusty Fragments >10" >3% Surface sand fractions 70 - 90% by wt.	1.00 1.00 0.59
Rock outcrop, rhyodacite	20	Not rated		Not rated	
138: Vitrandic Xerofluvents, debris flows-----	80	Limitations Saturation < 12" depth Very dusty	1.00 1.00	Limitations Saturation < 18" depth Very dusty	1.00 1.00
Typic Endoaquents-----	10	Limitations Saturation < 12" depth Surface sand fractions > 90% by wt. Fragments (<3") > 50%	1.00 1.00 1.00	Limitations Saturation < 18" depth Flooding > rare Surface sand fractions > 90% by wt.	1.00 1.00 1.00

Soil Survey of Lassen Volcanic National Park, California

Table 19.--Recreational Development, Part I--Continued

Map symbol and soil name	Pct. of map unit	Picnic areas		Camp areas	
		Limitation	Value	Limitation	Value
139: Duric Vitraquands-----	60	Limitations Saturation < 12" depth Very dusty	1.00 1.00	Limitations Saturation < 18" depth Very dusty	1.00 1.00
Typic Endoaquands-----	20	Limitations Saturation < 12" depth Frequent flooding	1.00 0.50	Limitations Saturation < 18" depth Flooding > rare	1.00 1.00
Aquandic Cryaquents-----	15	Limitations Saturation < 12" depth Very dusty Frequent flooding	1.00 1.00 0.50	Limitations Saturation < 18" depth Flooding > rare Very dusty	1.00 1.00 1.00
140: Vitrixerands-----	90	Limitations Very dusty Fragments >10" .1 to 3% Depth to pan between 20 and 40"	1.00 0.76 0.04	Limitations Very dusty Fragments >10" .1 to 3% Depth to pan between 20 and 40"	1.00 0.76 0.04
141: Humic Haploxerands-----	40	Limitations Very dusty Slopes > 15%	1.00 1.00	Limitations Very dusty Slopes > 15%	1.00 1.00
Typic Haploxerands-----	35	Limitations Very dusty Fragments >10" >3% Slopes > 15%	1.00 1.00 1.00	Limitations Very dusty Fragments >10" >3% Slopes > 15%	1.00 1.00 1.00
Bearrubble-----	15	Limitations Very dusty Fragments >10" >3% Slopes 8 to 15%	1.00 1.00 0.01	Limitations Very dusty Fragments >10" >3% Slopes 8 to 15%	1.00 1.00 0.01
Rubble land-----	10	Not rated		Not rated	
142: Cragwash-----	85	Limitations Very dusty Fragments >10" .1 to 3%	1.00 0.19	Limitations Very dusty Fragments >10" .1 to 3%	1.00 0.19
143: Andic Durixerpts-----	95	Limitations Very dusty Depth to pan between 20 and 40" Fragments >10" .1 to 3%	1.00 0.92 0.76	Limitations Very dusty Depth to pan between 20 and 40" Fragments >10" .1 to 3%	1.00 0.92 0.76
144: Xeric Vitricryands, cirque floor-----	55	Limitations Very dusty Fragments >10" >3% Fragments (<3") > 50%	1.00 1.00 1.00	Limitations Very dusty Fragments >10" >3% Fragments (<3") > 50%	1.00 1.00 1.00
Humic Xeric Vitricryands	30	Limitations Very dusty Fragments >10" >3% Slopes > 15%	1.00 1.00 1.00	Limitations Very dusty Fragments >10" >3% Slopes > 15%	1.00 1.00 1.00

Soil Survey of Lassen Volcanic National Park, California

Table 19.--Recreational Development, Part I--Continued

Map symbol and soil name	Pct. of map unit	Picnic areas		Camp areas	
		Limitation	Value	Limitation	Value
145: Sueredo-----	85	Limitations Very dusty Fragments >10" >3% Slopes 8 to 15%	1.00 1.00 0.01	Limitations Very dusty Fragments >10" >3% Slopes 8 to 15%	1.00 1.00 0.01
146: Sueredo-----	90	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00
147: Summertown-----	85	Limitations Very dusty Fragments >10" >3% Slopes > 15%	1.00 1.00 1.00	Limitations Very dusty Fragments >10" >3% Slopes > 15%	1.00 1.00 1.00
148: Humic Haploxerands, lake terrace-----	70	Limitations Very dusty Fragments >10" >3% Depth to pan between 20 and 40"	1.00 1.00 0.77	Limitations Very dusty Fragments >10" >3% Depth to pan between 20 and 40"	1.00 1.00 0.77
Typic Endoaquands-----	15	Limitations Saturation < 12" depth Frequent flooding	1.00 0.50	Limitations Saturation < 18" depth Flooding > rare	1.00 1.00
149: Rubble land-----	45	Not rated		Not rated	
Rock outcrop, cliffs----	30	Not rated		Not rated	
Emeraldlake-----	15	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00
150: Shadowlake-----	40	Limitations Slopes > 15% Very dusty Fragments >10" .1 to 3%	1.00 1.00 0.19	Limitations Slopes > 15% Very dusty Fragments >10" .1 to 3%	1.00 1.00 0.19
Terracelake-----	30	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00
Acroph-----	15	Limitations Slopes > 15% Fragments >10" >3% Bedrock depth < 20"	1.00 1.00 1.00	Limitations Slopes > 15% Fragments >10" >3% Bedrock depth < 20"	1.00 1.00 1.00
Rock outcrop-----	10	Not rated		Not rated	

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Table 19.--Recreational Development, Part I--Continued

Map symbol and soil name	Pct. of map unit	Picnic areas		Camp areas	
		Limitation	Value	Limitation	Value
151: Terracelake-----	40	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00
Acroph-----	20	Limitations Slopes > 15% Fragments >10" >3% Bedrock depth < 20"	1.00 1.00 1.00	Limitations Slopes > 15% Fragments >10" >3% Bedrock depth < 20"	1.00 1.00 1.00
Rock outcrop-----	15	Not rated		Not rated	
Shadowlake-----	15	Limitations Slopes > 15% Very dusty Fragments >10" .1 to 3%	1.00 1.00 0.19	Limitations Slopes > 15% Very dusty Fragments >10" .1 to 3%	1.00 1.00 0.19
152: Terracelake-----	35	Limitations Very dusty Fragments >10" >3% Slopes 8 to 15%	1.00 1.00 0.01	Limitations Very dusty Fragments >10" >3% Slopes 8 to 15%	1.00 1.00 0.01
Shadowlake-----	30	Limitations Very dusty Fragments >10" .1 to 3% Slopes 8 to 15%	1.00 0.19 0.01	Limitations Very dusty Fragments >10" .1 to 3% Slopes 8 to 15%	1.00 0.19 0.01
Acroph-----	15	Limitations Fragments >10" >3% Bedrock depth < 20" Very dusty	1.00 1.00 1.00	Limitations Fragments >10" >3% Bedrock depth < 20" Very dusty	1.00 1.00 1.00
Rock outcrop-----	10	Not rated		Not rated	
153: Typic Vitriixerands-----	50	Limitations Very dusty Fragments (<3") > 50% Fragments >10" >3%	1.00 1.00 1.00	Limitations Very dusty Fragments (<3") > 50% Fragments >10" >3%	1.00 1.00 1.00
Vitrandic Xerorthents, moraine-----	45	Limitations Very dusty Slopes > 15% Fragments (<3") 25-50%	1.00 1.00 0.97	Limitations Very dusty Slopes > 15% Fragments (<3") 25-50%	1.00 1.00 0.97
154: Typic Vitriixerands-----	45	Limitations Slopes > 15% Very dusty Fragments (<3") > 50%	1.00 1.00 1.00	Limitations Slopes > 15% Very dusty Fragments (<3") > 50%	1.00 1.00 1.00
Vitrandic Xerorthents, moraine-----	35	Limitations Slopes > 15% Very dusty Fragments (<3") 25-50%	1.00 1.00 0.97	Limitations Slopes > 15% Very dusty Fragments (<3") 25-50%	1.00 1.00 0.97

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Table 19.--Recreational Development, Part I--Continued

Map symbol and soil name	Pct. of map unit	Picnic areas		Camp areas	
		Limitation	Value	Limitation	Value
155: Xeric Vitricryands, pyroclastic surge-----	90	Limitations Very dusty Slopes > 15% Fragments >10" >3%	1.00 1.00 1.00	Limitations Very dusty Slopes > 15% Fragments >10" >3%	1.00 1.00 1.00
156: Xeric Vitricryands, pyroclastic surge-----	90	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00
157: Typic Vitriixerands, very deep-----	90	Limitations Very dusty Fragments >10" >3% Slopes 8 to 15%	1.00 1.00 0.04	Limitations Very dusty Fragments >10" >3% Slopes 8 to 15%	1.00 1.00 0.04
158: Typic Vitriixerands, unglaciaded-----	75	Limitations Very dusty Slopes 8 to 15%	1.00 0.84	Limitations Very dusty Slopes 8 to 15%	1.00 0.84
Rock outcrop, rhyodacite	20	Not rated		Not rated	
159: Typic Vitriixerands, bouldery-----	40	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00
Typic Vitriixerands, tephra over colluvium--	35	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00
Rubble land-----	15	Not rated		Not rated	
160: Aeric Endoaquents-----	45	Limitations Fragments >10" >3% Saturation < 12" depth	1.00 0.99	Limitations Saturation < 18" depth Flooding > rare Fragments >10" >3%	1.00 1.00 1.00
Humic Haploxerands, stream terrace-----	35	Limitations Very dusty	1.00	Limitations Very dusty	1.00
Riverwash-----	15	Not rated		Not rated	
161: Typic Psammaquents-----	95	Limitations Saturation < 12" depth Very dusty	1.00 1.00	Limitations Saturation < 18" depth Flooding > rare Very dusty	1.00 1.00 1.00

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Table 19.--Recreational Development, Part I--Continued

Map symbol and soil name	Pct. of map unit	Picnic areas		Camp areas	
		Limitation	Value	Limitation	Value
162: Humic Haploxerands, outwash-----	95	Limitations Very dusty Fragments >10" >3%	1.00 1.00	Limitations Very dusty Fragments >10" >3%	1.00 1.00
163: Vitrandic Cryofluvents--	65	Limitations Saturation < 12" depth Ponded (any duration) Very dusty	1.00 1.00 1.00	Limitations Saturation < 18" depth Ponded (any duration) Very dusty	1.00 1.00 1.00
Aquandic Cryaquepts-----	30	Limitations Saturation < 12" depth Very dusty Frequent flooding	1.00 1.00 0.50	Limitations Saturation < 18" depth Flooding > rare Very dusty	1.00 1.00 1.00
164: Aquepts-----	35	Limitations Saturation < 12" depth Fragments >10" >3% Very dusty	1.00 1.00 1.00	Limitations Saturation < 18" depth Fragments >10" >3% Very dusty	1.00 1.00 1.00
Typic Petraquepts, bedrock-----	25	Limitations Saturation < 12" depth Fragments >10" >3% Slopes > 15%	1.00 1.00 1.00	Limitations Saturation < 18" depth Fragments >10" >3% Slopes > 15%	1.00 1.00 1.00
Aquic Haploxerands-----	20	Limitations Very dusty Saturation from 12 to 30" depth Slopes 8 to 15%	1.00 0.88 0.63	Limitations Saturation < 18" depth Very dusty Slopes 8 to 15%	1.00 1.00 0.63
Typic Petraquepts-----	10	Limitations Saturation < 12" depth Very dusty Depth to pan between 20 and 40"	1.00 1.00 0.84	Limitations Saturation < 18" depth Very dusty Depth to pan between 20 and 40"	1.00 1.00 0.84
165: Aquandic Humaquepts-----	35	Limitations Saturation < 12" depth Ponded (any duration) Very dusty	1.00 1.00 1.00	Limitations Saturation < 18" depth Ponded (any duration) Very dusty	1.00 1.00 1.00
Histic Humaquepts-----	25	Limitations Saturation < 12" depth Very dusty	1.00 1.00	Limitations Saturation < 18" depth Flooding > rare Very dusty	1.00 1.00 1.00
Aquandic Endoaquepts----	20	Limitations Saturation < 12" depth Very dusty	1.00 1.00	Limitations Saturation < 18" depth Very dusty	1.00 1.00
Terric Haplohemists-----	15	Limitations Saturation < 12" depth Ponded (any duration) Very dusty	1.00 1.00 1.00	Limitations Saturation < 18" depth Ponded (any duration) Very dusty	1.00 1.00 1.00

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Table 19.--Recreational Development, Part I--Continued

Map symbol and soil name	Pct. of map unit	Picnic areas		Camp areas	
		Limitation	Value	Limitation	Value
166: Aquic Haploxerands-----	50	Limitations Very dusty Saturation from 12 to 30" depth Depth to pan between 20 and 40"	1.00 0.88 0.01	Limitations Saturation < 18" depth Very dusty Depth to pan between 20 and 40"	1.00 1.00 0.01
Humic Haploxerands, outwash terrace-----	40	Limitations Very dusty Fragments >10" >3% Slopes > 15%	1.00 1.00 1.00	Limitations Very dusty Fragments >10" >3% Slopes > 15%	1.00 1.00 1.00
167: Emeraldlake-----	35	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00
Readingpeak-----	20	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00
Terracelake-----	15	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00
Rock outcrop, dacite----	15	Not rated		Not rated	
168: Vitrixerands, low elevation-----	90	Limitations Very dusty Fragments >10" .1 to 3% Depth to pan between 20 and 40"	1.00 0.76 0.04	Limitations Very dusty Fragments >10" .1 to 3% Depth to pan between 20 and 40"	1.00 0.76 0.04
169: Sueredo-----	55	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00
Rock outcrop, cliffs----	20	Not rated		Not rated	
Scoured-----	15	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00
170: Rock outcrop, rhyodacite	35	Not rated		Not rated	
Emeraldlake-----	20	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00

Soil Survey of Lassen Volcanic National Park, California

Table 19.--Recreational Development, Part I--Continued

Map symbol and soil name	Pct. of map unit	Picnic areas		Camp areas	
		Limitation	Value	Limitation	Value
170: Rubble land-----	18	Not rated		Not rated	
Readingpeak-----	15	Limitations Slopes > 15% Very dusty Fragments >10" >3%		Limitations Slopes > 15% Very dusty Fragments >10" >3%	
171: Aquepts-----	50	Limitations Saturation < 12" depth Fragments >10" >3% Slopes > 15%		Limitations Saturation < 18" depth Fragments >10" >3% Slopes > 15%	
Typic Petraquepts, bedrock-----	35	Limitations Saturation < 12" depth Fragments >10" >3% Slopes > 15%		Limitations Saturation < 18" depth Fragments >10" >3% Slopes > 15%	
172: Badgerflat-----	90	Limitations Very dusty Fragments >10" >3%		Limitations Very dusty Fragments >10" >3%	
173: Badgerwash-----	90	Limitations Very dusty Fragments >10" >3% Depth to pan between 20 and 40"		Limitations Very dusty Fragments >10" >3% Depth to pan between 20 and 40"	
174: Vitrandic Cryorthents---	60	Limitations Fragments (<3") > 50% Very dusty Fragments >10" >3%		Limitations Fragments (<3") > 50% Very dusty Fragments >10" >3%	
Readingpeak-----	20	Limitations Very dusty Fragments >10" >3% Fragments (<3") > 50%		Limitations Very dusty Fragments >10" >3% Fragments (<3") > 50%	
Rock outcrop-----	10	Not rated		Not rated	
175: Shadowlake-----	75	Limitations Very dusty Fragments >10" .1 to 3%		Limitations Very dusty Fragments >10" .1 to 3%	
Vitrandic Cryofluvents--	15	Limitations Saturation < 12" depth Ponded (any duration) Very dusty		Limitations Saturation < 18" depth Ponded (any duration) Very dusty	
176: Juniperlake, bouldery---	85	Limitations Very dusty Fragments >10" >3% Slopes > 15%		Limitations Very dusty Fragments >10" >3% Slopes > 15%	

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Table 19.--Recreational Development, Part I--Continued

Map symbol and soil name	Pct. of map unit	Picnic areas		Camp areas	
		Limitation	Value	Limitation	Value
177: Vitrandic Cryorthents, debris flows, high elevation-----	85	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00	Limitations Slopes > 15% Very dusty Fragments >10" >3%	1.00 1.00 1.00
200: Cinder land-----	100	Not rated		Not rated	
201: Lava flows-----	100	Not rated		Not rated	
202: Typic Xerorthents, tephra-----	85	Limitations Very dusty Surface sand fractions 70 - 90% by wt.	1.00 0.66	Limitations Very dusty Surface sand fractions 70 - 90% by wt.	1.00 0.66
Typic Xerorthents, welded-----	10	Limitations Surface sand fractions > 90% by wt. Slopes > 15% Very dusty	1.00 1.00 1.00	Limitations Surface sand fractions > 90% by wt. Slopes > 15% Very dusty	1.00 1.00 1.00
203: Typic Xerorthents, tephra-----	90	Limitations Very dusty Surface sand fractions 70 - 90% by wt. Slopes 8 to 15%	1.00 0.66 0.37	Limitations Very dusty Surface sand fractions 70 - 90% by wt. Slopes 8 to 15%	1.00 0.66 0.37
205: Beaches-----	100	Not rated		Not rated	
W: Water-----	100	Not rated		Not rated	

The interpretation for picnic areas evaluates the following soil properties at variable depths in the soil: flooding, ponding, wetness, slope, depth to bedrock, depth to cemented pan, salinity (EC), pH, soil dustiness, fragments greater than 3 inches in size, fragments greater than 10 inches on the surface, the amount of sand or clay in the surface, Unified classes for high organic matter (PT, OL, OH) and permeability (Ksat) that is too high, allowing seepage in some climates.

The interpretation for camp areas evaluates the following soil properties at variable depths in the soil: flooding, ponding, wetness, slope, depth to bedrock, depth to cemented pans, fragments less than or equal to or greater than 3 inches in size, sodium content (SAR), salinity (EC), clayey surface textures, Unified classes for high organic matter (PT, OL, OH), soil dustiness and permeability (Ksat) that is too high, allowing seepage in some climates.

Soil Survey of Lassen Volcanic National Park, California

Table 19.—Recreational Development, Part II

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

Map symbol and soil name	Pct. of map unit	Foot traffic and equestrian trails		Mountain bike and off-road vehicle trails	
		Rating class and limiting features	Value	Rating class and limiting features	Value
100: Buttelake-----	85	Limitations Very dusty	1.00	Limitations Very dusty	1.00
101: Buttewash-----	85	Limitations Very dusty	1.00	Limitations Very dusty	1.00
102: Ashbutte-----	65	Limitations Very dusty Slopes > 25% Fragments >10" .1 to 3%	1.00 1.00 0.76	Limitations Very dusty Slopes > 40% Surface fragments (>10") .1-3% coverage	1.00 1.00 0.76
Vitrandid Xerorthents---	25	Limitations Very dusty Slopes > 25% Fragments >10" >3%	1.00 1.00 1.00	Limitations Very dusty Slopes > 40% Surface fragments (>10") >3% coverage	1.00 1.00 1.00
103: Scoured-----	75	Limitations Very dusty Fragments >10" >3%	1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage	1.00 1.00
104: Scoured-----	55	Limitations Very dusty Fragments >10" >3% Slopes > 25%	1.00 1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage	1.00 1.00
Juniperlake-----	20	Limitations Very dusty Fragments >10" >3% Slopes > 25%	1.00 1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage Slopes 25 to 40%	1.00 1.00 0.68
Rock outcrop-----	15	Not rated		Not rated	
105: Juniperlake-----	85	Limitations Very dusty Fragments >10" >3% Slopes > 25%	1.00 1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage Slopes 25 to 40%	1.00 1.00 0.68
106: Cenplat-----	70	Limitations Very dusty Fragments >10" >3%	1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage	1.00 1.00

Soil Survey of Lassen Volcanic National Park, California

Table 19.—Recreational Development, Part II—Continued

Map symbol and soil name	Pct. of map unit	Foot traffic and equestrian trails		Mountain bike and off-road vehicle trails	
		Rating class and limiting features	Value	Rating class and limiting features	Value
107: Badgerflat-----	40	Limitations Very dusty Fragments >10" >3% Slopes 15 - 25%	1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage	1.00 1.00
Cenplat-----	35	Limitations Very dusty Fragments >10" >3% Slopes > 25%	1.00 1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage Slopes 25 to 40%	1.00 1.00 0.68
108: Typic Xerorthents-----	80	Limitations Very dusty	1.00	Limitations Very dusty	1.00
109: Prospectpeak-----	85	Limitations Very dusty Fragments >10" >3%	1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage	1.00 1.00
110: Bearrubble-----	50	Limitations Very dusty Fragments >10" >3%	1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage	1.00 1.00
Rubble land-----	35	Not rated		Not rated	
111: Vitrandic Xerorthents, debris fan-----	95	Limitations Very dusty Fragments >10" >3% Surface sand fractions 70 - 90% by wt.	1.00 1.00 0.58	Limitations Very dusty Surface fragments (>10") >3% coverage Surface sand fractions 70 - 90% by wt.	1.00 1.00 0.58
112: Cascadesprings-----	85	Limitations Very dusty Fragments >10" >3%	1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage	1.00 1.00
113: Terracelake-----	35	Limitations Very dusty Slopes > 25% Fragments >10" >3%	1.00 1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage Slopes 25 to 40%	1.00 1.00 0.68
Emeraldlake-----	25	Limitations Very dusty Fragments >10" >3% Slopes > 25%	1.00 1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage Slopes > 40%	1.00 1.00 1.00

Soil Survey of Lassen Volcanic National Park, California

Table 19.—Recreational Development, Part II—Continued

Map symbol and soil name	Pct. of map unit	Foot traffic and equestrian trails		Mountain bike and off-road vehicle trails	
		Rating class and limiting features	Value	Rating class and limiting features	Value
113: Readingpeak-----	20	Limitations Very dusty Fragments >10" >3% Slopes > 25%	1.00 1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage Slopes > 40%	1.00 1.00 1.00
Rock outcrop-----	10	Not rated		Not rated	
114: Emeraldlake-----	25	Limitations Very dusty Fragments >10" >3% Slopes > 25%	1.00 1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage Slopes > 40%	1.00 1.00 1.00
Terracelake-----	23	Limitations Very dusty Slopes > 25% Fragments >10" >3%	1.00 1.00 1.00	Limitations Very dusty Slopes > 40% Surface fragments (>10") >3% coverage	1.00 1.00 1.00
Readingpeak-----	20	Limitations Very dusty Fragments >10" >3% Slopes > 25%	1.00 1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage Slopes > 40%	1.00 1.00 1.00
Rock outcrop-----	15	Not rated		Not rated	
Rubble land-----	12	Not rated		Not rated	
115: Shadowlake-----	85	Limitations Very dusty Fragments >10" .1 to 3%	1.00 0.19	Limitations Very dusty Surface fragments (>10") .1-3% coverage	1.00 0.19
116: Xeric Vitricryands, tephra over till-----	30	Limitations Very dusty Fragments >10" >3% Slopes 15 - 25%	1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage	1.00 1.00
Terracelake-----	25	Limitations Very dusty Slopes > 25% Fragments >10" >3%	1.00 1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage Slopes 25 to 40%	1.00 1.00 0.22
Rock outcrop-----	15	Not rated		Not rated	
Xeric Vitricryands, cirque floor-----	15	Limitations Very dusty Fragments >10" >3%	1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage	1.00 1.00

Soil Survey of Lassen Volcanic National Park, California

Table 19.—Recreational Development, Part II—Continued

Map symbol and soil name	Pct. of map unit	Foot traffic and equestrian trails		Mountain bike and off-road vehicle trails	
		Rating class and limiting features	Value	Rating class and limiting features	Value
117: Humic Haploxerands, moist lake terrace-----	90	Limitations Very dusty Saturation from 12 to 24" depth	1.00 0.32	Limitations Very dusty Saturation from 12 to 24" depth	1.00 0.32
118: Typic Dystroxerepts, landslides-----	90	Limitations Fragments >10" >3% Very dusty	1.00 1.00	Limitations Surface fragments (>10") >3% coverage Very dusty	1.00 1.00
119: Diamondpeak-----	30	Limitations Slopes > 25% Very dusty	1.00 1.00	Limitations Very dusty Slopes 25 to 40%	1.00 0.56
Brokeoff-----	25	Limitations Fragments >10" >3% Slopes > 25% Very dusty	1.00 1.00 1.00	Limitations Surface fragments (>10") >3% coverage Very dusty Slopes 25 to 40%	1.00 1.00 0.78
Endoaquepts-----	14	Limitations Saturation < 12" depth Slopes > 25% Very dusty	1.00 1.00 1.00	Limitations Saturation < 12" depth Slopes > 40% Very dusty	1.00 1.00 1.00
Aquic Dystroxerepts, debris flows-----	11	Limitations Saturation < 12" depth Fragments >10" .1 to 3% Slopes 15 - 25%	1.00 0.76 0.18	Limitations Saturation < 12" depth Surface fragments (>10") .1-3% coverage	1.00 0.76
Typic Dystroxerepts-----	10	Limitations Slopes > 25% Fragments >10" .1 to 3%	1.00 0.76	Limitations Slopes > 40% Surface fragments (>10") .1-3% coverage	1.00 0.76
120: Buttelake-----	65	Limitations Very dusty Slopes > 25%	1.00 1.00	Limitations Very dusty Slopes > 40%	1.00 1.00
Sunhoff-----	15	Limitations Very dusty Slopes > 25% Fragments >10" >3%	1.00 1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage Slopes 25 to 40%	1.00 1.00 0.78
Talved-----	10	Limitations Very dusty Fragments >10" >3% Slopes > 25%	1.00 1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage Slopes > 40%	1.00 1.00 1.00

Soil Survey of Lassen Volcanic National Park, California

Table 19.—Recreational Development, Part II—Continued

Map symbol and soil name	Pct. of map unit	Foot traffic and equestrian trails		Mountain bike and off-road vehicle trails	
		Rating class and limiting features	Value	Rating class and limiting features	Value
122: Xeric Vitricryands, colluvium-----	35	Limitations Very dusty Slopes > 25% Surface fragments <3" >65%	1.00 1.00 1.00	Limitations Very dusty Slopes > 40% Surface fragments <3" >65%	1.00 1.00 1.00
Xeric Vitricryands, ash over cinders-----	30	Limitations Very dusty Fragments >10" >3% Slopes 15 - 25%	1.00 1.00 0.82	Limitations Very dusty Surface fragments (>10") >3% coverage	1.00 1.00
Xeric Vitricryands, bedrock-----	20	Limitations Very dusty Fragments >10" >3%	1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage	1.00 1.00
125: Humic Haploxerands, stream terrace-----	55	Limitations Very dusty	1.00	Limitations Very dusty	1.00
Aquandic Humaquepts, flood plains-----	40	Limitations Saturation < 12" depth Very dusty Frequent flooding	1.00 1.00 0.50	Limitations Saturation < 12" depth Very dusty Frequent flooding	1.00 1.00 0.50
126: Kingsiron-----	45	Limitations Very dusty Fragments >10" >3% Slopes > 25%	1.00 1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage Slopes > 40%	1.00 1.00 1.00
Dittmar-----	20	Limitations Very dusty Fragments >10" >3% Slopes > 25%	1.00 1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage Slopes 25 to 40%	1.00 1.00 0.08
Rock outcrop-----	15	Not rated		Not rated	
127: Humic Haploxerands, strath terrace-----	65	Limitations Very dusty	1.00	Limitations Very dusty	1.00
Aquepts-----	15	Limitations Saturation < 12" depth Fragments >10" >3% Very dusty	1.00 1.00 1.00	Limitations Saturation < 12" depth Surface fragments (>10") >3% coverage Very dusty	1.00 1.00 1.00

Soil Survey of Lassen Volcanic National Park, California

Table 19.—Recreational Development, Part II—Continued

Map symbol and soil name	Pct. of map unit	Foot traffic and equestrian trails		Mountain bike and off-road vehicle trails	
		Rating class and limiting features	Value	Rating class and limiting features	Value
129: Humic Haploxerands, colluvium-----	80	Limitations Very dusty Fragments >10" >3% Slopes 15 - 25%	1.00 1.00 0.98	Limitations Very dusty Surface fragments (>10") >3% coverage	1.00 1.00
130: Histic Humaquepts, lake sediments-----	55	Limitations Saturation < 12" depth Ponded (any duration) Very dusty	1.00 1.00 1.00	Limitations Saturation < 12" depth Ponded (any duration) Very dusty	1.00 1.00 1.00
Histic Humaquepts, frequently flooded----	30	Limitations Saturation < 12" depth Very dusty Frequent flooding	1.00 1.00 0.50	Limitations Saturation < 12" depth Very dusty Frequent flooding	1.00 1.00 0.50
Typic Endoaquands-----	15	Limitations Saturation < 12" depth Frequent flooding	1.00 0.50	Limitations Saturation < 12" depth Frequent flooding	1.00 0.50
132: Vitrandic Cryorthents, debris flows-----	90	Limitations Very dusty Fragments >10" >3% Surface sand fractions 70 - 90% by wt.	1.00 1.00 0.61	Limitations Very dusty Surface fragments (>10") >3% coverage Surface sand fractions 70 - 90% by wt.	1.00 1.00 0.61
133: Vitrandic Xerofluvents--	55	Limitations Very dusty Fragments >10" .1 to 3%	1.00 0.76	Limitations Very dusty Surface fragments (>10") .1-3% coverage	1.00 0.76
Typic Endoaquents-----	30	Limitations Saturation < 12" depth Surface sand fractions > 90% by wt. Surface fragments <3" >65%	1.00 1.00 1.00	Limitations Saturation < 12" depth Surface sand fractions > 90% by wt. Surface fragments <3" >65%	1.00 1.00 1.00
134: Chaos-----	85	Limitations Very dusty Fragments >10" .1 to 3%	1.00 0.76	Limitations Very dusty Surface fragments (>10") .1-3% coverage	1.00 0.76
136: Terracelake-----	45	Limitations Very dusty Slopes > 25% Fragments >10" >3%	1.00 1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage Slopes 25 to 40%	1.00 1.00 0.01
Rock outcrop-----	20	Not rated		Not rated	

Soil Survey of Lassen Volcanic National Park, California

Table 19.—Recreational Development, Part II—Continued

Map symbol and soil name	Pct. of map unit	Foot traffic and equestrian trails		Mountain bike and off-road vehicle trails	
		Rating class and limiting features	Value	Rating class and limiting features	Value
136: Xeric Vitricryands, cirque floor-----	15	Limitations Very dusty Fragments >10" >3%	1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage	1.00 1.00
137: Xeric Vitricryands-----	75	Limitations Very dusty Fragments >10" >3% Surface sand fractions 70 - 90% by wt.	1.00 1.00 0.59	Limitations Very dusty Surface fragments (>10") >3% coverage Surface sand fractions 70 - 90% by wt.	1.00 1.00 0.59
Rock outcrop, rhyodacite	20	Not rated		Not rated	
138: Vitrandic Xerofluvents, debris flows-----	80	Limitations Saturation < 12" depth Very dusty	1.00 1.00	Limitations Saturation < 12" depth Very dusty	1.00 1.00
Typic Endoaquents-----	10	Limitations Saturation < 12" depth Surface sand fractions > 90% by wt. Surface fragments <3" >65%	1.00 1.00 1.00	Limitations Saturation < 12" depth Surface sand fractions > 90% by wt. Surface fragments <3" >65%	1.00 1.00 1.00
139: Duric Vitraquands-----	60	Limitations Saturation < 12" depth Very dusty	1.00 1.00	Limitations Saturation < 12" depth Very dusty	1.00 1.00
Typic Endoaquands-----	20	Limitations Saturation < 12" depth Frequent flooding	1.00 0.50	Limitations Saturation < 12" depth Frequent flooding	1.00 0.50
Aquandic Cryaquents-----	15	Limitations Saturation < 12" depth Very dusty Frequent flooding	1.00 1.00 0.50	Limitations Saturation < 12" depth Very dusty Frequent flooding	1.00 1.00 0.50
140: Vitrixerands-----	90	Limitations Very dusty Fragments >10" .1 to 3%	1.00 0.76	Limitations Very dusty Surface fragments (>10") .1-3% coverage	1.00 0.76
141: Humic Haploxerands-----	40	Limitations Very dusty Slopes 15 - 25%	1.00 0.82	Limitations Very dusty	1.00
Typic Haploxerands-----	35	Limitations Very dusty Fragments >10" >3% Slopes > 25%	1.00 1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage Slopes 25 to 40%	1.00 1.00 0.22

Soil Survey of Lassen Volcanic National Park, California

Table 19.—Recreational Development, Part II—Continued

Map symbol and soil name	Pct. of map unit	Foot traffic and equestrian trails		Mountain bike and off-road vehicle trails	
		Rating class and limiting features	Value	Rating class and limiting features	Value
141: Bearrubble-----	15	Limitations Very dusty Fragments >10" >3%	1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage	1.00 1.00
Rubble land-----	10	Not rated		Not rated	
142: Cragwash-----	85	Limitations Very dusty Fragments >10" .1 to 3%	1.00 0.19	Limitations Very dusty Surface fragments (>10") .1-3% coverage	1.00 0.19
143: Andic Durixerupts-----	95	Limitations Very dusty Fragments >10" .1 to 3%	1.00 0.76	Limitations Very dusty Surface fragments (>10") .1-3% coverage	1.00 0.76
144: Xeric Vitricryands, cirque floor-----	55	Limitations Very dusty Fragments >10" >3%	1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage	1.00 1.00
Humic Xeric Vitricryands	30	Limitations Very dusty Fragments >10" >3% Slopes > 25%	1.00 1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage Slopes 25 to 40%	1.00 1.00 0.56
145: Sueredo-----	85	Limitations Very dusty Fragments >10" >3%	1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage	1.00 1.00
146: Sueredo-----	90	Limitations Very dusty Slopes > 25% Fragments >10" >3%	1.00 1.00 1.00	Limitations Very dusty Slopes > 40% Surface fragments (>10") >3% coverage	1.00 1.00 1.00
147: Summertown-----	85	Limitations Very dusty Fragments >10" >3% Slopes 15 - 25%	1.00 1.00 0.50	Limitations Very dusty Surface fragments (>10") >3% coverage	1.00 1.00
148: Humic Haploxerands, lake terrace-----	70	Limitations Very dusty Fragments >10" >3%	1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage	1.00 1.00

Soil Survey of Lassen Volcanic National Park, California

Table 19.—Recreational Development, Part II—Continued

Map symbol and soil name	Pct. of map unit	Foot traffic and equestrian trails		Mountain bike and off-road vehicle trails	
		Rating class and limiting features	Value	Rating class and limiting features	Value
148: Typic Endoaquands-----	15	Limitations Saturation < 12" depth Frequent flooding	1.00 0.50	Limitations Saturation < 12" depth Frequent flooding	1.00 0.50
149: Rubble land-----	45	Not rated		Not rated	
Rock outcrop, cliffs----	30	Not rated		Not rated	
Emeraldlake-----	15	Limitations Slopes > 25% Very dusty Fragments >10" >3%	1.00 1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage Slopes > 40%	1.00 1.00 1.00
150: Shadowlake-----	40	Limitations Very dusty Slopes > 25% Fragments >10" .1 to 3%	1.00 1.00 0.19	Limitations Very dusty Slopes > 40% Surface fragments (>10") .1-3% coverage	1.00 1.00 0.19
Terracelake-----	30	Limitations Very dusty Slopes > 25% Fragments >10" >3%	1.00 1.00 1.00	Limitations Very dusty Slopes > 40% Surface fragments (>10") >3% coverage	1.00 1.00 1.00
Acroph-----	15	Limitations Fragments >10" >3% Slopes > 25% Very dusty	1.00 1.00 1.00	Limitations Surface fragments (>10") >3% coverage Slopes > 40% Very dusty	1.00 1.00 1.00
Rock outcrop-----	10	Not rated		Not rated	
151: Terracelake-----	40	Limitations Very dusty Slopes > 25% Fragments >10" >3%	1.00 1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage Slopes 25 to 40%	1.00 1.00 0.68
Acroph-----	20	Limitations Fragments >10" >3% Slopes > 25% Very dusty	1.00 1.00 1.00	Limitations Surface fragments (>10") >3% coverage Slopes > 40% Very dusty	1.00 1.00 1.00
Rock outcrop-----	15	Not rated		Not rated	
Shadowlake-----	15	Limitations Very dusty Slopes 15 - 25% Fragments >10" .1 to 3%	1.00 0.50 0.19	Limitations Very dusty Surface fragments (>10") .1-3% coverage	1.00 0.19

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Table 19.—Recreational Development, Part II—Continued

Map symbol and soil name	Pct. of map unit	Foot traffic and equestrian trails		Mountain bike and off-road vehicle trails	
		Rating class and limiting features	Value	Rating class and limiting features	Value
152: Terracelake-----	35	Limitations Very dusty Fragments >10" >3%	1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage	1.00 1.00
Shadowlake-----	30	Limitations Very dusty Fragments >10" .1 to 3%	1.00 0.19	Limitations Very dusty Surface fragments (>10") .1-3% coverage	1.00 0.19
Acroph-----	15	Limitations Fragments >10" >3% Very dusty	1.00 1.00	Limitations Surface fragments (>10") >3% coverage Very dusty	1.00 1.00
Rock outcrop-----	10	Not rated		Not rated	
153: Typic Vitrixerands-----	50	Limitations Very dusty Fragments >10" >3% Surface sand fractions 70 - 90% by wt.	1.00 1.00 0.52	Limitations Very dusty Surface fragments (>10") >3% coverage Surface sand fractions 70 - 90% by wt.	1.00 1.00 0.52
Vitrandic Xerorthents, moraine-----	45	Limitations Very dusty Fragments >10" .1 to 3% Slopes 15 - 25%	1.00 0.19 0.18	Limitations Very dusty Surface fragments (>10") .1-3% coverage	1.00 0.19
154: Typic Vitrixerands-----	45	Limitations Very dusty Slopes > 25% Fragments >10" >3%	1.00 1.00 1.00	Limitations Very dusty Slopes > 40% Surface fragments (>10") >3% coverage	1.00 1.00 1.00
Vitrandic Xerorthents, moraine-----	35	Limitations Very dusty Slopes > 25% Fragments >10" .1 to 3%	1.00 1.00 0.19	Limitations Very dusty Slopes > 40% Surface fragments (>10") .1-3% coverage	1.00 1.00 0.19
155: Xeric Vitricryands, pyroclastic surge-----	90	Limitations Very dusty Fragments >10" >3% Slopes 15 - 25%	1.00 1.00 0.02	Limitations Very dusty Surface fragments (>10") >3% coverage	1.00 1.00
156: Xeric Vitricryands, pyroclastic surge-----	90	Limitations Very dusty Slopes > 25% Fragments >10" >3%	1.00 1.00 1.00	Limitations Very dusty Slopes > 40% Surface fragments (>10") >3% coverage	1.00 1.00 1.00

Soil Survey of Lassen Volcanic National Park, California

Table 19.—Recreational Development, Part II—Continued

Map symbol and soil name	Pct. of map unit	Foot traffic and equestrian trails		Mountain bike and off-road vehicle trails	
		Rating class and limiting features	Value	Rating class and limiting features	Value
157: Typic Vitrixerands, very deep-----	90	Limitations Very dusty Fragments >10" >3%	1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage	1.00 1.00
158: Typic Vitrixerands, unglaciated-----	75	Limitations Very dusty	1.00	Limitations Very dusty	1.00
Rock outcrop, rhyodacite	20	Not rated		Not rated	
159: Typic Vitrixerands, bouldery-----	40	Limitations Very dusty Fragments >10" >3% Slopes > 25%	1.00 1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage Slopes 25 to 40%	1.00 1.00 0.78
Typic Vitrixerands, tephra over colluvium--	35	Limitations Very dusty Slopes > 25% Fragments >10" >3%	1.00 1.00 1.00	Limitations Very dusty Slopes > 40% Surface fragments (>10") >3% coverage	1.00 1.00 1.00
Rubble land-----	15	Not rated		Not rated	
160: Aeric Endoaquents-----	45	Limitations Fragments >10" >3% Saturation from 12 to 24" depth	1.00 0.98	Limitations Surface fragments (>10") >3% coverage Saturation from 12 to 24" depth	1.00 0.98
Humic Haploxerands, stream terrace-----	35	Limitations Very dusty	1.00	Limitations Very dusty	1.00
Riverwash-----	15	Not rated		Not rated	
161: Typic Psammaquents-----	95	Limitations Saturation < 12" depth Very dusty	1.00 1.00	Limitations Saturation < 12" depth Very dusty	1.00 1.00
162: Humic Haploxerands, outwash-----	95	Limitations Very dusty Fragments >10" >3%	1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage	1.00 1.00

Soil Survey of Lassen Volcanic National Park, California

Table 19.—Recreational Development, Part II—Continued

Map symbol and soil name	Pct. of map unit	Foot traffic and equestrian trails		Mountain bike and off-road vehicle trails	
		Rating class and limiting features	Value	Rating class and limiting features	Value
163: Vitrandic Cryofluvents--	65	Limitations Saturation < 12" depth Ponded (any duration) Very dusty	1.00 1.00 1.00	Limitations Saturation < 12" depth Very dusty Ponded (any duration)	1.00 1.00 1.00
Aquandic Cryaquepts-----	30	Limitations Saturation < 12" depth Very dusty Frequent flooding	1.00 1.00 0.50	Limitations Saturation < 12" depth Very dusty Frequent flooding	1.00 1.00 0.50
164: Aquepts-----	35	Limitations Saturation < 12" depth Fragments >10" >3% Very dusty	1.00 1.00 1.00	Limitations Saturation < 12" depth Surface fragments (>10") >3% coverage Very dusty	1.00 1.00 1.00
Typic Petraquepts, bedrock-----	25	Limitations Saturation < 12" depth Fragments >10" >3% Very dusty	1.00 1.00 1.00	Limitations Saturation < 12" depth Surface fragments (>10") >3% coverage Very dusty	1.00 1.00 1.00
Aquic Haploxerands-----	20	Limitations Very dusty Saturation from 12 to 24" depth	1.00 0.73	Limitations Very dusty Saturation from 12 to 24" depth	1.00 0.73
Typic Petraquepts-----	10	Limitations Saturation < 12" depth K-factor >.35 and slopes > 8% Very dusty	1.00 1.00 1.00	Limitations Saturation < 12" depth Very dusty	1.00 1.00
165: Aquandic Humaquepts-----	35	Limitations Saturation < 12" depth Ponded (any duration) Very dusty	1.00 1.00 1.00	Limitations Saturation < 12" depth Very dusty Ponded (any duration)	1.00 1.00 1.00
Histic Humaquepts-----	25	Limitations Saturation < 12" depth Very dusty	1.00 1.00	Limitations Saturation < 12" depth Very dusty	1.00 1.00
Aquandic Endoaquepts----	20	Limitations Saturation < 12" depth Very dusty	1.00 1.00	Limitations Saturation < 12" depth Very dusty	1.00 1.00
Terric Haplohemists-----	15	Limitations Saturation < 12" depth Ponded (any duration) Very dusty	1.00 1.00 1.00	Limitations Saturation < 12" depth Ponded (any duration) Very dusty	1.00 1.00 1.00
166: Aquic Haploxerands-----	50	Limitations Very dusty Saturation from 12 to 24" depth	1.00 0.73	Limitations Very dusty Saturation from 12 to 24" depth	1.00 0.73

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Table 19.—Recreational Development, Part II—Continued

Map symbol and soil name	Pct. of map unit	Foot traffic and equestrian trails		Mountain bike and off-road vehicle trails	
		Rating class and limiting features	Value	Rating class and limiting features	Value
166: Humic Haploxerands, outwash terrace-----	40	Limitations Very dusty Fragments >10" >3%	1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage	1.00 1.00
167: Emeraldlake-----	35	Limitations Slopes > 25% Very dusty Fragments >10" >3%	1.00 1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage Slopes > 40%	1.00 1.00 1.00
Readingpeak-----	20	Limitations Slopes > 25% Very dusty Fragments >10" >3%	1.00 1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage Slopes > 40%	1.00 1.00 1.00
Terracelake-----	15	Limitations Slopes > 25% Very dusty Fragments >10" >3%	1.00 1.00 1.00	Limitations Very dusty Slopes > 40% Surface fragments (>10") >3% coverage	1.00 1.00 1.00
Rock outcrop, dacite----	15	Not rated		Not rated	
168: Vitrixerands, low elevation-----	90	Limitations Very dusty Fragments >10" .1 to 3%	1.00 0.76	Limitations Very dusty Surface fragments (>10") .1-3% coverage	1.00 0.76
169: Sueredo-----	55	Limitations Very dusty Slopes > 25% Fragments >10" >3%	1.00 1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage Slopes 25 to 40%	1.00 1.00 0.78
Rock outcrop, cliffs----	20	Not rated		Not rated	
Scoured-----	15	Limitations Very dusty Fragments >10" >3% Slopes > 25%	1.00 1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage Slopes > 40%	1.00 1.00 1.00
170: Rock outcrop, rhyodacite	35	Not rated		Not rated	
Emeraldlake-----	20	Limitations Very dusty Fragments >10" >3% Slopes > 25%	1.00 1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage Slopes > 40%	1.00 1.00 1.00
Rubble land-----	18	Not rated		Not rated	

Soil Survey of Lassen Volcanic National Park, California

Table 19.—Recreational Development, Part II—Continued

Map symbol and soil name	Pct. of map unit	Foot traffic and equestrian trails		Mountain bike and off-road vehicle trails	
		Rating class and limiting features	Value	Rating class and limiting features	Value
170: Readingpeak-----	15	Limitations Very dusty Fragments >10" >3% Slopes > 25%	1.00 1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage Slopes > 40%	1.00 1.00 1.00
171: Aquepts-----	50	Limitations Saturation < 12" depth Fragments >10" >3% Slopes > 25%	1.00 1.00 1.00	Limitations Saturation < 12" depth Surface fragments (>10") >3% coverage Slopes > 40%	1.00 1.00 1.00
Typic Petraquepts, bedrock-----	35	Limitations Saturation < 12" depth Fragments >10" >3% Slopes > 25%	1.00 1.00 1.00	Limitations Saturation < 12" depth Surface fragments (>10") >3% coverage Slopes > 40%	1.00 1.00 1.00
172: Badgerflat-----	90	Limitations Very dusty Fragments >10" >3%	1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage	1.00 1.00
173: Badgerwash-----	90	Limitations Very dusty Fragments >10" >3%	1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage	1.00 1.00
174: Vitrandic Cryorthents---	60	Limitations Very dusty Fragments >10" >3% Surface sand fractions 70 - 90% by wt.	1.00 1.00 0.56	Limitations Very dusty Surface fragments (>10") >3% coverage Surface sand fractions 70 - 90% by wt.	1.00 1.00 0.56
Readingpeak-----	20	Limitations Very dusty Fragments >10" >3% Slopes > 25%	1.00 1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage Slopes > 40%	1.00 1.00 1.00
Rock outcrop-----	10	Not rated		Not rated	
175: Shadowlake-----	75	Limitations Very dusty Fragments >10" .1 to 3%	1.00 0.19	Limitations Very dusty Surface fragments (>10") .1-3% coverage	1.00 0.19
Vitrandic Cryofluvents--	15	Limitations Saturation < 12" depth Ponded (any duration) Very dusty	1.00 1.00 1.00	Limitations Saturation < 12" depth Very dusty Ponded (any duration)	1.00 1.00 1.00

Soil Survey of Lassen Volcanic National Park, California

Table 19.—Recreational Development, Part II—Continued

Map symbol and soil name	Pct. of map unit	Foot traffic and equestrian trails		Mountain bike and off-road vehicle trails	
		Rating class and limiting features	Value	Rating class and limiting features	Value
176: Juniperlake, bouldery---	85	Limitations Very dusty Fragments >10" >3% Slopes 15 - 25%	1.00 1.00 0.50	Limitations Very dusty Surface fragments (>10") >3% coverage	1.00 1.00
177: Vitrandic Cryorthents, debris flows, high elevation-----	85	Limitations Very dusty Fragments >10" >3% Slopes > 25%	1.00 1.00 1.00	Limitations Very dusty Surface fragments (>10") >3% coverage Surface sand fractions 70 - 90% by wt.	1.00 1.00 0.61
200: Cinder land-----	100	Not rated		Not rated	
201: Lava flows-----	100	Not rated		Not rated	
202: Typic Xerorthents, tephra-----	85	Limitations Very dusty Surface sand fractions 70 - 90% by wt.	1.00 0.66	Limitations Very dusty Surface sand fractions 70 - 90% by wt.	1.00 0.66
Typic Xerorthents, welded-----	10	Limitations Surface sand fractions > 90% by wt. Very dusty	1.00 1.00	Limitations Surface sand fractions > 90% by wt. Very dusty	1.00 1.00
203: Typic Xerorthents, tephra-----	90	Limitations Very dusty Surface sand fractions 70 - 90% by wt.	1.00 0.66	Limitations Very dusty Surface sand fractions 70 - 90% by wt.	1.00 0.66
205: Beaches-----	100	Not rated		Not rated	
W: Water-----	100	Not rated		Not rated	

Table 20.—Building Site Development, Part I

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. The rating is based on the limitation with the highest value. Only three highest value limitations are listed. There may be more limitations. Fine-earth fractions and coarse fragments are reported on a weight basis. A brief summary of rating criteria and abbreviations are listed on the last page of this report)

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Limitation	Value	Limitation	Value	Limitation	Value
100: Buttelake-----	85	Limitations Slopes 8 to 15%	0.16	Limitations Slopes 8 to 15%	0.16	Limitations Slopes > 8%	1.00
101: Buttewash-----	85	No limitations		No limitations		No limitations	
102: Ashbutte-----	65	Limitations Slopes > 15%	1.00	Limitations Slopes > 15%	1.00	Limitations Slopes > 8%	1.00
Vitrantic Xerorthents---	25	Limitations Slopes > 15%	1.00	Limitations Slopes > 15%	1.00	Limitations Slopes > 8%	1.00
103: Scoured-----	75	Limitations Fragments (>3") >50% Bedrock (hard) from 20 to 40"	1.00 0.46	Limitations Bedrock (hard) < 40" depth Fragments (>3") >50%	1.00 1.00	Limitations Fragments (>3") >50% Bedrock (hard) from 20 to 40" Slopes are from 4 to 8%	1.00 0.46 0.26
104: Scoured-----	55	Limitations Fragments (>3") >50% Slopes > 15% Bedrock (hard) from 20 to 40"	1.00 1.00 0.46	Limitations Bedrock (hard) < 40" depth Fragments (>3") >50% Slopes > 15%	1.00 1.00 1.00	Limitations Slopes > 8% Fragments (>3") >50% Bedrock (hard) from 20 to 40"	1.00 1.00 0.46
Juniperlake-----	20	Limitations Slopes > 15% Fragments (>3") 25 to 50%	1.00 0.01	Limitations Slopes > 15% Fragments (>3") 25 to 50%	1.00 0.01	Limitations Slopes > 8% Fragments (>3") 25 to 50%	1.00 0.01
Rock outcrop-----	15	Not rated		Not rated		Not rated	
105: Juniperlake-----	85	Limitations Slopes > 15% Fragments (>3") 25 to 50%	1.00 0.01	Limitations Slopes > 15% Fragments (>3") 25 to 50%	1.00 0.01	Limitations Slopes > 8% Fragments (>3") 25 to 50%	1.00 0.01

Table 20.—Building Site Development, Part I—Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Limitation	Value	Limitation	Value	Limitation	Value
106: Cenplat-----	70	Limitations Slopes > 15% Fragments (>3") 25 to 50% Bedrock (hard) from 20 to 40"	1.00 0.78 0.38	Limitations Bedrock (hard) < 40" depth Slopes > 15% Fragments (>3") 25 to 50%	1.00 1.00 0.78	Limitations Slopes > 8% Fragments (>3") 25 to 50% Bedrock (hard) from 20 to 40"	1.00 0.78 0.38
107: Badgerflat-----	40	Limitations Slopes > 15% Fragments (>3") 25 to 50%	1.00 0.42	Limitations Slopes > 15% Fragments (>3") 25 to 50%	1.00 0.42	Limitations Slopes > 8% Fragments (>3") 25 to 50%	1.00 0.42
Cenplat-----	35	Limitations Slopes > 15% Bedrock (hard) from 20 to 40"	1.00 0.01	Limitations Bedrock (hard) < 40" depth Slopes > 15%	1.00 1.00	Limitations Slopes > 8% Bedrock (hard) from 20 to 40"	1.00 0.01
108: Typic Xerorthents-----	80	No limitations		No limitations		No limitations	
109: Prospectpeak-----	85	Limitations Fragments (>3") >50% Slopes 8 to 15%	1.00 0.16	Limitations Fragments (>3") >50% Bedrock (hard) from 40 to 60" Slopes 8 to 15%	1.00 0.42 0.16	Limitations Slopes > 8% Fragments (>3") >50%	1.00 1.00
110: Bearrubble-----	50	Limitations Fragments (>3") 25 to 50% Slopes 8 to 15%	0.58 0.04	Limitations Fragments (>3") 25 to 50% Slopes 8 to 15%	0.58 0.04	Limitations Slopes > 8% Fragments (>3") 25 to 50%	1.00 0.58
Rubble land-----	35	Not rated		Not rated		Not rated	
111: Vitrandic Xerorthents, debris fan-----	95	Limitations Fragments (>3") 25 to 50%	0.01	Limitations Fragments (>3") 25 to 50%	0.01	Limitations Slopes are from 4 to 8% Fragments (>3") 25 to 50%	0.50 0.01
112: Cascadesprings-----	85	Limitations Slopes > 15% Fragments (>3") 25 to 50%	1.00 0.11	Limitations Slopes > 15% Fragments (>3") 25 to 50%	1.00 0.11	Limitations Slopes > 8% Fragments (>3") 25 to 50%	1.00 0.11

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Table 20.—Building Site Development, Part I—Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Limitation	Value	Limitation	Value	Limitation	Value
113: Terracelake-----	35	Limitations Slopes > 15% Fragments (>3") 25 to 50% Bedrock (hard) from 20 to 40"	1.00 0.12 0.02	Limitations Slopes > 15% Bedrock (hard) < 40" depth Fragments (>3") 25 to 50%	1.00 1.00 0.12	Limitations Slopes > 8% Fragments (>3") 25 to 50% Bedrock (hard) from 20 to 40"	1.00 0.12 0.02
Emeraldlake-----	25	Limitations Slopes > 15%	1.00	Limitations Slopes > 15%	1.00	Limitations Slopes > 8%	1.00
Readingpeak-----	20	Limitations Slopes > 15% Fragments (>3") 25 to 50%	1.00 0.26	Limitations Slopes > 15% Bedrock (hard) from 40 to 60" Fragments (>3") 25 to 50%	1.00 0.42 0.26	Limitations Slopes > 8% Fragments (>3") 25 to 50%	1.00 0.26
Rock outcrop-----	10	Not rated		Not rated		Not rated	
114: Emeraldlake-----	25	Limitations Slopes > 15%	1.00	Limitations Slopes > 15%	1.00	Limitations Slopes > 8%	1.00
Terracelake-----	23	Limitations Slopes > 15% Fragments (>3") 25 to 50% Bedrock (hard) from 20 to 40"	1.00 0.12 0.02	Limitations Slopes > 15% Bedrock (hard) < 40" depth Fragments (>3") 25 to 50%	1.00 1.00 0.12	Limitations Slopes > 8% Fragments (>3") 25 to 50% Bedrock (hard) from 20 to 40"	1.00 0.12 0.02
Readingpeak-----	20	Limitations Slopes > 15% Fragments (>3") 25 to 50%	1.00 0.26	Limitations Slopes > 15% Bedrock (hard) from 40 to 60" Fragments (>3") 25 to 50%	1.00 0.42 0.26	Limitations Slopes > 8% Fragments (>3") 25 to 50%	1.00 0.26
Rock outcrop-----	15	Not rated		Not rated		Not rated	
Rubble land-----	12	Not rated		Not rated		Not rated	
115: Shadowlake-----	85	No limitations		No limitations		No limitations	
116: Xeric Vitricryands, tephra over till-----	30	Limitations Slopes > 15%	1.00	Limitations Slopes > 15%	1.00	Limitations Slopes > 8%	1.00

Table 20.—Building Site Development, Part I—Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Limitation	Value	Limitation	Value	Limitation	Value
116: Terracelake-----	25	Limitations Slopes > 15% Fragments (>3") 25 to 50% Bedrock (hard) from 20 to 40"	1.00 0.12 0.02	Limitations Bedrock (hard) < 40" depth Slopes > 15% Fragments (>3") 25 to 50%	1.00 1.00 0.12	Limitations Slopes > 8% Fragments (>3") 25 to 50% Bedrock (hard) from 20 to 40"	1.00 0.12 0.02
Rock outcrop-----	15	Not rated		Not rated		Not rated	
Xeric Vitricryands, cirque floor-----	15	Limitations Slopes 8 to 15%	0.04	Limitations Slopes 8 to 15%	0.04	Limitations Slopes > 8%	1.00
117: Humic Haploxerands, moist lake terrace----	90	Limitations Saturation from 18 to 30" depth Fragments (>3") 25 to 50% Pan from 20 to 40"	0.95 0.45 0.42	Limitations Saturation < 2.5' depth Pan (thick) < 40" depth Fragments (>3") 25 to 50%	1.00 1.00 0.45	Limitations Saturation from 18 to 30" depth Slopes are from 4 to 8% Fragments (>3") 25 to 50%	0.95 0.74 0.45
118: Typic Dystroxerepts, landslides-----	90	Limitations Slopes 8 to 15% Shrink-swell (LEP 3-6)	0.16 0.01	Limitations Shrink-swell (LEP 3-6) Slopes 8 to 15%	0.22 0.16	Limitations Slopes > 8% Shrink-swell (LEP 3-6)	1.00 0.01
119: Diamondpeak-----	30	Limitations Slopes > 15% Shrink-swell (LEP 3-6)	1.00 0.01	Limitations Slopes > 15% Shrink-swell (LEP 3-6)	1.00 0.01	Limitations Slopes > 8% Shrink-swell (LEP 3-6)	1.00 0.01
Brokeoff-----	25	Limitations Slopes > 15% Fragments (>3") 25 to 50% Bedrock (hard) from 20 to 40"	1.00 0.75 0.03	Limitations Bedrock (hard) < 40" depth Slopes > 15% Fragments (>3") 25 to 50%	1.00 1.00 0.75	Limitations Slopes > 8% Fragments (>3") 25 to 50% Bedrock (hard) from 20 to 40"	1.00 0.75 0.03
Endoaquepts-----	14	Limitations Saturation < 18" depth Slopes > 15% Shrink-swell (LEP 3-6)	1.00 1.00 0.78	Limitations Saturation < 2.5' depth Shrink-swell (LEP >6) Slopes > 15%	1.00 1.00 1.00	Limitations Slopes > 8% Saturation < 18" depth Shrink-swell (LEP 3-6)	1.00 1.00 0.78
Aquic Dystroxerepts, debris flows-----	11	Limitations Saturation < 18" depth Slopes > 15% Shrink-swell (LEP 3-6)	1.00 1.00 0.22	Limitations Saturation < 2.5' depth Slopes > 15%	1.00 1.00	Limitations Slopes > 8% Saturation < 18" depth Shrink-swell (LEP 3-6)	1.00 1.00 0.22

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Table 20.--Building Site Development, Part I--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Limitation	Value	Limitation	Value	Limitation	Value
119: Typic Dystraxepts-----	10	Limitations Slopes > 15%	1.00	Limitations Slopes > 15% Bedrock (soft) < 20" depth	1.00 0.99	Limitations Slopes > 8%	1.00
120: Buttelake-----	65	Limitations Slopes > 15%	1.00	Limitations Slopes > 15%	1.00	Limitations Slopes > 8%	1.00
Sunhoff-----	15	Limitations Slopes > 15% Fragments (>3") 25 to 50%	1.00 0.15	Limitations Slopes > 15% Fragments (>3") 25 to 50%	1.00 0.15	Limitations Slopes > 8% Fragments (>3") 25 to 50%	1.00 0.15
Talved-----	10	Limitations Slopes > 15% Fragments (>3") >50%	1.00 1.00	Limitations Slopes > 15% Fragments (>3") >50%	1.00 1.00	Limitations Slopes > 8% Fragments (>3") >50%	1.00 1.00
122: Xeric Vitricryands, colluvium-----	35	Limitations Slopes > 15%	1.00	Limitations Slopes > 15%	1.00	Limitations Slopes > 8%	1.00
Xeric Vitricryands, ash over cinders-----	30	Limitations Slopes > 15%	1.00	Limitations Slopes > 15%	1.00	Limitations Slopes > 8%	1.00
Xeric Vitricryands, bedrock-----	20	Limitations Bedrock (hard) < 20" depth Slopes 8 to 15% Fragments (>3") 25 to 50%	0.99 0.84 0.81	Limitations Bedrock (hard) < 40" depth Slopes 8 to 15% Fragments (>3") 25 to 50%	1.00 0.84 0.81	Limitations Slopes > 8% Bedrock (hard) < 20" depth Fragments (>3") 25 to 50%	1.00 0.99 0.81
125: Humic Haploxerands, stream terrace-----	55	No limitations		Limitations Saturation from 2.5' to 6' depth	0.87	Limitations Slopes are from 4 to 8%	0.50
Aquandic Humaquepts, flood plains-----	40	Limitations Flooding > rare Saturation < 18" depth Fragments (>3") 25 to 50%	1.00 1.00 0.11	Limitations Flooding > rare Saturation < 2.5' depth Fragments (>3") 25 to 50%	1.00 1.00 0.11	Limitations Flooding > rare Saturation < 18" depth Fragments (>3") 25 to 50%	1.00 1.00 0.11
126: Kingsiron-----	45	Limitations Slopes > 15%	1.00	Limitations Slopes > 15%	1.00	Limitations Slopes > 8%	1.00

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Table 20.—Building Site Development, Part I—Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Limitation	Value	Limitation	Value	Limitation	Value
126: Dittmar-----	20	Limitations Slopes > 15% Bedrock (hard) < 20" depth Fragments (>3") 25 to 50%	1.00 1.00 0.97	Limitations Slopes > 15% Bedrock (hard) < 40" depth Fragments (>3") 25 to 50%	1.00 1.00 0.97	Limitations Slopes > 8% Bedrock (hard) < 20" depth Fragments (>3") 25 to 50%	1.00 1.00 0.97
Rock outcrop-----	15	Not rated		Not rated		Not rated	
127: Humic Haploxerands, strath terrace-----	65	Limitations Bedrock (hard) from 20 to 40" Slopes 8 to 15%	0.64 0.63	Limitations Bedrock (hard) < 40" depth Slopes 0 to 15% Slopes 8 to 15%	1.00 0.63 0.63	Limitations Slopes > 8% Bedrock (hard) from 20 to 40"	1.00 0.64
Aquepts-----	15	Limitations Saturation < 18" depth Slopes > 15% Fragments (>3") 25 to 50%	1.00 1.00 0.36	Limitations Saturation < 2.5' depth Slopes > 15% Fragments (>3") 25 to 50%	1.00 1.00 0.36	Limitations Slopes > 8% Saturation < 18" depth Fragments (>3") 25 to 50%	1.00 1.00 0.36
129: Humic Haploxerands, colluvium-----	80	Limitations Slopes > 15%	1.00	Limitations Slopes > 15%	1.00	Limitations Slopes > 8%	1.00
130: Histic Humaquepts, lake sediments-----	55	Limitations Ponded (any duration) Saturation < 18" depth Shrink-swell (LEP 3-6)	1.00 1.00 0.01	Limitations Ponded (any duration) Saturation < 2.5' depth	1.00 1.00	Limitations Ponded (any duration) Saturation < 18" depth Shrink-swell (LEP 3-6)	1.00 1.00 0.01
Histic Humaquepts, frequently flooded----	30	Limitations Flooding > rare Saturation < 18" depth Shrink-swell (LEP 3-6)	1.00 1.00 0.78	Limitations Flooding > rare Saturation < 2.5' depth Shrink-swell (LEP 3-6)	1.00 1.00 0.78	Limitations Flooding > rare Saturation < 18" depth Shrink-swell (LEP 3-6)	1.00 1.00 0.78
Typic Endoaquands-----	15	Limitations Flooding > rare Saturation < 18" depth	1.00 1.00	Limitations Flooding > rare Saturation < 2.5' depth	1.00 1.00	Limitations Flooding > rare Saturation < 18" depth	1.00 1.00
132: Vitrandic Cryorthents, debris flows-----	90	Limitations Slopes 8 to 15% Fragments (>3") 25 to 50%	0.37 0.01	Limitations Slopes 8 to 15% Fragments (>3") 25 to 50%	0.37 0.01	Limitations Slopes > 8% Fragments (>3") 25 to 50%	1.00 0.01

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Table 20.--Building Site Development, Part I--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Limitation	Value	Limitation	Value	Limitation	Value
133: Vitrandic Xerofluvents--	55	No limitations		No limitations		No limitations	
Typic Endoaquents-----	30	Limitations Flooding > rare Saturation < 18" depth	1.00 1.00	Limitations Flooding > rare Saturation < 2.5' depth	1.00 1.00	Limitations Flooding > rare Saturation < 18" depth	1.00 1.00
134: Chaos-----	85	No limitations		No limitations		Limitations Slopes are from 4 to 8%	0.50
136: Terracelake-----	45	Limitations Slopes > 15% Fragments (>3") 25 to 50% Bedrock (hard) from 20 to 40"	1.00 0.12 0.02	Limitations Bedrock (hard) < 40" depth Slopes > 15% Fragments (>3") 25 to 50%	1.00 1.00 0.12	Limitations Slopes > 8% Fragments (>3") 25 to 50% Bedrock (hard) from 20 to 40"	1.00 0.12 0.02
Rock outcrop-----	20	Not rated		Not rated		Not rated	
Xeric Vitricryands, cirque floor-----	15	Limitations Slopes > 15%	1.00	Limitations Slopes > 15%	1.00	Limitations Slopes > 8%	1.00
137: Xeric Vitricryands-----	75	Limitations Slopes 8 to 15%	0.16	Limitations Slopes 8 to 15%	0.16	Limitations Slopes > 8%	1.00
Rock outcrop, rhyodacite	20	Not rated		Not rated		Not rated	
138: Vitrandic Xerofluvents, debris flows-----	80	Limitations Saturation < 18" depth	1.00	Limitations Saturation < 2.5' depth	1.00	Limitations Saturation < 18" depth	1.00
Typic Endoaquents-----	10	Limitations Flooding > rare Saturation < 18" depth	1.00 1.00	Limitations Flooding > rare Saturation < 2.5' depth	1.00 1.00	Limitations Flooding > rare Saturation < 18" depth	1.00 1.00
139: Duric Vitraquands-----	60	Limitations Saturation < 18" depth	1.00	Limitations Saturation < 2.5' depth Pan (thick) from 40-60"	1.00 0.88	Limitations Saturation < 18" depth	1.00
Typic Endoaquands-----	20	Limitations Flooding > rare Saturation < 18" depth	1.00 1.00	Limitations Flooding > rare Saturation < 2.5' depth	1.00 1.00	Limitations Flooding > rare Saturation < 18" depth	1.00 1.00

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Table 20.—Building Site Development, Part I—Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Limitation	Value	Limitation	Value	Limitation	Value
139: Aquandic Cryaquents-----	15	Limitations Flooding > rare Saturation < 18" depth Organic matter (PT, OL, or OH)	1.00 1.00 1.00	Limitations Flooding > rare Saturation < 2.5' depth Organic matter (PT, OL, or OH)	1.00 1.00 1.00	Limitations Flooding > rare Saturation < 18" depth Organic matter (PT, OL, or OH)	1.00 1.00 1.00
140: Vitrixerands-----	90	Limitations Pan from 20 to 40"	0.04	Limitations Pan (thick) < 40" depth	1.00	Limitations Pan from 20 to 40"	0.04
141: Humic Haploxerands-----	40	Limitations Slopes > 15% Fragments (>3") 25 to 50%	1.00 0.41	Limitations Slopes > 15% Fragments (>3") 25 to 50%	1.00 0.41	Limitations Slopes > 8% Fragments (>3") 25 to 50%	1.00 0.41
Typic Haploxerands-----	35	Limitations Slopes > 15%	1.00	Limitations Slopes > 15%	1.00	Limitations Slopes > 8%	1.00
Bearrubble-----	15	Limitations Fragments (>3") 25 to 50% Slopes 8 to 15%	0.58 0.01	Limitations Fragments (>3") 25 to 50% Slopes 8 to 15%	0.58 0.01	Limitations Slopes > 8% Fragments (>3") 25 to 50%	0.98 0.58
Rubble land-----	10	Not rated		Not rated		Not rated	
142: Cragwash-----	85	No limitations		Limitations Pan (thick) from 40-60"	0.03	Limitations Slopes are from 4 to 8%	0.26
143: Andic Durixercepts-----	95	Limitations Pan from 20 to 40"	0.92	Limitations Pan (thick) < 40" depth	1.00	Limitations Pan from 20 to 40" Slopes are from 4 to 8%	0.92 0.74
144: Xeric Vitricryands, cirque floor-----	55	No limitations		No limitations		Limitations Slopes are from 4 to 8%	0.50
Humic Xeric Vitricryands	30	Limitations Slopes > 15%	1.00	Limitations Slopes > 15%	1.00	Limitations Slopes > 8%	1.00
145: Sueredo-----	85	Limitations Fragments (>3") 25 to 50% Slopes 8 to 15%	0.11 0.01	Limitations Fragments (>3") 25 to 50% Slopes 8 to 15%	0.11 0.01	Limitations Slopes > 8% Fragments (>3") 25 to 50%	0.98 0.11

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Table 20.—Building Site Development, Part I—Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Limitation	Value	Limitation	Value	Limitation	Value
146: Sueredo-----	90	Limitations Slopes > 15% Fragments (>3") 25 to 50%	1.00 0.11	Limitations Slopes > 15% Fragments (>3") 25 to 50%	1.00 0.11	Limitations Slopes > 8% Fragments (>3") 25 to 50%	1.00 0.11
147: Summertown-----	85	Limitations Slopes > 15% Fragments (>3") 25 to 50%	1.00 0.95	Limitations Slopes > 15% Fragments (>3") 25 to 50%	1.00 0.95	Limitations Slopes > 8% Fragments (>3") 25 to 50%	1.00 0.95
148: Humic Haploxerands, lake terrace-----	70	Limitations Fragments (>3") 25 to 50% Pan from 20 to 40"	0.85 0.77	Limitations Pan (thick) < 40" depth Fragments (>3") 25 to 50%	1.00 0.85	Limitations Fragments (>3") 25 to 50% Pan from 20 to 40"	0.85 0.77
Typic Endoaquands-----	15	Limitations Flooding > rare Saturation < 18" depth	1.00 1.00	Limitations Flooding > rare Saturation < 2.5' depth	1.00 1.00	Limitations Flooding > rare Saturation < 18" depth	1.00 1.00
149: Rubble land-----	45	Not rated		Not rated		Not rated	
Rock outcrop, cliffs----	30	Not rated		Not rated		Not rated	
Emeraldlake-----	15	Limitations Slopes > 15%	1.00	Limitations Slopes > 15%	1.00	Limitations Slopes > 8%	1.00
150: Shadowlake-----	40	Limitations Slopes > 15%	1.00	Limitations Slopes > 15%	1.00	Limitations Slopes > 8%	1.00
Terracelake-----	30	Limitations Slopes > 15% Fragments (>3") 25 to 50% Bedrock (hard) from 20 to 40"	1.00 0.12 0.02	Limitations Slopes > 15% Bedrock (hard) < 40" depth Fragments (>3") 25 to 50%	1.00 1.00 0.12	Limitations Slopes > 8% Fragments (>3") 25 to 50% Bedrock (hard) from 20 to 40"	1.00 0.12 0.02
Acroph-----	15	Limitations Slopes > 15% Bedrock (hard) < 20" depth	1.00 1.00	Limitations Slopes > 15% Bedrock (hard) < 40" depth	1.00 1.00	Limitations Slopes > 8% Bedrock (hard) < 20" depth	1.00 1.00
Rock outcrop-----	10	Not rated		Not rated		Not rated	

Table 20.—Building Site Development, Part I—Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Limitation	Value	Limitation	Value	Limitation	Value
151: Terracelake-----	40	Limitations Slopes > 15% Fragments (>3") 25 to 50% Bedrock (hard) from 20 to 40"	1.00 0.12 0.02	Limitations Slopes > 15% Bedrock (hard) < 40" depth Fragments (>3") 25 to 50%	1.00 1.00 0.12	Limitations Slopes > 8% Fragments (>3") 25 to 50% Bedrock (hard) from 20 to 40"	1.00 0.12 0.02
Acroph-----	20	Limitations Slopes > 15% Bedrock (hard) < 20" depth	1.00 1.00	Limitations Slopes > 15% Bedrock (hard) < 40" depth	1.00 1.00	Limitations Slopes > 8% Bedrock (hard) < 20" depth	1.00 1.00
Rock outcrop-----	15	Not rated		Not rated		Not rated	
Shadowlake-----	15	Limitations Slopes > 15%	1.00	Limitations Slopes > 15%	1.00	Limitations Slopes > 8%	1.00
152: Terracelake-----	35	Limitations Fragments (>3") 25 to 50% Bedrock (hard) from 20 to 40" Slopes 8 to 15%	0.12 0.02 0.01	Limitations Bedrock (hard) < 40" depth Fragments (>3") 25 to 50% Slopes 8 to 15%	1.00 0.12 0.01	Limitations Slopes > 8% Fragments (>3") 25 to 50% Bedrock (hard) from 20 to 40"	0.98 0.12 0.02
Shadowlake-----	30	Limitations Slopes 8 to 15%	0.01	Limitations Slopes 8 to 15%	0.01	Limitations Slopes > 8%	0.98
Acroph-----	15	Limitations Bedrock (hard) < 20" depth Slopes 8 to 15%	1.00 0.01	Limitations Bedrock (hard) < 40" depth Slopes 8 to 15%	1.00 0.01	Limitations Bedrock (hard) < 20" depth Slopes > 8%	1.00 0.98
Rock outcrop-----	10	Not rated		Not rated		Not rated	
153: Typic Vitrixerands-----	50	Limitations Slopes 8 to 15%	0.04	Limitations Slopes 8 to 15%	0.04	Limitations Slopes > 8%	1.00
Vitrantic Xerorthents, moraine-----	45	Limitations Slopes > 15%	1.00	Limitations Slopes > 15%	1.00	Limitations Slopes > 8%	1.00
154: Typic Vitrixerands-----	45	Limitations Slopes > 15%	1.00	Limitations Slopes > 15%	1.00	Limitations Slopes > 8%	1.00
Vitrantic Xerorthents, moraine-----	35	Limitations Slopes > 15%	1.00	Limitations Slopes > 15%	1.00	Limitations Slopes > 8%	1.00

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Table 20.—Building Site Development, Part I—Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Limitation	Value	Limitation	Value	Limitation	Value
155: Xeric Vitricryands, pyroclastic surge-----	90	Limitations Slopes > 15%	1.00	Limitations Slopes > 15%	1.00	Limitations Slopes > 8%	1.00
156: Xeric Vitricryands, pyroclastic surge-----	90	Limitations Slopes > 15%	1.00	Limitations Slopes > 15%	1.00	Limitations Slopes > 8%	1.00
157: Typic Vitrixerands, very deep-----	90	Limitations Slopes 8 to 15%	0.04	Limitations Slopes 8 to 15%	0.04	Limitations Slopes > 8%	1.00
158: Typic Vitrixerands, unglaciaded-----	75	Limitations Slopes 8 to 15%	0.84	Limitations Slopes 8 to 15%	0.84	Limitations Slopes > 8%	1.00
Rock outcrop, rhyodacite	20	Not rated		Not rated		Not rated	
159: Typic Vitrixerands, bouldery-----	40	Limitations Slopes > 15% Fragments (>3") >50%	1.00 1.00	Limitations Slopes > 15% Fragments (>3") >50%	1.00 1.00	Limitations Slopes > 8% Fragments (>3") >50%	1.00 1.00
Typic Vitrixerands, tephra over colluvium--	35	Limitations Slopes > 15%	1.00	Limitations Slopes > 15%	1.00	Limitations Slopes > 8%	1.00
Rubble land-----	15	Not rated		Not rated		Not rated	
160: Aeric Endoaquents-----	45	Limitations Flooding > rare Saturation < 18" depth	1.00 1.00	Limitations Flooding > rare Saturation < 2.5' depth	1.00 1.00	Limitations Flooding > rare Saturation < 18" depth Slopes are from 4 to 8%	1.00 1.00 0.02
Humic Haploxerands, stream terrace-----	35	No limitations		Limitations Saturation from 2.5' to 6' depth	0.56	Limitations Slopes are from 4 to 8%	0.02
Riverwash-----	15	Not rated		Not rated		Not rated	

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Table 20.—Building Site Development, Part I—Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Limitation	Value	Limitation	Value	Limitation	Value
161: Typic Psammaquents-----	95	Limitations Flooding > rare Saturation < 18" depth	1.00 1.00	Limitations Flooding > rare Saturation < 2.5' depth	1.00 1.00	Limitations Flooding > rare Saturation < 18" depth	1.00 1.00
162: Humic Haploxerands, outwash-----	95	Limitations Fragments (>3") 25 to 50%	0.03	Limitations Fragments (>3") 25 to 50%	0.03	Limitations Fragments (>3") 25 to 50% Slopes are from 4 to 8%	0.03 0.02
163: Vitrandic Cryofluvents--	65	Limitations Ponded (any duration) Saturation < 18" depth Organic matter (PT, OL, or OH)	1.00 1.00 1.00	Limitations Ponded (any duration) Saturation < 2.5' depth Organic matter (PT, OL, or OH)	1.00 1.00 1.00	Limitations Ponded (any duration) Saturation < 18" depth Organic matter (PT, OL, or OH)	1.00 1.00 1.00
Aquandic Cryaquents-----	30	Limitations Flooding > rare Saturation < 18" depth Organic matter (PT, OL, or OH)	1.00 1.00 1.00	Limitations Flooding > rare Saturation < 2.5' depth Organic matter (PT, OL, or OH)	1.00 1.00 1.00	Limitations Flooding > rare Saturation < 18" depth Organic matter (PT, OL, or OH)	1.00 1.00 1.00
164: Aquepts-----	35	Limitations Saturation < 18" depth Fragments (>3") 25 to 50% Slopes 8 to 15%	1.00 0.36 0.16	Limitations Saturation < 2.5' depth Fragments (>3") 25 to 50% Slopes 8 to 15%	1.00 0.36 0.16	Limitations Slopes > 8% Saturation < 18" depth Fragments (>3") 25 to 50%	1.00 1.00 0.36
Typic Petraquepts, bedrock-----	25	Limitations Saturation < 18" depth Slopes > 15% Fragments (>3") 25 to 50%	1.00 1.00 0.49	Limitations Saturation < 2.5' depth Bedrock (hard) < 40" depth Slopes > 15%	1.00 1.00 1.00	Limitations Slopes > 8% Saturation < 18" depth Fragments (>3") 25 to 50%	1.00 1.00 0.49
Aquic Haploxerands-----	20	Limitations Saturation < 18" depth Slopes 8 to 15% Pan from 20 to 40"	1.00 0.63 0.01	Limitations Saturation < 2.5' depth Pan (thick) < 40" depth Slopes 8 to 15%	1.00 1.00 0.63	Limitations Slopes > 8% Saturation < 18" depth Pan from 20 to 40"	1.00 1.00 0.01
Typic Petraquepts-----	10	Limitations Saturation < 18" depth Pan from 20 to 40" Slopes 8 to 15%	1.00 0.84 0.04	Limitations Saturation < 2.5' depth Pan (thick) < 40" depth Slopes 8 to 15%	1.00 1.00 0.04	Limitations Slopes > 8% Saturation < 18" depth Pan from 20 to 40"	1.00 1.00 0.84

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Table 20.—Building Site Development, Part I—Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Limitation	Value	Limitation	Value	Limitation	Value
165:							
Aquandic Humaquepts-----	35	Limitations Ponded (any duration) Saturation < 18" depth	1.00 1.00	Limitations Ponded (any duration) Saturation < 2.5' depth	1.00 1.00	Limitations Ponded (any duration) Saturation < 18" depth	1.00 1.00
Histic Humaquepts-----	25	Limitations Flooding > rare Saturation < 18" depth Shrink-swell (LEP 3-6)	1.00 1.00 0.01	Limitations Flooding > rare Saturation < 2.5' depth	1.00 1.00	Limitations Flooding > rare Saturation < 18" depth Shrink-swell (LEP 3-6)	1.00 1.00 0.01
Aquandic Endoaquepts----	20	Limitations Saturation < 18" depth	1.00	Limitations Saturation < 2.5' depth	1.00	Limitations Saturation < 18" depth Slopes are from 4 to 8%	1.00 0.02
Terric Haplohemists-----	15	Limitations Ponded (any duration) Saturation < 18" depth Shrink-swell (LEP 3-6)	1.00 1.00 0.01	Limitations Ponded (any duration) Saturation < 2.5' depth	1.00 1.00	Limitations Ponded (any duration) Saturation < 18" depth Shrink-swell (LEP 3-6)	1.00 1.00 0.01
166:							
Aquic Haploxerands-----	50	Limitations Saturation < 18" depth Pan from 20 to 40"	1.00 0.01	Limitations Saturation < 2.5' depth Pan (thick) < 40" depth	1.00 1.00	Limitations Saturation < 18" depth Slopes are from 4 to 8% Pan from 20 to 40"	1.00 0.02 0.01
Humic Haploxerands, outwash terrace-----	40	Limitations Slopes > 15%	1.00	Limitations Slopes > 15%	1.00	Limitations Slopes > 8%	1.00
167:							
Emeraldlake-----	35	Limitations Slopes > 15%	1.00	Limitations Slopes > 15%	1.00	Limitations Slopes > 8%	1.00
Readingpeak-----	20	Limitations Slopes > 15% Fragments (>3") 25 to 50%	1.00 0.26	Limitations Slopes > 15% Bedrock (hard) from 40 to 60" Fragments (>3") 25 to 50%	1.00 0.42 0.26	Limitations Slopes > 8% Fragments (>3") 25 to 50%	1.00 0.26
Terracelake-----	15	Limitations Slopes > 15% Fragments (>3") 25 to 50% Bedrock (hard) from 20 to 40"	1.00 0.12 0.02	Limitations Slopes > 15% Bedrock (hard) < 40" depth Fragments (>3") 25 to 50%	1.00 1.00 0.12	Limitations Slopes > 8% Fragments (>3") 25 to 50% Bedrock (hard) from 20 to 40"	1.00 0.12 0.02
Rock outcrop, dacite----	15	Not rated		Not rated		Not rated	

Table 20.—Building Site Development, Part I—Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Limitation	Value	Limitation	Value	Limitation	Value
168: Vitrixerands, low elevation-----	90	Limitations Pan from 20 to 40"	0.04	Limitations Pan (thick) < 40" depth	1.00	Limitations Pan from 20 to 40"	0.04
169: Sueredo-----	55	Limitations Slopes > 15% Fragments (>3") 25 to 50%	1.00 0.11	Limitations Slopes > 15% Fragments (>3") 25 to 50%	1.00 0.11	Limitations Slopes > 8% Fragments (>3") 25 to 50%	1.00 0.11
Rock outcrop, cliffs----	20	Not rated		Not rated		Not rated	
Scoured-----	15	Limitations Slopes > 15% Fragments (>3") >50% Bedrock (hard) from 20 to 40"	1.00 1.00 0.46	Limitations Slopes > 15% Bedrock (hard) < 40" depth Fragments (>3") >50%	1.00 1.00 1.00	Limitations Slopes > 8% Fragments (>3") >50% Bedrock (hard) from 20 to 40"	1.00 1.00 0.46
170: Rock outcrop, rhyodacite	35	Not rated		Not rated		Not rated	
Emeraldlake-----	20	Limitations Slopes > 15%	1.00	Limitations Slopes > 15%	1.00	Limitations Slopes > 8%	1.00
Rubble land-----	18	Not rated		Not rated		Not rated	
Readingpeak-----	15	Limitations Slopes > 15% Fragments (>3") 25 to 50%	1.00 0.26	Limitations Slopes > 15% Bedrock (hard) from 40 to 60" Fragments (>3") 25 to 50%	1.00 0.42 0.26	Limitations Slopes > 8% Fragments (>3") 25 to 50%	1.00 0.26
171: Aquepts-----	50	Limitations Saturation < 18" depth Slopes > 15% Fragments (>3") 25 to 50%	1.00 1.00 0.36	Limitations Saturation < 2.5' depth Slopes > 15% Fragments (>3") 25 to 50%	1.00 1.00 0.36	Limitations Slopes > 8% Saturation < 18" depth Fragments (>3") 25 to 50%	1.00 1.00 0.36
Typic Petraquepts, bedrock-----	35	Limitations Saturation < 18" depth Slopes > 15% Fragments (>3") 25 to 50%	1.00 1.00 0.49	Limitations Saturation < 2.5' depth Bedrock (hard) < 40" depth Slopes > 15%	1.00 1.00 1.00	Limitations Slopes > 8% Saturation < 18" depth Fragments (>3") 25 to 50%	1.00 1.00 0.49
172: Badgerflat-----	90	Limitations Fragments (>3") 25 to 50%	0.42	Limitations Fragments (>3") 25 to 50%	0.42	Limitations Slopes are from 4 to 8% Fragments (>3") 25 to 50%	0.50 0.42

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Table 20.—Building Site Development, Part I—Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Limitation	Value	Limitation	Value	Limitation	Value
173: Badgerwash-----	90	Limitations Fragments (>3") 25 to 50% Pan from 20 to 40"	0.86 0.10	Limitations Pan (thick) < 40" depth Fragments (>3") 25 to 50%	1.00 0.86	Limitations Fragments (>3") 25 to 50% Pan from 20 to 40"	0.86 0.10
174: Vitrandic Cryorthents---	60	No limitations		No limitations		Limitations Slopes are from 4 to 8%	0.50
Readingpeak-----	20	Limitations Slopes > 15% Fragments (>3") 25 to 50%	1.00 0.26	Limitations Slopes > 15% Bedrock (hard) from 40 to 60" Fragments (>3") 25 to 50%	1.00 0.42 0.26	Limitations Slopes > 8% Fragments (>3") 25 to 50%	1.00 0.26
Rock outcrop-----	10	Not rated		Not rated		Not rated	
175: Shadowlake-----	75	No limitations		No limitations		Limitations Slopes are from 4 to 8%	0.50
Vitrandic Cryofluvents--	15	Limitations Ponded (any duration) Saturation < 18" depth Organic matter (PT, OL, or OH)	1.00 1.00 1.00	Limitations Ponded (any duration) Saturation < 2.5' depth Organic matter (PT, OL, or OH)	1.00 1.00 1.00	Limitations Ponded (any duration) Saturation < 18" depth Organic matter (PT, OL, or OH)	1.00 1.00 1.00
176: Juniperlake, bouldery---	85	Limitations Slopes > 15% Fragments (>3") 25 to 50%	1.00 0.01	Limitations Slopes > 15% Fragments (>3") 25 to 50%	1.00 0.01	Limitations Slopes > 8% Fragments (>3") 25 to 50%	1.00 0.01
177: Vitrandic Cryorthents, debris flows, high elevation-----	85	Limitations Slopes > 15%	1.00	Limitations Slopes > 15%	1.00	Limitations Slopes > 8%	1.00
200: Cinder land-----	100	Not rated		Not rated		Not rated	
201: Lava flows-----	100	Not rated		Not rated		Not rated	
202: Typic Xerorthents, tephra-----	85	No limitations		No limitations		Limitations Slopes are from 4 to 8%	0.50

Table 20.—Building Site Development, Part I—Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Limitation	Value	Limitation	Value	Limitation	Value
202: Typic Xerorthents, welded-----	10	Limitations Slopes > 15%	1.00	Limitations Slopes > 15%	1.00	Limitations Slopes > 8%	1.00
203: Typic Xerorthents, tephra-----	90	Limitations Slopes 8 to 15%	0.37	Limitations Slopes 8 to 15%	0.37	Limitations Slopes > 8%	1.00
205: Beaches-----	100	Not rated		Not rated		Not rated	
W: Water-----	100	Not rated		Not rated		Not rated	

The interpretation for dwellings without basements evaluates the following soil properties, some at variable depths in the soil: flooding, ponding, wetness, slope, subsidence of organic soils, shrink-swell potential expressed as linear extensibility percent (LEP), organic Unified classes for low soil strength (PT, OL, or OH), depth to hard or soft bedrock, depth to thick or thin cemented pans, and fragments greater than 3 inches in size.

The interpretation for dwellings with basements evaluates the following soil properties, some at variable depths in the soil: flooding, ponding, wetness, slope, subsidence of organic soils, shrink-swell potential expressed as linear extensibility percent (LEP), organic Unified classes for low strength (PT, OL, or OH), depth to hard or soft bedrock, depth to thick or thin cemented pans, and fragments greater than 3 inches in size.

The interpretation for small commercial buildings evaluates the following soil properties, some at variable depths in the soil: flooding, ponding, wetness, slope, subsidence of organic soils, shrink-swell potential expressed as linear extensibility percent (LEP), depth to hard or soft bedrock, depth to thick or thin cemented pans, and fragments greater than 3 inches in size.

Table 20.--Building Site Development, Part II

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. The rating is based on the limitation with the highest value. Only three highest value limitations are listed. There may be more limitations. Fine-earth fractions and coarse fragments are reported on a weight basis. A brief summary of rating criteria summary and abbreviations are listed on the last page of this report)

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations	
		Limitation	Value	Limitation	Value
100: Buttelake-----	85	Limitations Slopes 8 to 15%	0.16	Limitations Unstable excavation walls Slopes 8 to 15%	1.00 0.16
101: Buttewash-----	85	No limitations		Limitations Unstable excavation walls	1.00
102: Ashbutte-----	65	Limitations Slopes > 15%	1.00	Limitations Slopes > 15% Unstable excavation walls	1.00 1.00
Vitrandic Xerorthents-----	25	Limitations Slopes > 15%	1.00	Limitations Slopes > 15% Unstable excavation walls	1.00 1.00
103: Scoured-----	75	Limitations Fragments (>3") >50% Bedrock (hard) from 20 to 40"	1.00 0.46	Limitations Bedrock (hard) < 40" depth Fragments (>3") >50% Unstable excavation walls	1.00 1.00 0.10
104: Scoured-----	55	Limitations Fragments (>3") >50% Slopes > 15% Bedrock (hard) from 20 to 40"	1.00 1.00 0.46	Limitations Bedrock (hard) < 40" depth Fragments (>3") >50% Slopes > 15%	1.00 1.00 1.00
Juniperlake-----	20	Limitations Slopes > 15% Fragments (>3") 25 to 50%	1.00 0.01	Limitations Unstable excavation walls Slopes > 15% Fragments (>3") 25 to 50%	1.00 1.00 0.01
Rock outcrop-----	15	Not rated		Not rated	
105: Juniperlake-----	85	Limitations Slopes > 15% Fragments (>3") 25 to 50%	1.00 0.01	Limitations Unstable excavation walls Slopes > 15% Fragments (>3") 25 to 50%	1.00 1.00 0.01

Table 20.--Building Site Development, Part II--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations	
		Limitation	Value	Limitation	Value
106: Cenplat-----	70	Limitations Slopes > 15% Fragments (>3") 25 to 50% Bedrock (hard) from 20 to 40"	1.00 0.78 0.38	Limitations Bedrock (hard) < 40" depth Unstable excavation walls Slopes > 15%	1.00 1.00 1.00
107: Badgerflat-----	40	Limitations Slopes > 15% Fragments (>3") 25 to 50%	1.00 0.42	Limitations Unstable excavation walls Slopes > 15% Fragments (>3") 25 to 50%	1.00 1.00 0.42
Cenplat-----	35	Limitations Slopes > 15% Bedrock (hard) from 20 to 40"	1.00 0.01	Limitations Bedrock (hard) < 40" depth Unstable excavation walls Slopes > 15%	1.00 1.00 1.00
108: Typic Xerorthents-----	80	No limitations		Limitations Unstable excavation walls	1.00
109: Prospectpeak-----	85	Limitations Fragments (>3") >50% Slopes 8 to 15%	1.00 0.16	Limitations Fragments (>3") >50% Bedrock (hard) from 40 to 60" Slopes 8 to 15%	1.00 0.42 0.16
110: Bearrubble-----	50	Limitations Fragments (>3") 25 to 50% Slopes 8 to 15%	0.58 0.04	Limitations Fragments (>3") 25 to 50% Unstable excavation walls Slopes 8 to 15%	0.58 1.10 0.04
Rubble land-----	35	Not rated		Not rated	
111: Vitrandic Xerorthents, debris fan-	95	Limitations Fragments (>3") 25 to 50%	0.01	Limitations Unstable excavation walls Fragments (>3") 25 to 50%	1.00 0.01
112: Cascadesprings-----	85	Limitations Slopes > 15% Fragments (>3") 25 to 50%	1.00 0.11	Limitations Unstable excavation walls Slopes > 15% Fragments (>3") 25 to 50%	1.00 1.00 0.11

Table 20.--Building Site Development, Part II--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations	
		Limitation	Value	Limitation	Value
113: Terracelake-----	35	Limitations Slopes > 15% Frost action possible Fragments (>3") 25 to 50%	1.00 0.50 0.12	Limitations Bedrock (hard) < 40" depth Slopes > 15% Unstable excavation walls	1.00 1.00 1.00
Emeraldlake-----	25	Limitations Slopes > 15% Frost action possible	1.00 0.50	Limitations Slopes > 15% Unstable excavation walls	1.00 1.00
Readingpeak-----	20	Limitations Slopes > 15% Frost action possible Fragments (>3") 25 to 50%	1.00 0.50 0.26	Limitations Slopes > 15% Unstable excavation walls Bedrock (hard) from 40 to 60"	1.00 1.00 0.42
Rock outcrop-----	10	Not rated		Not rated	
114: Emeraldlake-----	25	Limitations Slopes > 15% Frost action possible	1.00 0.50	Limitations Slopes > 15% Unstable excavation walls	1.00 1.00
Terracelake-----	23	Limitations Slopes > 15% Frost action possible Fragments (>3") 25 to 50%	1.00 0.50 0.12	Limitations Bedrock (hard) < 40" depth Slopes > 15% Unstable excavation walls	1.00 1.00 1.00
Readingpeak-----	20	Limitations Slopes > 15% Frost action possible Fragments (>3") 25 to 50%	1.00 0.50 0.26	Limitations Slopes > 15% Unstable excavation walls Bedrock (hard) from 40 to 60"	1.00 1.00 0.42
Rock outcrop-----	15	Not rated		Not rated	
Rubble land-----	12	Not rated		Not rated	
115: Shadowlake-----	85	Limitations Frost action possible	0.50	Limitations Unstable excavation walls	1.00
116: Xeric Vitricryands, tephra over till-----	30	Limitations Slopes > 15% Frost action possible	1.00 0.50	Limitations Unstable excavation walls Slopes > 15%	1.00 1.00
Terracelake-----	25	Limitations Slopes > 15% Frost action possible Fragments (>3") 25 to 50%	1.00 0.50 0.12	Limitations Bedrock (hard) < 40" depth Unstable excavation walls Slopes > 15%	1.00 1.00 1.00

Table 20.--Building Site Development, Part II--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations	
		Limitation	Value	Limitation	Value
116: Rock outcrop-----	15	Not rated		Not rated	
Xeric Vitricryands, cirque floor--	15	Limitations Frost action possible Slopes 8 to 15%	0.50 0.04	Limitations Unstable excavation walls Slopes 8 to 15%	1.00 0.04
117: Humic Haploxerands, moist lake terrace-----	90	Limitations Saturation from 12 to 30" depth Fragments (>3") 25 to 50% Pan from 20 to 40"	0.68 0.45 0.42	Limitations Pan (thick) < 40" depth Saturation < 2.5' depth Fragments (>3") 25 to 50%	1.00 1.00 0.45
118: Typic Dystraxepts, landslides---	90	Limitations Slopes 8 to 15% Shrink-swell (LEP 3-6)	0.16 0.01	Limitations Slopes 8 to 15% Unstable excavation walls	0.16 0.10
119: Diamondpeak-----	30	Limitations AASHTO GI >8 (low soil strength) Slopes > 15% Shrink-swell (LEP 3-6)	1.00 1.00 0.01	Limitations Slopes > 15% Unstable excavation walls	1.00 0.10
Brokeoff-----	25	Limitations Slopes > 15% Fragments (>3") 25 to 50% Bedrock (hard) from 20 to 40"	1.00 0.75 0.03	Limitations Bedrock (hard) < 40" depth Slopes > 15% Fragments (>3") 25 to 50%	1.00 1.00 0.75
Endoaquepts-----	14	Limitations Saturation < 12" depth Slopes > 15% AASHTO GI >8 (low soil strength)	1.00 1.00 1.00	Limitations Saturation < 2.5' depth Unstable excavation walls Slopes > 15%	1.00 1.00 1.00
Aquic Dystraxepts, debris flows-	11	Limitations Saturation < 12" depth Slopes > 15% Shrink-swell (LEP 3-6)	1.00 1.00 0.22	Limitations Saturation < 2.5' depth Unstable excavation walls Slopes > 15%	1.00 1.00 1.00
Typic Dystraxepts-----	10	Limitations Slopes > 15% AASHTO GI 5-8 (soil strength)	1.00 0.78	Limitations Slopes > 15% Bedrock (soft) < 20" depth Unstable excavation walls	1.00 0.99 0.10
120: Buttelake-----	65	Limitations Slopes > 15%	1.00	Limitations Slopes > 15% Unstable excavation walls	1.00 1.00

Table 20.--Building Site Development, Part II--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations	
		Limitation	Value	Limitation	Value
120: Sunhoff-----	15	Limitations Slopes > 15% Fragments (>3") 25 to 50%	1.00 0.15	Limitations Slopes > 15% Unstable excavation walls Fragments (>3") 25 to 50%	1.00 1.00 0.15
Talved-----	10	Limitations Slopes > 15% Fragments (>3") >50%	1.00 1.00	Limitations Slopes > 15% Fragments (>3") >50% Unstable excavation walls	1.00 1.00 0.10
122: Xeric Vitricryands, colluvium----	35	Limitations Slopes > 15% Frost action possible	1.00 0.50	Limitations Unstable excavation walls Slopes > 15%	1.00 1.00
Xeric Vitricryands, ash over cinders-----	30	Limitations Slopes > 15% Frost action possible	1.00 0.50	Limitations Unstable excavation walls Slopes > 15%	1.00 1.00
Xeric Vitricryands, bedrock-----	20	Limitations Bedrock (hard) < 20" depth Slopes 8 to 15% Fragments (>3") 25 to 50%	0.99 0.84 0.81	Limitations Bedrock (hard) < 40" depth Slopes 8 to 15% Fragments (>3") 25 to 50%	1.00 0.84 0.81
125: Humic Haploxerands, stream terrace	55	No limitations		Limitations Unstable excavation walls Saturation from 2.5' to 6' depth	1.00 0.87
Aquandic Humaquepts, flood plains-	40	Limitations Saturation < 12" depth Flooding > occasional Fragments (>3") 25 to 50%	1.00 1.00 0.11	Limitations Saturation < 2.5' depth Unstable excavation walls Frequent or occasional flooding	1.00 1.00 0.50
126: Kingsiron-----	45	Limitations Slopes > 15%	1.00	Limitations Slopes > 15% Unstable excavation walls	1.00 1.00
Dittmar-----	20	Limitations Bedrock (hard) < 20" depth Slopes > 15% Fragments (>3") 25 to 50%	1.00 1.00 0.97	Limitations Bedrock (hard) < 40" depth Slopes > 15% Fragments (>3") 25 to 50%	1.00 1.00 0.97
Rock outcrop-----	15	Not rated		Not rated	

Table 20.--Building Site Development, Part II--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations	
		Limitation	Value	Limitation	Value
127: Humic Haploxerands, strath terrace	65	Limitations Bedrock (hard) from 20 to 40" Slopes 8 to 15%	0.64 0.63	Limitations Bedrock (hard) < 40" depth Unstable excavation walls Slopes 8 to 15%	1.00 1.00 0.63
Aquepts-----	15	Limitations Saturation < 12" depth Slopes > 15% Fragments (>3") 25 to 50%	1.00 1.00 0.36	Limitations Saturation < 2.5' depth Slopes > 15% Fragments (>3") 25 to 50%	1.00 1.00 0.36
129: Humic Haploxerands, colluvium----	80	Limitations Slopes > 15%	1.00	Limitations Unstable excavation walls Slopes > 15%	1.00 1.00
130: Histic Humaquepts, lake sediments-	55	Limitations Ponded (any duration) Saturation < 12" depth AASHTO GI >8 (low soil strength)	1.00 1.00 1.00	Limitations Ponded (any duration) Saturation < 2.5' depth Unstable excavation walls	1.00 1.00 1.00
Histic Humaquepts, frequently flooded-----	30	Limitations Saturation < 12" depth Flooding > occasional Shrink-swell (LEP 3-6)	1.00 1.00 0.78	Limitations Saturation < 2.5' depth Unstable excavation walls Frequent or occasional flooding	1.00 1.00 0.50
Typic Endoaquands-----	15	Limitations Saturation < 12" depth Flooding > occasional	1.00 1.00	Limitations Saturation < 2.5' depth Unstable excavation walls Frequent or occasional flooding	1.00 1.00 0.50
132: Vitrandic Cryorthents, debris flows-----	90	Limitations Frost action possible Slopes 8 to 15% Fragments (>3") 25 to 50%	0.50 0.37 0.01	Limitations Unstable excavation walls Slopes 8 to 15% Fragments (>3") 25 to 50%	1.00 0.37 0.01
133: Vitrandic Xerofluvents-----	55	No limitations		Limitations Unstable excavation walls	1.00
Typic Endoaquents-----	30	Limitations Saturation < 12" depth Flooding > occasional	1.00 1.00	Limitations Saturation < 2.5' depth Unstable excavation walls Frequent or occasional flooding	1.00 1.00 0.50

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Table 20.--Building Site Development, Part II--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations	
		Limitation	Value	Limitation	Value
134: Chaos-----	85	No limitations		Limitations Unstable excavation walls	1.00
136: Terracelake-----	45	Limitations Slopes > 15% Frost action possible Fragments (>3") 25 to 50%	1.00 0.50 0.12	Limitations Bedrock (hard) < 40" depth Unstable excavation walls Slopes > 15%	1.00 1.00 1.00
Rock outcrop-----	20	Not rated		Not rated	
Xeric Vitricryands, cirque floor--	15	Limitations Slopes > 15% Frost action possible	1.00 0.50	Limitations Unstable excavation walls Slopes > 15%	1.00 1.00
137: Xeric Vitricryands-----	75	Limitations Frost action possible Slopes 8 to 15%	0.50 0.16	Limitations Unstable excavation walls Slopes 8 to 15%	1.00 0.16
Rock outcrop, rhyodacite-----	20	Not rated		Not rated	
138: Vitrandic Xerofluvents, debris flows-----	80	Limitations Saturation < 12" depth	1.00	Limitations Saturation < 2.5' depth Unstable excavation walls	1.00 1.00
Typic Endoaquents-----	10	Limitations Saturation < 12" depth Flooding > occasional	1.00 1.00	Limitations Saturation < 2.5' depth Unstable excavation walls Frequent or occasional flooding	1.00 1.00 0.50
139: Duric Vitraquands-----	60	Limitations Saturation < 12" depth	1.00	Limitations Saturation < 2.5' depth Unstable excavation walls Pan (thick) from 40-60"	1.00 1.00 0.88
Typic Endoaquands-----	20	Limitations Saturation < 12" depth Flooding > occasional	1.00 1.00	Limitations Saturation < 2.5' depth Unstable excavation walls Frequent or occasional flooding	1.00 1.00 0.50
Aquandic Cryaquents-----	15	Limitations AASHTO GI >8 (low soil strength) Saturation < 12" depth Flooding > occasional	1.00 1.00 1.00	Limitations Saturation < 2.5' depth Unstable excavation walls Organic matter (PT, OH, or OL) below 20"	1.00 1.00 1.00

Table 20.--Building Site Development, Part II--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations	
		Limitation	Value	Limitation	Value
140: Vitrixerands-----	90	Limitations Pan from 20 to 40"	0.04	Limitations Pan (thick) < 40" depth Unstable excavation walls Bulk density > 1.8 g/cc	1.00 1.00 0.50
141: Humic Haploxerands-----	40	Limitations Slopes > 15% Fragments (>3") 25 to 50%	1.00 0.41	Limitations Slopes > 15% Fragments (>3") 25 to 50% Unstable excavation walls	1.00 0.41 0.10
Typic Haploxerands-----	35	Limitations Slopes > 15%	1.00	Limitations Unstable excavation walls Slopes > 15%	1.00 1.00
Bearrubble-----	15	Limitations Fragments (>3") 25 to 50% Slopes 8 to 15%	0.58 0.01	Limitations Fragments (>3") 25 to 50% Unstable excavation walls Slopes 8 to 15%	0.58 0.10 0.01
Rubble land-----	10	Not rated		Not rated	
142: Cragwash-----	85	No limitations		Limitations Unstable excavation walls Pan (thick) from 40-60"	1.00 0.03
143: Andic Durixerpts-----	95	Limitations Pan from 20 to 40"	0.92	Limitations Pan (thick) < 40" depth Unstable excavation walls	1.00 1.00
144: Xeric Vitricryands, cirque floor--	55	Limitations Frost action possible	0.50	Limitations Unstable excavation walls	1.00
Humic Xeric Vitricryands-----	30	Limitations Slopes > 15% Frost action possible	1.00 0.50	Limitations Unstable excavation walls Slopes > 15%	1.00 1.00
145: Sueredo-----	85	Limitations Fragments (>3") 25 to 50% Slopes 8 to 15%	0.11 0.01	Limitations Unstable excavation walls Fragments (>3") 25 to 50% Slopes 8 to 15%	1.00 0.11 0.01

Table 20.--Building Site Development, Part II--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations	
		Limitation	Value	Limitation	Value
146: Sueredo-----	90	Limitations Slopes > 15% Fragments (>3") 25 to 50%	1.00 0.11	Limitations Slopes > 15% Unstable excavation walls Fragments (>3") 25 to 50%	1.00 1.00 0.11
147: Summertown-----	85	Limitations Slopes > 15% Fragments (>3") 25 to 50%	1.00 0.95	Limitations Unstable excavation walls Slopes > 15% Fragments (>3") 25 to 50%	1.00 1.00 0.95
148: Humic Haploxerands, lake terrace--	70	Limitations Fragments (>3") 25 to 50% Pan from 20 to 40"	0.85 0.77	Limitations Pan (thick) < 40" depth Fragments (>3") 25 to 50% Unstable excavation walls	1.00 0.85 0.10
Typic Endoaquands-----	15	Limitations Saturation < 12" depth Flooding > occasional	1.00 1.00	Limitations Saturation < 2.5' depth Unstable excavation walls Frequent or occasional flooding	1.00 1.00 0.50
149: Rubble land-----	45	Not rated		Not rated	
Rock outcrop, cliffs-----	30	Not rated		Not rated	
Emeraldlake-----	15	Limitations Slopes > 15% Frost action possible	1.00 0.50	Limitations Slopes > 15% Unstable excavation walls	1.00 1.00
150: Shadowlake-----	40	Limitations Slopes > 15% Frost action possible	1.00 0.50	Limitations Slopes > 15% Unstable excavation walls	1.00 1.00
Terracelake-----	30	Limitations Slopes > 15% Frost action possible Fragments (>3") 25 to 50%	1.00 0.50 0.12	Limitations Bedrock (hard) < 40" depth Slopes > 15% Unstable excavation walls	1.00 1.00 1.00
Acroph-----	15	Limitations Bedrock (hard) < 20" depth Slopes > 15% Frost action possible	1.00 1.00 0.50	Limitations Bedrock (hard) < 40" depth Slopes > 15% Unstable excavation walls	1.00 1.00 0.10
Rock outcrop-----	10	Not rated		Not rated	

Table 20.--Building Site Development, Part II--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations	
		Limitation	Value	Limitation	Value
151:					
Terracelake-----	40	Limitations Slopes > 15% Frost action possible Fragments (>3") 25 to 50%	1.00 0.50 0.12	Limitations Bedrock (hard) < 40" depth Slopes > 15% Unstable excavation walls	1.00 1.00 1.00
Acroph-----	20	Limitations Bedrock (hard) < 20" depth Slopes > 15% Frost action possible	1.00 1.00 0.50	Limitations Bedrock (hard) < 40" depth Slopes > 15% Unstable excavation walls	1.00 1.00 0.10
Rock outcrop-----	15	Not rated		Not rated	
Shadowlake-----	15	Limitations Slopes > 15% Frost action possible	1.00 0.50	Limitations Slopes > 15% Unstable excavation walls	1.00 1.00
152:					
Terracelake-----	35	Limitations Frost action possible Fragments (>3") 25 to 50% Bedrock (hard) from 20 to 40"	0.50 0.12 0.02	Limitations Bedrock (hard) < 40" depth Unstable excavation walls Fragments (>3") 25 to 50%	1.00 1.00 0.12
Shadowlake-----	30	Limitations Frost action possible Slopes 8 to 15%	0.50 0.01	Limitations Unstable excavation walls Slopes 8 to 15%	1.00 0.01
Acroph-----	15	Limitations Bedrock (hard) < 20" depth Frost action possible Slopes 8 to 15%	1.00 0.50 0.01	Limitations Bedrock (hard) < 40" depth Unstable excavation walls Slopes 8 to 15%	1.00 0.10 0.01
Rock outcrop-----	10	Not rated		Not rated	
153:					
Typic Vitriixerands-----	50	Limitations Slopes 8 to 15%	0.04	Limitations Unstable excavation walls Slopes 8 to 15%	1.00 0.04
Vitrandic Xerorthents, moraine----	45	Limitations Slopes > 15%	1.00	Limitations Unstable excavation walls Slopes > 15%	1.00 1.00
154:					
Typic Vitriixerands-----	45	Limitations Slopes > 15%	1.00	Limitations Slopes > 15% Unstable excavation walls	1.00 1.00

Table 20.--Building Site Development, Part II--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations	
		Limitation	Value	Limitation	Value
154: Vitrandic Xerorthents, moraine----	35	Limitations Slopes > 15%	1.00	Limitations Slopes > 15% Unstable excavation walls	1.00 1.00
155: Xeric Vitricryands, pyroclastic surge-----	90	Limitations Slopes > 15% Frost action possible	1.00 0.50	Limitations Unstable excavation walls Slopes > 15%	1.00 1.00
156: Xeric Vitricryands, pyroclastic surge-----	90	Limitations Slopes > 15% Frost action possible	1.00 0.50	Limitations Slopes > 15% Unstable excavation walls	1.00 1.00
157: Typic Vitriixerands, very deep----	90	Limitations Slopes 8 to 15%	0.04	Limitations Unstable excavation walls Slopes 8 to 15%	1.00 0.04
158: Typic Vitriixerands, unglaciated---	75	Limitations Slopes 8 to 15%	0.84	Limitations Unstable excavation walls Slopes 8 to 15%	1.00 0.84
Rock outcrop, rhyodacite-----	20	Not rated		Not rated	
159: Typic Vitriixerands, bouldery-----	40	Limitations Fragments (>3") >50% Slopes > 15%	1.00 1.00	Limitations Fragments (>3") >50% Slopes > 15% Unstable excavation walls	1.00 1.00 0.10
Typic Vitriixerands, tephra over colluvium-----	35	Limitations Slopes > 15%	1.00	Limitations Slopes > 15% Unstable excavation walls	1.00 1.00
Rubble land-----	15	Not rated		Not rated	
160: Aeric Endoaquents-----	45	Limitations Flooding > occasional Saturation < 12" depth	1.00 0.99	Limitations Saturation < 2.5' depth Unstable excavation walls Frequent or occasional flooding	1.00 1.00 0.50

Table 20.--Building Site Development, Part II--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations	
		Limitation	Value	Limitation	Value
160: Humic Haploxerands, stream terrace	35	No limitations		Limitations Unstable excavation walls Saturation from 2.5' to 6' depth	1.00 0.56
Riverwash-----	15	Not rated		Not rated	
161: Typic Psammaquents-----	95	Limitations Saturation < 12" depth Flooding > occasional	1.00 1.00	Limitations Saturation < 2.5' depth Unstable excavation walls Frequent or occasional flooding	1.00 1.00 0.50
162: Humic Haploxerands, outwash-----	95	Limitations Fragments (>3") 25 to 50%	0.03	Limitations Unstable excavation walls Fragments (>3") 25 to 50%	1.00 0.03
163: Vitrandic Cryofluvents-----	65	Limitations Ponded (any duration) Saturation < 12" depth AASHTO GI 5-8 (soil strength)	1.00 1.00 0.78	Limitations Ponded (any duration) Saturation < 2.5' depth Unstable excavation walls	1.00 1.00 1.00
Aquandic Cryaquents-----	30	Limitations AASHTO GI >8 (low soil strength) Saturation < 12" depth Flooding > occasional	1.00 1.00 1.00	Limitations Saturation < 2.5' depth Unstable excavation walls Organic matter (PT, OH, or OL) below 20"	1.00 1.00 1.00
164: Aquepts-----	35	Limitations Saturation < 12" depth Fragments (>3") 25 to 50% Slopes 8 to 15%	1.00 0.36 0.16	Limitations Saturation < 2.5' depth Fragments (>3") 25 to 50% Slopes 8 to 15%	1.00 0.36 0.16
Typic Petraquepts, bedrock-----	25	Limitations Saturation < 12" depth Slopes > 15% Fragments (>3") 25 to 50%	1.00 1.00 0.49	Limitations Bedrock (hard) < 40" depth Saturation < 2.5' depth Unstable excavation walls	1.00 1.00 1.00
Aquic Haploxerands-----	20	Limitations Saturation from 12 to 30" depth Slopes 8 to 15% Pan from 20 to 40"	0.88 0.63 0.01	Limitations Pan (thick) < 40" depth Saturation < 2.5' depth Unstable excavation walls	1.00 1.00 1.00

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Table 20.--Building Site Development, Part II--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations	
		Limitation	Value	Limitation	Value
164: Typic Petraquepts-----	10	Limitations Saturation < 12" depth Pan from 20 to 40" Slopes 8 to 15%	1.00 0.84 0.04	Limitations Pan (thick) < 40" depth Saturation < 2.5' depth Unstable excavation walls	1.00 1.00 1.00
165: Aquandic Humaquepts-----	35	Limitations Ponded (any duration) Saturation < 12" depth	1.00 1.00	Limitations Ponded (any duration) Saturation < 2.5' depth Unstable excavation walls	1.00 1.00 1.00
Histic Humaquepts-----	25	Limitations Saturation < 12" depth AASHTO GI >8 (low soil strength) Flooding = rare	1.00 1.00 0.50	Limitations Saturation < 2.5' depth Unstable excavation walls	1.00 0.10
Aquandic Endoaquepts-----	20	Limitations Saturation < 12" depth	1.00	Limitations Saturation < 2.5' depth Unstable excavation walls	1.00 1.00
Terric Haplohemists-----	15	Limitations AASHTO GI >8 (low soil strength) Ponded (any duration) Saturation < 12" depth	1.00 1.00 1.00	Limitations Ponded (any duration) Saturation < 2.5' depth Unstable excavation walls	1.00 1.00 0.10
166: Aquic Haploxerands-----	50	Limitations Saturation from 12 to 30" depth Pan from 20 to 40"	0.88 0.01	Limitations Pan (thick) < 40" depth Saturation < 2.5' depth Unstable excavation walls	1.00 1.00 1.00
Humic Haploxerands, outwash terrace-----	40	Limitations Slopes > 15%	1.00	Limitations Unstable excavation walls Slopes > 15%	1.00 1.00
167: Emeraldlake-----	35	Limitations Slopes > 15% Frost action possible	1.00 0.50	Limitations Slopes > 15% Unstable excavation walls	1.00 1.00
Readingpeak-----	20	Limitations Slopes > 15% Frost action possible Fragments (>3") 25 to 50%	1.00 0.50 0.26	Limitations Slopes > 15% Unstable excavation walls Bedrock (hard) from 40 to 60"	1.00 1.00 0.42

Table 20.--Building Site Development, Part II--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations	
		Limitation	Value	Limitation	Value
167: Terracelake-----	15	Limitations Slopes > 15% Frost action possible Fragments (>3") 25 to 50%	1.00 0.50 0.12	Limitations Bedrock (hard) < 40" depth Slopes > 15% Unstable excavation walls	1.00 1.00 1.00
Rock outcrop, dacite-----	15	Not rated		Not rated	
168: Vitrixerands, low elevation-----	90	Limitations Pan from 20 to 40"	0.04	Limitations Pan (thick) < 40" depth Unstable excavation walls Bulk density > 1.8 g/cc	1.00 1.00 0.50
169: Sueredo-----	55	Limitations Slopes > 15% Fragments (>3") 25 to 50%	1.00 0.11	Limitations Slopes > 15% Unstable excavation walls Fragments (>3") 25 to 50%	1.00 1.00 0.11
Rock outcrop, cliffs-----	20	Not rated		Not rated	
Scoured-----	15	Limitations Slopes > 15% Fragments (>3") >50% Bedrock (hard) from 20 to 40"	1.00 1.00 0.46	Limitations Bedrock (hard) < 40" depth Slopes > 15% Fragments (>3") >50%	1.00 1.00 1.00
170: Rock outcrop, rhyodacite-----	35	Not rated		Not rated	
Emeraldlake-----	20	Limitations Slopes > 15% Frost action possible	1.00 0.50	Limitations Slopes > 15% Unstable excavation walls	1.00 1.00
Rubble land-----	18	Not rated		Not rated	
Readingpeak-----	15	Limitations Slopes > 15% Frost action possible Fragments (>3") 25 to 50%	1.00 0.50 0.26	Limitations Slopes > 15% Unstable excavation walls Bedrock (hard) from 40 to 60"	1.00 1.00 0.42
171: Aquepts-----	50	Limitations Saturation < 12" depth Slopes > 15% Frost action possible	1.00 1.00 0.50	Limitations Saturation < 2.5' depth Slopes > 15% Fragments (>3") 25 to 50%	1.00 1.00 0.36

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Table 20.--Building Site Development, Part II--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations	
		Limitation	Value	Limitation	Value
171: Typic Petraquepts, bedrock-----	35	Limitations Saturation < 12" depth Slopes > 15% Fragments (>3") 25 to 50%	1.00 1.00 0.49	Limitations Bedrock (hard) < 40" depth Saturation < 2.5' depth Unstable excavation walls	1.00 1.00 1.00
172: Badgerflat-----	90	Limitations Fragments (>3") 25 to 50%	0.42	Limitations Unstable excavation walls Fragments (>3") 25 to 50%	1.00 0.42
173: Badgerwash-----	90	Limitations Fragments (>3") 25 to 50% Pan from 20 to 40"	0.86 0.10	Limitations Pan (thick) < 40" depth Unstable excavation walls Fragments (>3") 25 to 50%	1.00 1.00 0.86
174: Vitrandic Cryorthents-----	60	Limitations Frost action possible	0.50	Limitations Unstable excavation walls	1.00
Readingpeak-----	20	Limitations Slopes > 15% Frost action possible Fragments (>3") 25 to 50%	1.00 0.50 0.26	Limitations Unstable excavation walls Slopes > 15% Bedrock (hard) from 40 to 60"	1.00 1.00 0.42
Rock outcrop-----	10	Not rated		Not rated	
175: Shadowlake-----	75	Limitations Frost action possible	0.50	Limitations Unstable excavation walls	1.00
Vitrandic Cryofluvents-----	15	Limitations Ponded (any duration) Saturation < 12" depth AASHTO GI 5-8 (soil strength)	1.00 1.00 0.78	Limitations Ponded (any duration) Saturation < 2.5' depth Unstable excavation walls	1.00 1.00 1.00
176: Juniperlake, bouldery-----	85	Limitations Slopes > 15% Fragments (>3") 25 to 50%	1.00 0.01	Limitations Unstable excavation walls Slopes > 15% Fragments (>3") 25 to 50%	1.00 1.00 0.01
177: Vitrandic Cryorthents, debris flows, high elevation-----	85	Limitations Slopes > 15% Frost action possible	1.00 0.50	Limitations Slopes > 15% Unstable excavation walls	1.00 1.00

Table 20.--Building Site Development, Part II--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations	
		Limitation	Value	Limitation	Value
200: Cinder land-----	100	Not rated		Not rated	
201: Lava flows-----	100	Not rated		Not rated	
202: Typic Xerorthents, tephra-----	85	No limitations		Limitations Unstable excavation walls	1.00
Typic Xerorthents, welded-----	10	Limitations Slopes > 15%	1.00	Limitations Unstable excavation walls Slopes > 15%	1.00 1.00
203: Typic Xerorthents, tephra-----	90	Limitations Slopes 8 to 15%	0.37	Limitations Unstable excavation walls Slopes 8 to 15%	1.00 0.37
205: Beaches-----	100	Not rated		Not rated	
W: Water-----	100	Not rated		Not rated	

The interpretation for local roads and streets evaluates the following soil properties at variable depths in the soil: flooding, ponding, wetness, slope, organic Unified classes for low soil strength (PT, OL, or OH), amount of clay, depth to hard or soft bedrock, depth to thick or thin cemented pans, fragments greater than 3 inches in size, soil bulk density, and the potential of the soil to cave.

The interpretation for shallow excavation evaluates the following soil properties at variable depths in the soil: flooding, ponding, wetness, slope, subsidence of organic soils, shrink-swell potential expressed as linear extensibility percent (LEP), potential frost action, depth to hard or soft bedrock, depth to thick or thin cemented pans, fragments greater than 3 inches in size, and soil strength expressed as the AASHTO group index number (AASHTO GI).

Table 21.--Sanitary Facilities

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. The rating is based on the limitation with the highest value. Only three highest value limitations are listed. There may be more limitations. Fine-earth fractions and coarse fragments are reported on a weight basis. A brief summary of rating criteria summary and abbreviations are listed on the last page of this report)

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Limitation	Value	Limitation	Value
100: Buttelake-----	85	Limitations Permeability < .6"/hr in 24-60" (slow perc) Slopes 8 to 15%	1.00 0.16	Limitations Permeability > 2"/hr (seepage) Slopes > 8%	1.00 1.00
101: Buttewash-----	85	Limitations Depth to pan 40 to 72" Permeability ranges .6 - 2"/hr (slow perc)	0.93 0.50	Limitations Permeability > 2"/hr (seepage) Depth to pan from 40-60"	1.00 0.82
102: Ashbutte-----	65	Limitations Permeability > 6"/hr in 24-60" (seepage and poor filter) Slopes > 15% Seepage in bottom layer	1.00 1.00 1.00	Limitations Slopes > 8% Permeability > 2"/hr (seepage)	1.00 1.00
Vitrandic Xerorthents-----	25	Limitations Slopes > 15% Seepage in bottom layer Permeability > 6"/hr in 24-60" (seepage and poor filter)	1.00 1.00 1.00	Limitations Slopes > 8% Permeability > 2"/hr (seepage)	1.00 1.00
103: Scoured-----	75	Limitations Depth to bedrock <40" Fragments (>3") >50%	1.00 1.00	Limitations Bedrock (hard) < 40" depth Permeability > 2"/hr (seepage) Fragments (>3") > 35%	1.00 1.00 1.00
104: Scoured-----	55	Limitations Depth to bedrock <40" Fragments (>3") >50% Slopes > 15%	1.00 1.00 1.00	Limitations Bedrock (hard) < 40" depth Permeability > 2"/hr (seepage) Slopes > 8%	1.00 1.00 1.00
Juniperlake-----	20	Limitations Permeability < .6"/hr in 24-60" (slow perc) Slopes > 15% Fragments (>3") 25 to 50%	1.00 1.00 0.01	Limitations Permeability > 2"/hr (seepage) Slopes > 8% Fragments (>3") 20-35%	1.00 1.00 0.04

Table 21.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Limitation	Value	Limitation	Value
104: Rock outcrop-----	15	Not rated		Not rated	
105: Juniperlake-----	85	Limitations Permeability < .6"/hr in 24-60" (slow perc) Slopes > 15% Fragments (>3") 25 to 50%	1.00 1.00 0.01	Limitations Permeability > 2"/hr (seepage) Slopes > 8% Fragments (>3") 20-35%	1.00 1.00 0.04
106: Cenplat-----	70	Limitations Depth to bedrock <40" Slopes > 15% Seepage in bottom layer	1.00 1.00 1.00	Limitations Bedrock (hard) < 40" depth Permeability > 2"/hr (seepage) Slopes > 8%	1.00 1.00 1.00
107: Badgerflat-----	40	Limitations Permeability < .6"/hr in 24-60" (slow perc) Slopes > 15% Fragments (>3") 25 to 50%	1.00 1.00 0.42	Limitations Slopes > 8% Permeability > 2"/hr (seepage) Fragments (>3") 20-35%	1.00 1.00 0.96
Cenplat-----	35	Limitations Depth to bedrock <40" Slopes > 15% Permeability > 6"/hr in 24-60" (seepage and poor filter)	1.00 1.00 1.00	Limitations Bedrock (hard) < 40" depth Slopes > 8% Permeability > 2"/hr (seepage)	1.00 1.00 1.00
108: Typic Xerorthents-----	80	Limitations Seepage in bottom layer	1.00	Limitations Permeability > 2"/hr (seepage) Slopes 2 to 8%	1.00 0.17
109: Prospectpeak-----	85	Limitations Fragments (>3") >50% Seepage in bottom layer Depth to bedrock 40 to 72"	1.00 1.00 0.78	Limitations Slopes > 8% Fragments (>3") > 35% Permeability > 2"/hr (seepage)	1.00 1.00 1.00
110: Bearthrubble-----	50	Limitations Seepage in bottom layer Fragments (>3") 25 to 50% Slopes 8 to 15%	1.00 0.58 0.04	Limitations Slopes > 8% Permeability > 2"/hr (seepage) Fragments (>3") > 35%	1.00 1.00 1.00
Rubble land-----	35	Not rated		Not rated	

Table 21.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Limitation	Value	Limitation	Value
111: Vitrandic Xerorthents, debris fan-	95	Limitations Seepage in bottom layer Permeability > 6"/hr in 24-60" (seepage and poor filter) Fragments (>3") 25 to 50%	1.00 1.00 0.01	Limitations Permeability > 2"/hr (seepage) Slopes 2 to 8% Fragments (>3") 20-35%	1.00 0.67 0.27
112: Cascadesprings-----	85	Limitations Permeability < .6"/hr in 24-60" (slow perc) Slopes > 15% Fragments (>3") 25 to 50%	1.00 1.00 0.11	Limitations Permeability > 2"/hr (seepage) Slopes > 8%	1.00 1.00
113: Terracelake-----	35	Limitations Depth to bedrock <40" Slopes > 15% Seepage in bottom layer	1.00 1.00 1.00	Limitations Bedrock (hard) < 40" depth Slopes > 8% Permeability > 2"/hr (seepage)	1.00 1.00 1.00
Emeraldlake-----	25	Limitations Slopes > 15% Seepage in bottom layer Permeability > 6"/hr in 24-60" (seepage and poor filter)	1.00 1.00 1.00	Limitations Slopes > 8% Permeability > 2"/hr (seepage)	1.00 1.00
Readingpeak-----	20	Limitations Slopes > 15% Seepage in bottom layer Depth to bedrock 40 to 72"	1.00 1.00 0.78	Limitations Slopes > 8% Permeability > 2"/hr (seepage) Bedrock (hard) from 40 to 60"	1.00 1.00 0.42
Rock outcrop-----	10	Not rated		Not rated	
114: Emeraldlake-----	25	Limitations Slopes > 15% Seepage in bottom layer Permeability > 6"/hr in 24-60" (seepage and poor filter)	1.00 1.00 1.00	Limitations Slopes > 8% Permeability > 2"/hr (seepage)	1.00 1.00
Terracelake-----	23	Limitations Depth to bedrock <40" Slopes > 15% Seepage in bottom layer	1.00 1.00 1.00	Limitations Bedrock (hard) < 40" depth Slopes > 8% Permeability > 2"/hr (seepage)	1.00 1.00 1.00
Readingpeak-----	20	Limitations Slopes > 15% Seepage in bottom layer Depth to bedrock 40 to 72"	1.00 1.00 0.78	Limitations Slopes > 8% Permeability > 2"/hr (seepage) Bedrock (hard) from 40 to 60"	1.00 1.00 0.42

Table 21.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Limitation	Value	Limitation	Value
114: Rock outcrop-----	15	Not rated		Not rated	
Rubble land-----	12	Not rated		Not rated	
115: Shadowlake-----	85	Limitations Permeability < .6"/hr in 24-60" (slow perc)	1.00	Limitations Permeability > 2"/hr (seepage)	1.00
116: Xeric Vitricryands, tephra over till-----	30	Limitations Permeability > 6"/hr in 24-60" (seepage and poor filter)	1.00	Limitations Permeability > 2"/hr (seepage)	1.00
		Slopes > 15%	1.00	Slopes > 8%	1.00
		Seepage in bottom layer	1.00	Fragments (>3") 20-35%	0.25
Terracelake-----	25	Limitations Depth to bedrock <40"	1.00	Limitations Bedrock (hard) < 40" depth	1.00
		Slopes > 15%	1.00	Permeability > 2"/hr (seepage)	1.00
		Seepage in bottom layer	1.00	Slopes > 8%	1.00
Rock outcrop-----	15	Not rated		Not rated	
Xeric Vitricryands, cirque floor--	15	Limitations Permeability < .6"/hr in 24-60" (slow perc)	1.00	Limitations Permeability > 2"/hr (seepage)	1.00
		Slopes 8 to 15%	0.04	Slopes > 8%	1.00
117: Humic Haploxerands, moist lake terrace-----	90	Limitations Depth to pan < 40"	1.00	Limitations Depth to pan < 40"	1.00
		Saturation < 4' depth	1.00	Permeability > 2"/hr (seepage)	1.00
		Seepage in bottom layer	1.00	Slopes 2 to 8%	0.83
118: Typic Dystraxepts, landslides---	90	Limitations Permeability ranges .6 - 2"/hr (slow perc)	0.50	Limitations Slopes > 8%	1.00
		Slopes 8 to 15%	0.16	Permeability .6-2"/hr (some seepage)	0.50
119: Diamondpeak-----	30	Limitations Slopes > 15%	1.00	Limitations Slopes > 8%	1.00
		Permeability ranges .6 - 2"/hr (slow perc)	0.50	Permeability .6-2"/hr (some seepage)	0.50

Table 21.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Limitation	Value	Limitation	Value
119: Brokeoff-----	25	Limitations Permeability < .6"/hr in 24-60" (slow perc) Depth to bedrock <40" Slopes > 15%	1.00 1.00 1.00 1.00	Limitations Bedrock (hard) < 40" depth Slopes > 8% Permeability .6-2"/hr (some seepage)	1.00 1.00 0.50
Endoaquepts-----	14	Limitations Permeability < .6"/hr in 24-60" (slow perc) Saturation < 4' depth Slopes > 15%	1.00 1.00 1.00 1.00	Limitations Saturation at < 3.5' depth Slopes > 8%	1.00 1.00
Aquic Dystrocherepts, debris flows-	11	Limitations Saturation < 4' depth Slopes > 15% Permeability < .6"/hr in 24-60" (slow perc)	1.00 1.00 1.00	Limitations Saturation at < 3.5' depth Slopes > 8%	1.00 1.00
Typic Dystrocherepts-----	10	Limitations Depth to bedrock <40" Slopes > 15% Restricted permeability due to bedrock or hardpan	1.00 1.00 1.00	Limitations Bedrock (soft) < 40" depth Slopes > 8% Permeability > 2"/hr (seepage)	1.00 1.00 1.00
120: Buttelake-----	65	Limitations Permeability < .6"/hr in 24-60" (slow perc) Slopes > 15%	1.00 1.00	Limitations Slopes > 8% Permeability > 2"/hr (seepage)	1.00 1.00
Sunhoff-----	15	Limitations Permeability < .6"/hr in 24-60" (slow perc) Slopes > 15% Fragments (>3") 25 to 50%	1.00 1.00 1.00 0.15	Limitations Slopes > 8% Permeability > 2"/hr (seepage) Fragments (>3") 20-35%	1.00 1.00 0.87
Talved-----	10	Limitations Slopes > 15% Seepage in bottom layer Fragments (>3") >50%	1.00 1.00 1.00	Limitations Slopes > 8% Fragments (>3") > 35% Permeability > 2"/hr (seepage)	1.00 1.00 1.00
122: Xeric Vitricryands, colluvium-----	35	Limitations Seepage in bottom layer Slopes > 15%	1.00 1.00	Limitations Slopes > 8% Permeability > 2"/hr (seepage)	1.00 1.00

Table 21.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Limitation	Value	Limitation	Value
122: Xeric Vitricryands, ash over cinders-----	30	Limitations Seepage in bottom layer Slopes > 15%	1.00 1.00	Limitations Slopes > 8% Permeability > 2"/hr (seepage)	1.00 1.00
Xeric Vitricryands, bedrock-----	20	Limitations Depth to bedrock <40" Restricted permeability due to bedrock or hardpan Seepage in bottom layer	1.00 1.00 1.00	Limitations Bedrock (hard) < 40" depth Slopes > 8% Permeability > 2"/hr (seepage)	1.00 1.00 1.00
125: Humic Haploxerands, stream terrace	55	Limitations Saturation < 4' depth Seepage in bottom layer	1.00 1.00	Limitations Permeability > 2"/hr (seepage) Slopes 2 to 8%	1.00 0.67
Aquandic Humaquepts, flood plains-	40	Limitations Flooding Saturation < 4' depth Permeability ranges .6 - 2"/hr (slow perc)	1.00 1.00 0.50	Limitations Saturation at < 3.5' depth Flooding > occasional Permeability .6-2"/hr (some seepage)	1.00 1.00 0.50
126: Kingsiron-----	45	Limitations Slopes > 15% Seepage in bottom layer	1.00 1.00	Limitations Slopes > 8% Permeability > 2"/hr (seepage)	1.00 1.00
Dittmar-----	20	Limitations Depth to bedrock <40" Slopes > 15% Restricted permeability due to bedrock or hardpan	1.00 1.00 1.00	Limitations Bedrock (hard) < 40" depth Slopes > 8% Permeability > 2"/hr (seepage)	1.00 1.00 1.00
Rock outcrop-----	15	Not rated		Not rated	
127: Humic Haploxerands, strath terrace	65	Limitations Depth to bedrock <40" Seepage in bottom layer Slopes 8 to 15%	1.00 1.00 0.63	Limitations Bedrock (hard) < 40" depth Permeability > 2"/hr (seepage) Slopes > 8%	1.00 1.00 1.00
Aquepts-----	15	Limitations Saturation < 4' depth Slopes > 15% Seepage in bottom layer	1.00 1.00 1.00	Limitations Permeability > 2"/hr (seepage) Slopes > 8% Fragments (>3") > 35%	1.00 1.00 1.00

Table 21.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Limitation	Value	Limitation	Value
129: Humic Haploxerands, colluvium-----	80	Limitations Slopes > 15% Seepage in bottom layer	1.00 1.00	Limitations Slopes > 8% Permeability > 2"/hr (seepage)	1.00 1.00
130: Histic Humaquepts, lake sediments-	55	Limitations Ponded (any duration) Saturation < 4' depth Seepage in bottom layer	1.00 1.00 1.00	Limitations Ponded (any duration) Permeability > 2"/hr (seepage) Saturation at < 3.5' depth	1.00 1.00 1.00
Histic Humaquepts, frequently flooded-----	30	Limitations Flooding Saturation < 4' depth Permeability < .6"/hr in 24-60" (slow perc)	1.00 1.00 1.00	Limitations Saturation at < 3.5' depth Flooding > occasional Permeability > 2"/hr (seepage)	1.00 1.00 1.00
Typic Endoaquands-----	15	Limitations Flooding Saturation < 4' depth Seepage in bottom layer	1.00 1.00 1.00	Limitations Flooding > occasional Permeability > 2"/hr (seepage) Saturation from 3.5 to 5' depth	1.00 1.00 0.50
132: Vitrandic Cryorthents, debris flows-----	90	Limitations Permeability < .6"/hr in 24-60" (slow perc) Slopes 8 to 15% Fragments (>3") 25 to 50%	1.00 0.37 0.01	Limitations Slopes > 8% Permeability > 2"/hr (seepage)	1.00 1.00
133: Vitrandic Xerofluvents-----	55	Limitations Seepage in bottom layer	1.00	Limitations Permeability > 2"/hr (seepage)	1.00
Typic Endoaquents-----	30	Limitations Flooding Saturation < 4' depth Permeability > 6"/hr in 24-60" (seepage and poor filter)	1.00 1.00 1.00	Limitations Flooding > occasional Permeability > 2"/hr (seepage)	1.00 1.00
134: Chaos-----	85	Limitations Permeability > 6"/hr in 24-60" (seepage and poor filter) Seepage in bottom layer	1.00 1.00	Limitations Permeability > 2"/hr (seepage) Slopes 2 to 8%	1.00 0.67

Table 21.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Limitation	Value	Limitation	Value
136: Terracelake-----	45	Limitations Depth to bedrock <40" Slopes > 15% Seepage in bottom layer	1.00 1.00 1.00	Limitations Bedrock (hard) < 40" depth Permeability > 2"/hr (seepage) Slopes > 8%	1.00 1.00 1.00
Rock outcrop-----	20	Not rated		Not rated	
Xeric Vitricryands, cirque floor--	15	Limitations Permeability < .6"/hr in 24-60" (slow perc) Slopes > 15%	1.00 1.00	Limitations Permeability > 2"/hr (seepage) Slopes > 8%	1.00 1.00
137: Xeric Vitricryands-----	75	Limitations Permeability < .6"/hr in 24-60" (slow perc) Slopes 8 to 15%	1.00 0.16	Limitations Slopes > 8% Permeability > 2"/hr (seepage)	1.00 1.00
Rock outcrop, rhyodacite-----	20	Not rated		Not rated	
138: Vitrandic Xerofluvents, debris flows-----	80	Limitations Saturation < 4' depth Seepage in bottom layer	1.00 1.00	Limitations Permeability > 2"/hr (seepage)	1.00
Typic Endoaquents-----	10	Limitations Flooding Saturation < 4' depth Permeability > 6"/hr in 24-60" (seepage and poor filter)	1.00 1.00 1.00	Limitations Flooding > occasional Permeability > 2"/hr (seepage)	1.00 1.00
139: Duric Vitraquands-----	60	Limitations Saturation < 4' depth Seepage in bottom layer Permeability > 6"/hr in 24-60" (seepage and poor filter)	1.00 1.00 1.00	Limitations Permeability > 2"/hr (seepage) Depth to pan from 40-60"	1.00 0.88
Typic Endoaquands-----	20	Limitations Flooding Saturation < 4' depth Seepage in bottom layer	1.00 1.00 1.00	Limitations Flooding > occasional Permeability > 2"/hr (seepage) Saturation from 3.5 to 5' depth	1.00 1.00 0.50
Aquandic Cryaquents-----	15	Limitations Flooding Saturation < 4' depth Permeability < .6"/hr in 24-60" (slow perc)	1.00 1.00 1.00	Limitations Flooding > occasional Permeability > 2"/hr (seepage) Organic matter (OL, OH) in 50-15 cm	1.00 1.00 0.50

Table 21.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Limitation	Value	Limitation	Value
140: Vitrixerands-----	90	Limitations Depth to pan < 40" Permeability > 6"/hr in 24-60" (seepage and poor filter) Seepage in bottom layer	1.00 1.00 1.00	Limitations Depth to pan < 40" Permeability > 2"/hr (seepage) Slopes 2 to 8%	1.00 1.00 0.17
141: Humic Haploxerands-----	40	Limitations Slopes > 15% Permeability ranges .6 - 2"/hr (slow perc) Fragments (>3") 25 to 50%	1.00 0.50 0.41	Limitations Permeability > 2"/hr (seepage) Slopes > 8% Fragments (>3") > 35%	1.00 1.00 1.00
Typic Haploxerands-----	35	Limitations Slopes > 15% Seepage in bottom layer Permeability ranges .6 - 2"/hr (slow perc)	1.00 1.00 0.50	Limitations Permeability > 2"/hr (seepage) Slopes > 8% Fragments (>3") 20-35%	1.00 1.00 0.04
Bearrubble-----	15	Limitations Seepage in bottom layer Fragments (>3") 25 to 50% Slopes 8 to 15%	1.00 0.58 0.01	Limitations Permeability > 2"/hr (seepage) Slopes > 8% Fragments (>3") > 35%	1.00 1.00 1.00
Rubble land-----	10	Not rated		Not rated	
142: Cragwash-----	85	Limitations Seepage in bottom layer Permeability > 6"/hr in 24-60" (seepage and poor filter) Depth to pan 40 to 72"	1.00 1.00 0.43	Limitations Permeability > 2"/hr (seepage) Slopes 2 to 8% Depth to pan from 40-60"	1.00 0.50 0.03
143: Andic Durixercepts-----	95	Limitations Depth to pan < 40" Seepage in bottom layer Restricted permeability due to bedrock or hardpan	1.00 1.00 1.00	Limitations Depth to pan < 40" Permeability > 2"/hr (seepage) Slopes 2 to 8%	1.00 1.00 0.83
144: Xeric Vitricryands, cirque floor--	55	Limitations Permeability < .6"/hr in 24-60" (slow perc)	1.00	Limitations Permeability > 2"/hr (seepage) Slopes 2 to 8%	1.00 0.67
Humic Xeric Vitricryands-----	30	Limitations Permeability < .6"/hr in 24-60" (slow perc) Slopes > 15%	1.00 1.00	Limitations Permeability > 2"/hr (seepage) Slopes > 8%	1.00 1.00

Table 21.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Limitation	Value	Limitation	Value
145: Sueredo-----	85	Limitations Permeability < .6"/hr in 24-60" (slow perc) Fragments (>3") 25 to 50% Slopes 8 to 15%	1.00 0.11 0.01	Limitations Permeability > 2"/hr (seepage) Slopes > 8%	1.00 1.00
146: Sueredo-----	90	Limitations Permeability < .6"/hr in 24-60" (slow perc) Slopes > 15% Fragments (>3") 25 to 50%	1.00 1.00 0.11	Limitations Slopes > 8% Permeability > 2"/hr (seepage)	1.00 1.00
147: Summertown-----	85	Limitations Permeability < .6"/hr in 24-60" (slow perc) Slopes > 15% Fragments (>3") 25 to 50%	1.00 1.00 0.95	Limitations Permeability > 2"/hr (seepage) Slopes > 8% Fragments (>3") 20-35%	1.00 1.00 0.01
148: Humic Haploxerands, lake terrace--	70	Limitations Depth to pan < 40" Seepage in bottom layer Fragments (>3") 25 to 50%	1.00 1.00 0.85	Limitations Depth to pan < 40" Permeability > 2"/hr (seepage) Fragments (>3") > 35%	1.00 1.00 1.00
Typic Endoaquands-----	15	Limitations Flooding Saturation < 4' depth Seepage in bottom layer	1.00 1.00 1.00	Limitations Flooding > occasional Permeability > 2"/hr (seepage) Saturation from 3.5 to 5' depth	1.00 1.00 0.50
149: Rubble land-----	45	Not rated		Not rated	
Rock outcrop, cliffs-----	30	Not rated		Not rated	
Emeraldlake-----	15	Limitations Slopes > 15% Seepage in bottom layer Permeability > 6"/hr in 24-60" (seepage and poor filter)	1.00 1.00 1.00	Limitations Slopes > 8% Permeability > 2"/hr (seepage)	1.00 1.00
150: Shadowlake-----	40	Limitations Permeability < .6"/hr in 24-60" (slow perc) Slopes > 15%	1.00 1.00	Limitations Slopes > 8% Permeability > 2"/hr (seepage)	1.00 1.00

Table 21.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Limitation	Value	Limitation	Value
150: Terracelake-----	30	Limitations Depth to bedrock <40" Slopes > 15% Seepage in bottom layer	1.00 1.00 1.00	Limitations Bedrock (hard) < 40" depth Slopes > 8% Permeability > 2"/hr (seepage)	1.00 1.00 1.00
Acroph-----	15	Limitations Depth to bedrock <40" Slopes > 15% Restricted permeability due to bedrock or hardpan	1.00 1.00 1.00	Limitations Bedrock (hard) < 40" depth Slopes > 8% Permeability > 2"/hr (seepage)	1.00 1.00 1.00
Rock outcrop-----	10	Not rated		Not rated	
151: Terracelake-----	40	Limitations Depth to bedrock <40" Slopes > 15% Seepage in bottom layer	1.00 1.00 1.00	Limitations Bedrock (hard) < 40" depth Slopes > 8% Permeability > 2"/hr (seepage)	1.00 1.00 1.00
Acroph-----	20	Limitations Depth to bedrock <40" Slopes > 15% Restricted permeability due to bedrock or hardpan	1.00 1.00 1.00	Limitations Bedrock (hard) < 40" depth Slopes > 8% Permeability > 2"/hr (seepage)	1.00 1.00 1.00
Rock outcrop-----	15	Not rated		Not rated	
Shadowlake-----	15	Limitations Permeability < .6"/hr in 24-60" (slow perc) Slopes > 15%	1.00 1.00	Limitations Slopes > 8% Permeability > 2"/hr (seepage)	1.00 1.00
152: Terracelake-----	35	Limitations Depth to bedrock <40" Seepage in bottom layer Fragments (>3") 25 to 50%	1.00 1.00 0.12	Limitations Bedrock (hard) < 40" depth Permeability > 2"/hr (seepage) Slopes > 8%	1.00 1.00 1.00
Shadowlake-----	30	Limitations Permeability < .6"/hr in 24-60" (slow perc) Slopes 8 to 15%	1.00 0.01	Limitations Permeability > 2"/hr (seepage) Slopes > 8%	1.00 1.00
Acroph-----	15	Limitations Depth to bedrock <40" Restricted permeability due to bedrock or hardpan Seepage in bottom layer	1.00 1.00 1.00	Limitations Bedrock (hard) < 40" depth Permeability > 2"/hr (seepage) Slopes > 8%	1.00 1.00 1.00

Table 21.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Limitation	Value	Limitation	Value
152: Rock outcrop-----	10	Not rated		Not rated	
153: Typic Vitriixerands-----	50	Limitations Permeability < .6"/hr in 24-60" (slow perc) Slopes 8 to 15%	1.00 0.04	Limitations Permeability > 2"/hr (seepage) Slopes > 8%	1.00 1.00
Vitrandic Xerorthents, moraine----	45	Limitations Permeability < .6"/hr in 24-60" (slow perc) Slopes > 15%	1.00 1.00	Limitations Permeability > 2"/hr (seepage) Slopes > 8%	1.00 1.00
154: Typic Vitriixerands-----	45	Limitations Permeability < .6"/hr in 24-60" (slow perc) Slopes > 15%	1.00 1.00	Limitations Slopes > 8% Permeability > 2"/hr (seepage)	1.00 1.00
Vitrandic Xerorthents, moraine----	35	Limitations Permeability < .6"/hr in 24-60" (slow perc) Slopes > 15%	1.00 1.00	Limitations Slopes > 8% Permeability > 2"/hr (seepage)	1.00 1.00
155: Xeric Vitricryands, pyroclastic surge-----	90	Limitations Permeability < .6"/hr in 24-60" (slow perc) Slopes > 15%	1.00 1.00	Limitations Slopes > 8% Permeability > 2"/hr (seepage)	1.00 1.00
156: Xeric Vitricryands, pyroclastic surge-----	90	Limitations Permeability < .6"/hr in 24-60" (slow perc) Slopes > 15%	1.00 1.00	Limitations Slopes > 8% Permeability > 2"/hr (seepage)	1.00 1.00
157: Typic Vitriixerands, very deep----	90	Limitations Seepage in bottom layer Permeability > 6"/hr in 24-60" (seepage and poor filter) Slopes 8 to 15%	1.00 1.00 0.04	Limitations Permeability > 2"/hr (seepage) Slopes > 8%	1.00 1.00

Table 21.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Limitation	Value	Limitation	Value
158: Typic Vitrixerands, unglaciated---	75	Limitations Seepage in bottom layer Permeability > 6"/hr in 24-60" (seepage and poor filter) Depth to bedrock <40"	1.00 1.00 0.99	Limitations Permeability > 2"/hr (seepage) Slopes > 8% Bedrock (soft) < 40" depth	1.00 1.00 0.99
Rock outcrop, rhyodacite-----	20	Not rated		Not rated	
159: Typic Vitrixerands, bouldery-----	40	Limitations Fragments (>3") >50% Permeability > 6"/hr in 24-60" (seepage and poor filter) Slopes > 15%	1.00 1.00 1.00	Limitations Slopes > 8% Fragments (>3") > 35% Permeability > 2"/hr (seepage)	1.00 1.00 1.00
Typic Vitrixerands, tephra over colluvium-----	35	Limitations Slopes > 15% Seepage in bottom layer	1.00 1.00	Limitations Slopes > 8% Permeability > 2"/hr (seepage)	1.00 1.00
Rubble land-----	15	Not rated		Not rated	
160: Aeric Endoaquents-----	45	Limitations Flooding Saturation < 4' depth Seepage in bottom layer	1.00 1.00 1.00	Limitations Flooding > occasional Permeability > 2"/hr (seepage) Slopes 2 to 8%	1.00 1.00 0.33
Humic Haploxerands, stream terrace	35	Limitations Seepage in bottom layer Saturation from 4 to 6' depth	1.00 0.99	Limitations Permeability > 2"/hr (seepage) Slopes 2 to 8%	1.00 0.33
Riverwash-----	15	Not rated		Not rated	
161: Typic Psammaquents-----	95	Limitations Flooding Saturation < 4' depth Permeability > 6"/hr in 24-60" (seepage and poor filter)	1.00 1.00 1.00	Limitations Flooding > occasional Permeability > 2"/hr (seepage)	1.00 1.00
162: Humic Haploxerands, outwash-----	95	Limitations Seepage in bottom layer Permeability > 6"/hr in 24-60" (seepage and poor filter) Fragments (>3") 25 to 50%	1.00 1.00 0.03	Limitations Permeability > 2"/hr (seepage) Slopes 2 to 8%	1.00 0.33

Table 21.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Limitation	Value	Limitation	Value
163: Vitrandic Cryofluvents-----	65	Limitations Ponded (any duration) Saturation < 4' depth Seepage in bottom layer	1.00 1.00 1.00	Limitations Saturation at < 3.5' depth Ponded (any duration) Permeability > 2"/hr (seepage)	1.00 1.00 1.00
Aquandic Cryaquepts-----	30	Limitations Flooding Saturation < 4' depth Permeability < .6"/hr in 24-60" (slow perc)	1.00 1.00 1.00	Limitations Flooding > occasional Permeability > 2"/hr (seepage) Organic matter (OL, OH) in 50-15 cm	1.00 1.00 0.50
164: Aquepts-----	35	Limitations Saturation < 4' depth Seepage in bottom layer Fragments (>3") 25 to 50%	1.00 1.00 0.36	Limitations Permeability > 2"/hr (seepage) Slopes > 8% Fragments (>3") > 35%	1.00 1.00 1.00
Typic Petraquepts, bedrock-----	25	Limitations Depth to bedrock <40" Saturation < 4' depth Seepage in bottom layer	1.00 1.00 1.00	Limitations Bedrock (hard) < 40" depth Permeability > 2"/hr (seepage) Slopes > 8%	1.00 1.00 1.00
Aquic Haploxerands-----	20	Limitations Depth to pan < 40" Saturation < 4' depth Seepage in bottom layer	1.00 1.00 1.00	Limitations Depth to pan < 40" Permeability > 2"/hr (seepage) Slopes > 8%	1.00 1.00 1.00
Typic Petraquepts-----	10	Limitations Depth to pan < 40" Saturation < 4' depth Permeability ranges .6 - 2"/hr (slow perc)	1.00 1.00 0.50	Limitations Saturation at < 3.5' depth Depth to pan < 40" Slopes > 8%	1.00 1.00 1.00
165: Aquandic Humaquepts-----	35	Limitations Ponded (any duration) Saturation < 4' depth Seepage in bottom layer	1.00 1.00 1.00	Limitations Ponded (any duration) Permeability > 2"/hr (seepage) Saturation from 3.5 to 5' depth	1.00 1.00 0.50
Histic Humaquepts-----	25	Limitations Saturation < 4' depth Seepage in bottom layer Permeability ranges .6 - 2"/hr (slow perc)	1.00 1.00 0.50	Limitations Saturation at < 3.5' depth Permeability > 2"/hr (seepage) Flooding = rare	1.00 1.00 0.50

Table 21.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Limitation	Value	Limitation	Value
165: Aquandic Endoaquepts-----	20	Limitations Saturation < 4' depth Seepage in bottom layer Permeability ranges .6 - 2"/hr (slow perc)	1.00 1.00 0.50	Limitations Saturation at < 3.5' depth Permeability > 2"/hr (seepage) Slopes 2 to 8%	1.00 1.00 0.33
Terric Haplohemists-----	15	Limitations Ponded (any duration) Saturation < 4' depth Permeability < .6"/hr in 24-60" (slow perc)	1.00 1.00 1.00	Limitations Saturation at < 3.5' depth Ponded (any duration) Permeability > 2"/hr (seepage)	1.00 1.00 1.00
166: Aquic Haploxerands-----	50	Limitations Depth to pan < 40" Saturation < 4' depth Seepage in bottom layer	1.00 1.00 1.00	Limitations Depth to pan < 40" Permeability > 2"/hr (seepage) Saturation from 3.5 to 5' depth	1.00 1.00 0.50
Humic Haploxerands, outwash terrace-----	40	Limitations Depth to pan < 40" Seepage in bottom layer Permeability > 6"/hr in 24-60" (seepage and poor filter)	1.00 1.00 1.00	Limitations Depth to pan < 40" Permeability > 2"/hr (seepage) Slopes > 8%	1.00 1.00 1.00
167: Emeraldlake-----	35	Limitations Slopes > 15% Seepage in bottom layer Permeability > 6"/hr in 24-60" (seepage and poor filter)	1.00 1.00 1.00	Limitations Slopes > 8% Permeability > 2"/hr (seepage)	1.00 1.00
Readingpeak-----	20	Limitations Slopes > 15% Seepage in bottom layer Depth to bedrock 40 to 72"	1.00 1.00 0.78	Limitations Slopes > 8% Permeability > 2"/hr (seepage) Bedrock (hard) from 40 to 60"	1.00 1.00 0.42
Terracelake-----	15	Limitations Depth to bedrock <40" Slopes > 15% Seepage in bottom layer	1.00 1.00 1.00	Limitations Bedrock (hard) < 40" depth Slopes > 8% Permeability > 2"/hr (seepage)	1.00 1.00 1.00
Rock outcrop, dacite-----	15	Not rated		Not rated	

Table 21.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Limitation	Value	Limitation	Value
168: Vitrixerands, low elevation-----	90	Limitations Depth to pan < 40" Permeability > 6"/hr in 24-60" (seepage and poor filter) Seepage in bottom layer	1.00 1.00 1.00	Limitations Depth to pan < 40" Permeability > 2"/hr (seepage)	1.00 1.00
169: Sueredo-----	55	Limitations Permeability < .6"/hr in 24-60" (slow perc) Slopes > 15% Fragments (>3") 25 to 50%	1.00 1.00 0.11	Limitations Slopes > 8% Permeability > 2"/hr (seepage)	1.00 1.00
Rock outcrop, cliffs-----	20	Not rated		Not rated	
Scoured-----	15	Limitations Depth to bedrock <40" Slopes > 15% Fragments (>3") >50%	1.00 1.00 1.00	Limitations Bedrock (hard) < 40" depth Slopes > 8% Permeability > 2"/hr (seepage)	1.00 1.00 1.00
170: Rock outcrop, rhyodacite-----	35	Not rated		Not rated	
Emeraldlake-----	20	Limitations Slopes > 15% Seepage in bottom layer Permeability > 6"/hr in 24-60" (seepage and poor filter)	1.00 1.00 1.00	Limitations Slopes > 8% Permeability > 2"/hr (seepage)	1.00 1.00
Rubble land-----	18	Not rated		Not rated	
Readingpeak-----	15	Limitations Slopes > 15% Seepage in bottom layer Depth to bedrock 40 to 72"	1.00 1.00 0.78	Limitations Slopes > 8% Permeability > 2"/hr (seepage) Bedrock (hard) from 40 to 60"	1.00 1.00 0.42
171: Aquepts-----	50	Limitations Saturation < 4' depth Slopes > 15% Seepage in bottom layer	1.00 1.00 1.00	Limitations Permeability > 2"/hr (seepage) Slopes > 8% Fragments (>3") > 35%	1.00 1.00 1.00
Typic Petraquepts, bedrock-----	35	Limitations Depth to bedrock <40" Saturation < 4' depth Seepage in bottom layer	1.00 1.00 1.00	Limitations Bedrock (hard) < 40" depth Permeability > 2"/hr (seepage) Slopes > 8%	1.00 1.00 1.00

Table 21.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Limitation	Value	Limitation	Value
172: Badgerflat-----	90	Limitations Permeability < .6"/hr in 24-60" (slow perc) Fragments (>3") 25 to 50%	1.00 0.42	Limitations Permeability > 2"/hr (seepage) Fragments (>3") 20-35% Slopes 2 to 8%	1.00 0.96 0.67
173: Badgerwash-----	90	Limitations Depth to pan < 40" Seepage in bottom layer Fragments (>3") 25 to 50%	1.00 1.00 0.86	Limitations Depth to pan < 40" Permeability > 2"/hr (seepage) Fragments (>3") > 35%	1.00 1.00 0.99
174: Vitrandic Cryorthents-----	60	Limitations Seepage in bottom layer Permeability > 6"/hr in 24-60" (seepage and poor filter)	1.00 1.00	Limitations Permeability > 2"/hr (seepage) Slopes 2 to 8%	1.00 0.67
Readingpeak-----	20	Limitations Seepage in bottom layer Slopes > 15% Depth to bedrock 40 to 72"	1.00 1.00 0.78	Limitations Permeability > 2"/hr (seepage) Slopes > 8% Bedrock (hard) from 40 to 60"	1.00 1.00 0.42
Rock outcrop-----	10	Not rated		Not rated	
175: Shadowlake-----	75	Limitations Permeability < .6"/hr in 24-60" (slow perc)	1.00	Limitations Permeability > 2"/hr (seepage) Slopes 2 to 8%	1.00 0.67
Vitrandic Cryofluvents-----	15	Limitations Ponded (any duration) Saturation < 4' depth Seepage in bottom layer	1.00 1.00 1.00	Limitations Saturation at < 3.5' depth Ponded (any duration) Permeability > 2"/hr (seepage)	1.00 1.00 1.00
176: Juniperlake, bouldery-----	85	Limitations Permeability < .6"/hr in 24-60" (slow perc) Slopes > 15% Fragments (>3") 25 to 50%	1.00 1.00 0.01	Limitations Slopes > 8% Permeability > 2"/hr (seepage) Fragments (>3") 20-35%	1.00 1.00 0.04
177: Vitrandic Cryorthents, debris flows, high elevation-----	85	Limitations Slopes > 15% Seepage in bottom layer Permeability > 6"/hr in 24-60" (seepage and poor filter)	1.00 1.00 1.00	Limitations Slopes > 8% Permeability > 2"/hr (seepage)	1.00 1.00

Table 21.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank adsorption fields		Sewage lagoons	
		Limitation	Value	Limitation	Value
200: Cinder land-----	100	Not rated		Not rated	
201: Lava flows-----	100	Not rated		Not rated	
202: Typic Xerorthents, tephra-----	85	Limitations Seepage in bottom layer Permeability > 6"/hr in 24-60" (seepage and poor filter)	1.00 1.00	Limitations Permeability > 2"/hr (seepage) Slopes 2 to 8%	1.00 0.67
Typic Xerorthents, welded-----	10	Limitations Seepage in bottom layer Slopes > 15%	1.00 1.00	Limitations Permeability > 2"/hr (seepage) Slopes > 8%	1.00 1.00
203: Typic Xerorthents, tephra-----	90	Limitations Seepage in bottom layer Permeability > 6"/hr in 24-60" (seepage and poor filter) Slopes 8 to 15%	1.00 1.00 0.37	Limitations Permeability > 2"/hr (seepage) Slopes > 8%	1.00 1.00
205: Beaches-----	100	Not rated		Not rated	
W: Water-----	100	Not rated		Not rated	

The interpretation for septic tanks adsorption fields evaluates the following soil properties at variable depths in the soil: flooding; ponding; wetness; slope; subsidence of organic soils; depth to hard or soft bedrock; depth to cemented pans; permeability that is too fast, allowing seepage; and permeability that is too slow or an impermeable layer at shallow a depth.

The interpretation for sewage lagoons evaluates the following soil properties at variable depths in the soil: flooding, ponding, wetness, slope, organic Unified classes for low strength (PT, OL, or OH), depth to hard or soft bedrock, depth to cemented pans, fragments greater than 3 inches in size, and permeability that is too fast, allowing seepage.

Table 22.—Construction Materials, Part I

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.00 to 0.99. The closer the value is to 0, the greater the potential limitation. Values of 0 are absolute limitations based on the soil property criteria used to develop the interpretation. Values closer to 1.0 have less of a limitation. Limiting features with values = 1 have absolutely no limitation and are not shown in this report. Rating classes are determined by the most limiting value. Fine-earth fractions and fragment limiting features are reported on a weight basis. A brief rating criteria summary and abbreviations used in the ratings are listed on the last page of this report)

Map symbol and soil name	Pct of map unit	Potential source of gravel		Potential source of sand		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
100: Buttelake-----	85	Fair source Thickest layer not a source due to fines or thin layer Bottom layer possible source	0.00 0.71	Fair source Bottom layer not a source Thickest layer possible source	0.00 0.04	Poor source Hard to reclaim Rock fragment content Slope 8 to 12%	0.00 0.00 0.84
101: Buttewash-----	85	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Poor source Bottom layer not a source Thickest layer not a source	0.00 0.00	Poor source Rock fragment content Hard to reclaim	0.00 0.00
102: Ashbutte-----	65	Fair source Thickest layer possible source Bottom layer possible source	0.14 0.14	Fair source Thickest layer possible source Bottom layer is a possible source	0.04 0.14	Poor source Slope > 15% Hard to reclaim Rock fragment content	0.00 0.00 0.00
Vitrantic Xerorthents-----	25	Fair source Thickest layer possible source Bottom layer possible source	0.16 0.57	Fair source Thickest layer possible source Bottom layer is a possible source	0.08 0.57	Poor source Slope > 15% Hard to reclaim Rock fragment content Sand fractions 75-85%	0.00 0.00 0.00 0.15
103: Scoured-----	75	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Poor source Bottom layer not a source Thickest layer not a source	0.00 0.00	Poor source Rock fragment content Depth to bedrock 20 to 40" Sand fractions 75-85%	0.00 0.52 0.98
104: Scoured-----	55	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Poor source Bottom layer not a source Thickest layer not a source	0.00 0.00	Poor source Rock fragment content Slope > 15% Depth to bedrock 20 to 40" Sand fractions 75-85%	0.00 0.00 0.52 0.98

Table 22.—Construction Materials, Part I—Continued

Map symbol and soil name	Pct of map unit	Potential source of gravel		Potential source of sand		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
104: Juniperlake-----	20	Fair source Thickest layer not a source due to fines or thin layer Bottom layer possible source	0.00 0.15	Fair source Thickest layer not a source Bottom layer is a possible source	0.00 0.04	Poor source Hard to reclaim Rock fragment content Slope > 15%	0.00 0.00 0.00
Rock outcrop-----	15	Not rated		Not rated		Not rated	
105: Juniperlake-----	85	Fair source Thickest layer not a source due to fines or thin layer Bottom layer possible source	0.00 0.15	Fair source Thickest layer not a source Bottom layer is a possible source	0.00 0.04	Poor source Hard to reclaim Rock fragment content Slope > 15%	0.00 0.00 0.00
106: Cenplat-----	70	Fair source Thickest layer not a source due to fines or thin layer Bottom layer possible source	0.00 0.38	Fair source Thickest layer not a source Bottom layer is a possible source	0.00 0.03	Poor source Rock fragment content Slope > 15% Depth to bedrock 20 to 40"	0.00 0.00 0.56
107: Badgerflat-----	40	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Thickest layer not a source Bottom layer is a possible source	0.00 0.10	Poor source Hard to reclaim Rock fragment content Slope > 15% Sand fractions 75-85%	0.00 0.00 0.00 0.30
Cenplat-----	35	Poor source Thickest layer not a source due to fines or thin layer Bottom layer not a source	0.00 0.00	Poor source Thickest layer not a source Bottom layer not a source	0.00 0.00	Poor source Rock fragment content Slope > 15% Sand fractions 75-85% Depth to bedrock 20 to 40"	0.00 0.00 0.20 0.96
108: Typic Xerorthents--	80	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Bottom layer is a possible source Thickest layer possible source	0.02 0.64	Poor source Sand fractions > 85% Hard to reclaim Rock fragment content	0.00 0.00 0.00

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Table 22.—Construction Materials, Part I—Continued

Map symbol and soil name	Pct of map unit	Potential source of gravel		Potential source of sand		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
109: Prospectpeak-----	85	Poor source Thickest layer not a source due to fines or thin layer Bottom layer not a source	0.00 0.00	Poor source Thickest layer not a source Bottom layer not a source	0.00 0.00	Poor source Hard to reclaim Rock fragment content Sand fractions 75-85% Slope 8 to 12%	0.00 0.00 0.67 0.84
110: Bearrubble-----	50	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Bottom layer not a source Thickest layer possible source	0.00 0.03	Poor source Rock fragment content Hard to reclaim Slope 8 to 12%	0.00 0.00 0.96
Rubble land-----	35	Not rated		Not rated		Not rated	
111: Vitrandic Xerorthents, debris fan-----	95	Fair source Bottom layer not a source Thickest layer possible source	0.00 0.03	Fair source Thickest layer possible source Bottom layer is a possible source	0.06 0.06	Poor source Hard to reclaim Rock fragment content Sand fractions 75-85%	0.00 0.00 0.18
112: Cascadesprings----	85	Poor source Thickest layer not a source due to fines or thin layer Bottom layer not a source	0.00 0.00	Poor source Bottom layer not a source Thickest layer not a source	0.00 0.00	Poor source Rock fragment content Slope > 15% Sand fractions 75-85%	0.00 0.00 0.93
113: Terracelake-----	35	Poor source Thickest layer not a source due to fines or thin layer Bottom layer not a source	0.00 0.00	Poor source Thickest layer not a source Bottom layer not a source	0.00 0.00	Poor source Slope > 15% Rock fragment content Depth to bedrock 20 to 40"	0.00 0.00 0.90
Emeraldlake-----	25	Poor source Thickest layer not a source due to fines or thin layer Bottom layer not a source	0.00 0.00	Poor source Bottom layer not a source Thickest layer not a source	0.00 0.00	Poor source Slope > 15% Rock fragment content Hard to reclaim Sand fractions 75-85%	0.00 0.00 0.00 0.05
Readingpeak-----	20	Fair source Thickest layer possible source Bottom layer possible source	0.03 0.03	Fair source Bottom layer is a possible source Thickest layer possible source	0.03 0.03	Poor source Slope > 15% Hard to reclaim Rock fragment content Sand fractions 75-85%	0.00 0.00 0.00 0.32
Rock outcrop-----	10	Not rated		Not rated		Not rated	

Table 22.—Construction Materials, Part I—Continued

Map symbol and soil name	Pct of map unit	Potential source of gravel		Potential source of sand		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
114: Emeraldlake-----	25	Poor source Thickest layer not a source due to fines or thin layer Bottom layer not a source	0.00 0.00	Poor source Bottom layer not a source Thickest layer not a source	0.00 0.00	Poor source Slope > 15% Rock fragment content Hard to reclaim Sand fractions 75-85%	0.00 0.00 0.00 0.05
Terracelake-----	23	Poor source Thickest layer not a source due to fines or thin layer Bottom layer not a source	0.00 0.00	Poor source Thickest layer not a source Bottom layer not a source	0.00 0.00	Poor source Slope > 15% Rock fragment content Depth to bedrock 20 to 40"	0.00 0.00 0.90
Readingpeak-----	20	Fair source Thickest layer possible source Bottom layer possible source	0.03 0.03	Fair source Bottom layer is a possible source Thickest layer possible source	0.03 0.03	Poor source Slope > 15% Hard to reclaim Rock fragment content Sand fractions 75-85%	0.00 0.00 0.00 0.32
Rock outcrop-----	15	Not rated		Not rated		Not rated	
Rubble land-----	12	Not rated		Not rated		Not rated	
115: Shadowlake-----	85	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Bottom layer not a source Thickest layer possible source	0.00 0.04	Poor source Rock fragment content Not hard to reclaim	0.00 1.00
116: Xeric Vitricryands, tephra over till--	30	Fair source Thickest layer not a source due to fines or thin layer Bottom layer possible source	0.00 0.22	Fair source Thickest layer possible source Bottom layer is a possible source	0.09 0.46	Poor source Hard to reclaim Rock fragment content Slope > 15% Sand fractions 75-85%	0.00 0.00 0.00 0.02
Terracelake-----	25	Poor source Thickest layer not a source due to fines or thin layer Bottom layer not a source	0.00 0.00	Poor source Thickest layer not a source Bottom layer not a source	0.00 0.00	Poor source Rock fragment content Slope > 15% Depth to bedrock 20 to 40"	0.00 0.00 0.90
Rock outcrop-----	15	Not rated		Not rated		Not rated	

Table 22.—Construction Materials, Part I—Continued

Map symbol and soil name	Pct of map unit	Potential source of gravel		Potential source of sand		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
116: Xeric Vitricryands, cirque floor-----	15	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Thickest layer possible source Bottom layer is a possible source	0.01 0.03	Poor source Rock fragment content Hard to reclaim Slope 8 to 12%	0.00 0.54 0.96
117: Humic Haploxerands, moist lake terrace-----	90	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Bottom layer not a source Thickest layer possible source	0.00 0.01	Poor source Rock fragment content Saturation from 1 to 3' Depth to pan 20 to 40"	0.00 0.18 0.58
118: Tyic Dystroxerepts, landslides-----	90	Poor source Thickest layer not a source due to fines or thin layer Bottom layer not a source	0.00 0.00	Poor source Bottom layer not a source Thickest layer not a source	0.00 0.00	Poor source Rock fragment content Hard to reclaim pH between 4.5 and 6.5 Slope 8 to 12%	0.00 0.50 0.50 0.84
119: Diamondpeak-----	30	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Poor source Bottom layer not a source Thickest layer not a source	0.00 0.00	Poor source Slope > 15% pH between 4.5 and 6.5	0.00 0.92
Brokeoff-----	25	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Poor source Bottom layer not a source Thickest layer not a source	0.00 0.00	Poor source Rock fragment content Slope > 15% pH between 4.5 and 6.5 Depth to bedrock 20 to 40"	0.00 0.00 0.88 0.88
Endoaquepts-----	14	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Poor source Bottom layer not a source Thickest layer not a source	0.00 0.00	Poor source Saturation < 1' depth Slope > 15% Rock fragment content Clay 27 to 40% Hard to reclaim	0.00 0.00 0.02 0.92 0.98

Table 22.—Construction Materials, Part I—Continued

Map symbol and soil name	Pct of map unit	Potential source of gravel		Potential source of sand		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
119: Aquic Dystroxerepts, debris flows-----	11	Fair source Bottom layer not a source Thickest layer possible source	0.00 0.03	Poor source Bottom layer not a source Thickest layer not a source	0.00 0.00	Poor source Saturation < 1' depth Hard to reclaim Slope > 15% Rock fragment content pH between 4.5 and 6.5	0.00 0.00 0.00 0.24
Typic Dystroxerepts	10	Fair source Thickest layer not a source due to fines or thin layer Bottom layer possible source	0.00 0.50	Fair source Thickest layer not a source Bottom layer is a possible source	0.00 0.04	Poor source Slope > 15% Depth to bedrock 20 to 40" pH between 4.5 and 6.5	0.00 0.04 0.12
120: Buttelake-----	65	Fair source Thickest layer not a source due to fines or thin layer Bottom layer possible source	0.00 0.71	Fair source Bottom layer not a source Thickest layer possible source	0.00 0.04	Poor source Slope > 15% Hard to reclaim Rock fragment content	0.00 0.00 0.00
Sunhoff-----	15	Fair source Thickest layer not a source due to fines or thin layer Bottom layer possible source	0.00 0.07	Fair source Thickest layer not a source Bottom layer is a possible source	0.00 0.04	Poor source Slope > 15% Rock fragment content Sand fractions 75-85%	0.00 0.00 0.38
Talved-----	10	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Poor source Bottom layer not a source Thickest layer not a source	0.00 0.00	Poor source Slope > 15% Rock fragment content Hard to reclaim	0.00 0.00 0.00
122: Xeric Vitricryands, colluvium-----	35	Fair source Thickest layer not a source due to fines or thin layer Bottom layer possible source	0.00 0.45	Fair source Thickest layer not a source Bottom layer is a possible source	0.00 0.10	Poor source Hard to reclaim Rock fragment content Slope > 15%	0.00 0.00 0.00
Xeric Vitricryands, ash over cinders--	30	Fair source Bottom layer possible source Thickest layer possible source	0.10 0.10	Fair source Thickest layer possible source Bottom layer is a possible source	0.11 0.74	Poor source Hard to reclaim Rock fragment content Slope > 15%	0.00 0.00 0.00

Table 22.—Construction Materials, Part I—Continued

Map symbol and soil name	Pct of map unit	Potential source of gravel		Potential source of sand		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
122: Xeric Vitricryands, bedrock-----	20	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Poor source Bottom layer not a source Thickest layer not a source	0.00 0.00	Poor source Rock fragment content Depth to bedrock 20 to 40" Slope 12 to 15%	0.00 0.06 0.16
125: Humic Haploxerands, stream terrace----	55	Fair source Bottom layer not a source Thickest layer possible source	0.00 0.31	Fair source Bottom layer not a source Thickest layer possible source	0.00 0.10	Poor source Hard to reclaim Rock fragment content Sand fractions 75-85%	0.00 0.00 0.25
Aquandic Humaquepts, flood plains-----	40	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Thickest layer not a source Bottom layer is a possible source	0.00 0.03	Poor source Saturation < 1' depth Hard to reclaim Rock fragment content	0.00 0.00 0.00
126: Kingsiron-----	45	Fair source Thickest layer possible source Bottom layer possible source	0.36 0.54	Fair source Thickest layer possible source Bottom layer is a possible source	0.02 0.02	Poor source Slope > 15% Hard to reclaim Rock fragment content	0.00 0.00 0.00
Dittmar-----	20	Fair source Thickest layer not a source due to fines or thin layer Bottom layer possible source	0.00 0.03	Poor source Bottom layer not a source Thickest layer not a source	0.00 0.00	Poor source Slope > 15% Rock fragment content Depth to bedrock < 20"	0.00 0.00 0.00
Rock outcrop-----	15	Not rated		Not rated		Not rated	
127: Humic Haploxerands, strath terrace----	65	Poor source Thickest layer not a source due to fines or thin layer Bottom layer not a source	0.00 0.00	Poor source Thickest layer not a source Bottom layer not a source	0.00 0.00	Poor source Rock fragment content Slope 12 to 15% Depth to bedrock 20 to 40"	0.00 0.37 0.42
Aquepts-----	15	Poor source Thickest layer not a source due to fines or thin layer Bottom layer not a source	0.00 0.00	Fair source Thickest layer possible source Bottom layer is a possible source	0.02 0.03	Poor source Saturation < 1' depth Rock fragment content Hard to reclaim Slope > 15%	0.00 0.00 0.00 0.00

Table 22.—Construction Materials, Part I—Continued

Map symbol and soil name	Pct of map unit	Potential source of gravel		Potential source of sand		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
129: Humic Haploxerands, colluvium-----	80	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Thickest layer possible source Bottom layer is a possible source	0.00 0.04	Poor source Hard to reclaim Rock fragment content Slope > 15%	0.00 0.00 0.00
130: Histic Humaquepts, lake sediments----	55	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Thickest layer not a source Bottom layer is a possible source	0.00 0.09	Poor source Saturation < 1' depth	0.00
Histic Humaquepts, frequently flooded	30	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Thickest layer not a source Bottom layer is a possible source	0.00 0.66	Poor source Saturation < 1' depth Rock fragment content Clay 27 to 40%	0.00 0.18 0.82
Typic Endoaquands--	15	Fair source Bottom layer not a source Thickest layer possible source	0.00 0.18	Fair source Thickest layer possible source Bottom layer is a possible source	0.05 0.10	Poor source Saturation < 1' depth Hard to reclaim Rock fragment content	0.00 0.00 0.00
132: Vitrandic Cryorthents, debris flows-----	90	Fair source Bottom layer not a source Thickest layer possible source	0.00 0.07	Fair source Thickest layer possible source Bottom layer is a possible source	0.07 0.09	Poor source Rock fragment content Hard to reclaim Sand fractions 75-85% Slope 8 to 12%	0.00 0.00 0.20 0.63
133: Vitrandic Xerofluvents-----	55	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Bottom layer is a possible source Thickest layer possible source	0.04 0.10	Poor source Rock fragment content Hard to reclaim Sand fractions 75-85%	0.00 0.00 0.32
Typic Endoaquents--	30	Poor source Thickest layer not a source due to fines or thin layer Bottom layer not a source	0.00 0.00 0.00	Fair source Thickest layer not a source Bottom layer is a possible source	0.00 0.70	Poor source Sand fractions > 85% Saturation < 1' depth Rock fragment content	0.00 0.00 0.00

Table 22.—Construction Materials, Part I—Continued

Map symbol and soil name	Pct of map unit	Potential source of gravel		Potential source of sand		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
134: Chaos-----	85	Poor source Thickest layer not a source due to fines or thin layer Bottom layer not a source	0.00 0.00	Fair source Bottom layer is a possible source Thickest layer possible source	0.08 0.10	Poor source Sand fractions > 85% Rock fragment content Hard to reclaim	0.00 0.00 0.00
136: Terracelake-----	45	Poor source Thickest layer not a source due to fines or thin layer Bottom layer not a source	0.00 0.00	Poor source Thickest layer not a source Bottom layer not a source	0.00 0.00	Poor source Rock fragment content Slope > 15% Depth to bedrock 20 to 40"	0.00 0.00 0.90
Rock outcrop-----	20	Not rated		Not rated		Not rated	
Xeric Vitricryands, cirque floor-----	15	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Thickest layer possible source Bottom layer is a possible source	0.01 0.03	Poor source Rock fragment content Slope > 15% Hard to reclaim	0.00 0.00 0.54
137: Xeric Vitricryands-	75	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Bottom layer is a possible source Thickest layer possible source	0.08 0.08	Fair source Sand fractions 75-85% Hard to reclaim Rock fragment content Slope 8 to 12%	0.15 0.32 0.76 0.84
Rock outcrop, rhyodacite-----	20	Not rated		Not rated		Not rated	
138: Vitrandic Xerofluvents, debris flows-----	80	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Bottom layer not a source Thickest layer possible source	0.00 0.10	Poor source Saturation < 1' depth Hard to reclaim Rock fragment content Sand fractions 75-85%	0.00 0.00 0.00 0.25
Typic Endoaquents--	10	Poor source Thickest layer not a source due to fines or thin layer Bottom layer not a source	0.00 0.00	Fair source Thickest layer not a source Bottom layer is a possible source	0.00 0.70	Poor source Sand fractions > 85% Saturation < 1' depth Rock fragment content	0.00 0.00 0.00

Table 22.—Construction Materials, Part I—Continued

Map symbol and soil name	Pct of map unit	Potential source of gravel		Potential source of sand		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
139: Duric Vitraquands--	60	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Thickest layer not a source Bottom layer is a possible source	0.00 0.10	Poor source Saturation < 1' depth Hard to reclaim Rock fragment content Sand fractions 75-85%	0.00 0.00 0.00 0.75
Typic Endoaquands--	20	Fair source Bottom layer not a source Thickest layer possible source	0.00 0.18	Fair source Thickest layer possible source Bottom layer is a possible source	0.05 0.10	Poor source Saturation < 1' depth Hard to reclaim Rock fragment content	0.00 0.00 0.00
Aquandic Cryaquents	15	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Thickest layer not a source Bottom layer is a possible source	0.00 0.61	Poor source Saturation < 1' depth Hard to reclaim OM = 15-30%	0.00 0.26 0.92
140: Vitrixerands-----	90	Poor source Thickest layer not a source due to fines or thin layer Bottom layer not a source	0.00 0.00	Fair source Bottom layer is a possible source Thickest layer possible source	0.08 0.08	Poor source Rock fragment content Sand fractions 75-85% Depth to pan 20 to 40"	0.00 0.80 0.96
141: Humic Haploxerands-	40	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Bottom layer not a source Thickest layer possible source	0.00 0.04	Poor source Rock fragment content Hard to reclaim Slope > 15%	0.00 0.00 0.00
Typic Haploxerands-	35	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Thickest layer not a source Bottom layer is a possible source	0.00 0.04	Poor source Rock fragment content Slope > 15%	0.00 0.00
Bearrubble-----	15	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Bottom layer not a source Thickest layer possible source	0.00 0.03	Poor source Rock fragment content Hard to reclaim	0.00 0.00
Rubble land-----	10	Not rated		Not rated		Not rated	
142: Cragwash-----	85	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Poor source Thickest layer not a source Bottom layer not a source	0.00 0.00	Poor source Rock fragment content Hard to reclaim Sand fractions 75-85%	0.00 0.00 0.09

Table 22.—Construction Materials, Part I—Continued

Map symbol and soil name	Pct of map unit	Potential source of gravel		Potential source of sand		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
143: Andic Durixerpts--	95	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Thickest layer not a source Bottom layer is a possible source	0.00 0.09	Poor source Rock fragment content Depth to pan 20 to 40"	0.00 0.08
144: Xeric Vitricryands, cirque floor-----	55	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Thickest layer possible source Bottom layer is a possible source	0.01 0.03	Poor source Rock fragment content Hard to reclaim	0.00 0.54
Humic Xeric Vitricryands-----	30	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Thickest layer not a source Bottom layer is a possible source	0.00 0.04	Poor source Rock fragment content Slope > 15%	0.00 0.00
145: Sueredo-----	85	Fair source Bottom layer not a source Thickest layer possible source	0.00 0.11	Fair source Bottom layer is a possible source Thickest layer possible source	0.09 0.11	Poor source Sand fractions > 85% Hard to reclaim Rock fragment content	0.00 0.00 0.00
146: Sueredo-----	90	Fair source Bottom layer not a source Thickest layer possible source	0.00 0.11	Fair source Bottom layer is a possible source Thickest layer possible source	0.09 0.11	Poor source Slope > 15% Sand fractions > 85% Hard to reclaim Rock fragment content	0.00 0.00 0.00 0.00
147: Summertown-----	85	Poor source Thickest layer not a source due to fines or thin layer Bottom layer not a source	0.00 0.00	Poor source Thickest layer not a source Bottom layer not a source	0.00 0.00	Poor source Rock fragment content Hard to reclaim Slope > 15% Sand fractions 75-85%	0.00 0.00 0.00 0.28
148: Humic Haploxerands, lake terrace-----	70	Poor source Thickest layer not a source due to fines or thin layer Bottom layer not a source	0.00 0.00	Poor source Bottom layer not a source Thickest layer not a source	0.00 0.00	Poor source Rock fragment content Depth to pan 20 to 40"	0.00 0.23

Table 22.—Construction Materials, Part I—Continued

Map symbol and soil name	Pct of map unit	Potential source of gravel		Potential source of sand		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
148: Typic Endoaquands--	15	Fair source Bottom layer not a source Thickest layer possible source	0.00 0.18	Fair source Thickest layer possible source Bottom layer is a possible source	0.05 0.10	Poor source Saturation < 1' depth Hard to reclaim Rock fragment content	0.00 0.00 0.00
149: Rubble land-----	45	Not rated		Not rated		Not rated	
Rock outcrop, cliffs-----	30	Not rated		Not rated		Not rated	
Emeraldlake-----	15	Poor source Thickest layer not a source due to fines or thin layer Bottom layer not a source	0.00 0.00	Poor source Bottom layer not a source Thickest layer not a source	0.00 0.00	Poor source Slope > 15% Rock fragment content Hard to reclaim Sand fractions 75-85%	0.00 0.00 0.00 0.05
150: Shadowlake-----	40	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Bottom layer not a source Thickest layer possible source	0.00 0.04	Poor source Slope > 15% Rock fragment content Not hard to reclaim	0.00 0.00 1.00
Terracelake-----	30	Poor source Thickest layer not a source due to fines or thin layer Bottom layer not a source	0.00 0.00	Poor source Thickest layer not a source Bottom layer not a source	0.00 0.00	Poor source Slope > 15% Rock fragment content Depth to bedrock 20 to 40"	0.00 0.00 0.90
Acroph-----	15	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Thickest layer not a source Bottom layer is a possible source	0.00 0.06	Poor source Slope > 15% Rock fragment content Depth to bedrock < 20" Sand fractions 75-85%	0.00 0.00 0.00 0.15
Rock outcrop-----	10	Not rated		Not rated		Not rated	
151: Terracelake-----	40	Poor source Thickest layer not a source due to fines or thin layer Bottom layer not a source	0.00 0.00	Poor source Thickest layer not a source Bottom layer not a source	0.00 0.00	Poor source Slope > 15% Rock fragment content Depth to bedrock 20 to 40"	0.00 0.00 0.90

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Table 22.—Construction Materials, Part I—Continued

Map symbol and soil name	Pct of map unit	Potential source of gravel		Potential source of sand		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
151: Acroph-----	20	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Thickest layer not a source Bottom layer is a possible source	0.00 0.06	Poor source Slope > 15% Rock fragment content Depth to bedrock < 20" Sand fractions 75-85%	0.00 0.00 0.00 0.15
Rock outcrop-----	15	Not rated		Not rated		Not rated	
Shadowlake-----	15	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Bottom layer not a source Thickest layer possible source	0.00 0.04	Poor source Slope > 15% Rock fragment content Not hard to reclaim	0.00 0.00 1.00
152: Terracelake-----	35	Poor source Thickest layer not a source due to fines or thin layer Bottom layer not a source	0.00 0.00	Poor source Thickest layer not a source Bottom layer not a source	0.00 0.00	Poor source Rock fragment content Depth to bedrock 20 to 40"	0.00 0.90
Shadowlake-----	30	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Bottom layer not a source Thickest layer possible source	0.00 0.04	Poor source Rock fragment content Not hard to reclaim	0.00 1.00
Acroph-----	15	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Thickest layer not a source Bottom layer is a possible source	0.00 0.06	Poor source Rock fragment content Depth to bedrock < 20" Sand fractions 75-85%	0.00 0.00 0.15
Rock outcrop-----	10	Not rated		Not rated		Not rated	
153: Typic Vitriixerands-	50	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Thickest layer possible source Bottom layer is a possible source	0.08 0.08	Poor source Hard to reclaim Rock fragment content Sand fractions 75-85% Slope 8 to 12%	0.00 0.00 0.20 0.96
Vitrandic Xerorthents, moraine-----	45	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Thickest layer possible source Bottom layer is a possible source	0.05 0.10	Poor source Rock fragment content Slope > 15% Sand fractions 75-85%	0.00 0.00 0.40

Table 22.—Construction Materials, Part I—Continued

Map symbol and soil name	Pct of map unit	Potential source of gravel		Potential source of sand		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
154: Typic Vitriixerands-	45	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Thickest layer possible source Bottom layer is a possible source	0.08 0.08	Poor source Slope > 15% Hard to reclaim Rock fragment content Sand fractions 75-85%	0.00 0.00 0.00 0.20
Vitrandic Xerorthents, moraine-----	35	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Thickest layer possible source Bottom layer is a possible source	0.05 0.10	Poor source Slope > 15% Rock fragment content Sand fractions 75-85%	0.00 0.00 0.40
155: Xeric Vitricryands, pyroclastic surge-	90	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Thickest layer not a source Bottom layer is a possible source	0.00 0.10	Poor source Rock fragment content Hard to reclaim Slope > 15%	0.00 0.00 0.00
156: Xeric Vitricryands, pyroclastic surge-	90	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Thickest layer not a source Bottom layer is a possible source	0.00 0.10	Poor source Slope > 15% Rock fragment content Hard to reclaim	0.00 0.00 0.00
157: Typic Vitriixerands, very deep-----	90	Fair source Thickest layer not a source due to fines or thin layer Bottom layer possible source	0.00 0.03	Fair source Thickest layer possible source Bottom layer is a possible source	0.02 0.03	Poor source Hard to reclaim Rock fragment content Slope 8 to 12%	0.00 0.00 0.96
158: Typic Vitriixerands, unglaciated-----	75	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Thickest layer possible source Bottom layer is a possible source	0.10 0.10	Poor source Rock fragment content Slope 12 to 15% Sand fractions 75-85%	0.00 0.16 0.25
Rock outcrop, rhyodacite-----	20	Not rated		Not rated		Not rated	

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Table 22.—Construction Materials, Part I—Continued

Map symbol and soil name	Pct of map unit	Potential source of gravel		Potential source of sand		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
159: Typic Vitrixerands, bouldery-----	40	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Poor source Bottom layer not a source Thickest layer not a source	0.00 0.00	Poor source Slope > 15% Sand fractions > 85% Hard to reclaim Rock fragment content	0.00 0.00 0.00 0.00
Typic Vitrixerands, tephra over colluvium-----	35	Fair source Thickest layer not a source due to fines or thin layer Bottom layer possible source	0.00 0.30	Fair source Thickest layer possible source Bottom layer is a possible source	0.03 0.10	Poor source Slope > 15% Hard to reclaim Rock fragment content	0.00 0.00 0.00
Rubble land-----	15	Not rated		Not rated		Not rated	
160: Aeric Endoaquents--	45	Fair source Bottom layer possible source Thickest layer possible source	0.11 0.11	Fair source Thickest layer possible source Bottom layer is a possible source	0.11 0.11	Poor source Sand fractions > 85% Hard to reclaim Rock fragment content Saturation from 1 to 3'	0.00 0.00 0.00 0.01
Humic Haploxerands, stream terrace----	35	Fair source Bottom layer not a source Thickest layer possible source	0.00 0.31	Fair source Bottom layer not a source Thickest layer possible source	0.00 0.10	Poor source Hard to reclaim Rock fragment content Sand fractions 75-85%	0.00 0.00 0.25
Riverwash-----	15	Not rated		Not rated		Not rated	
161: Typic Psammaquents-	95	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Thickest layer not a source Bottom layer is a possible source	0.00 0.95	Poor source Sand fractions > 85% Saturation < 1' depth	0.00 0.00
162: Humic Haploxerands, outwash-----	95	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Thickest layer possible source Bottom layer is a possible source	0.08 0.34	Poor source Hard to reclaim Rock fragment content Sand fractions 75-85%	0.00 0.00 0.30

Table 22.—Construction Materials, Part I—Continued

Map symbol and soil name	Pct of map unit	Potential source of gravel		Potential source of sand		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
163: Vitrandic Cryofluvents-----	65	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Good source Thickest layer not a source	0.00	Poor source Saturation < 1' depth	0.00
Aquandic Cryaquepts	30	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Thickest layer not a source Bottom layer is a possible source	0.00 0.61	Poor source Saturation < 1' depth Hard to reclaim OM = 15-30%	0.00 0.26 0.92
164: Aquepts-----	35	Poor source Thickest layer not a source due to fines or thin layer Bottom layer not a source	0.00 0.00	Fair source Thickest layer possible source Bottom layer is a possible source	0.02 0.03	Poor source Saturation < 1' depth Rock fragment content Hard to reclaim Slope 8 to 12%	0.00 0.00 0.00 0.84
Typic Petraquepts, bedrock-----	25	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Thickest layer possible source Bottom layer is a possible source	0.05 0.10	Poor source Saturation < 1' depth Rock fragment content Slope > 15% Depth to bedrock 20 to 40"	0.00 0.00 0.00 0.78
Aquic Haploxerands-	20	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Bottom layer is a possible source Thickest layer possible source	0.04 0.04	Poor source Rock fragment content Saturation from 1 to 3' Slope 12 to 15% Depth to pan > 40" or NULL data	0.00 0.07 0.37 1.00
Typic Petraquepts--	10	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Poor source Bottom layer not a source Thickest layer not a source	0.00 0.00	Poor source Saturation < 1' depth Depth to pan 20 to 40" Rock fragment content Slope 8 to 12%	0.00 0.16 0.59 0.96
165: Aquandic Humaquepts	35	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Thickest layer possible source Bottom layer is a possible source	0.00 0.03	Poor source Saturation < 1' depth Rock fragment content Hard to reclaim	0.00 0.00 0.20

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Table 22.—Construction Materials, Part I—Continued

Map symbol and soil name	Pct of map unit	Potential source of gravel		Potential source of sand		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
165: Histic Humaquepts--	25	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Thickest layer possible source Bottom layer is a possible source	0.01 0.10	Poor source Saturation < 1' depth Hard to reclaim pH > 6.5 or is NULL	0.00 0.00 1.00
Aquandic Endoaquepts-----	20	Fair source Thickest layer not a source due to fines or thin layer Bottom layer possible source	0.00 0.25	Fair source Thickest layer not a source Bottom layer is a possible source	0.00 0.10	Poor source Saturation < 1' depth Hard to reclaim Rock fragment content	0.00 0.00 0.00
Terric Haplohemists	15	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Poor source Bottom layer not a source Thickest layer not a source	0.00 0.00	Poor source Saturation < 1' depth OM > 30%	0.00 0.00
166: Aquic Haploxerands--	50	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Bottom layer is a possible source Thickest layer possible source	0.04 0.04	Poor source Rock fragment content Saturation from 1 to 3' Depth to pan > 40" or NULL data	0.00 0.07 1.00
Humic Haploxerands, outwash terrace---	40	Poor source Thickest layer not a source due to fines or thin layer Bottom layer not a source	0.00 0.00	Poor source Bottom layer not a source Thickest layer not a source	0.00 0.00	Poor source Rock fragment content Slope > 15% Depth to pan 20 to 40"	0.00 0.00 0.65
167: Emeraldlake-----	35	Poor source Thickest layer not a source due to fines or thin layer Bottom layer not a source	0.00 0.00	Poor source Bottom layer not a source Thickest layer not a source	0.00 0.00	Poor source Slope > 15% Rock fragment content Hard to reclaim Sand fractions 75-85%	0.00 0.00 0.00 0.05
Readingpeak-----	20	Fair source Thickest layer possible source Bottom layer possible source	0.03 0.03	Fair source Bottom layer is a possible source Thickest layer possible source	0.03 0.03	Poor source Slope > 15% Hard to reclaim Rock fragment content Sand fractions 75-85%	0.00 0.00 0.00 0.32

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Table 22.—Construction Materials, Part I—Continued

Map symbol and soil name	Pct of map unit	Potential source of gravel		Potential source of sand		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
167: Terracelake-----	15	Poor source Thickest layer not a source due to fines or thin layer Bottom layer not a source	0.00 0.00	Poor source Thickest layer not a source Bottom layer not a source	0.00 0.00	Poor source Slope > 15% Rock fragment content Depth to bedrock 20 to 40"	0.00 0.00 0.90
Rock outcrop, dacite-----	15	Not rated		Not rated		Not rated	
168: Vitrikerands, low elevation-----	90	Poor source Thickest layer not a source due to fines or thin layer Bottom layer not a source	0.00 0.00	Fair source Bottom layer is a possible source Thickest layer possible source	0.08 0.08	Poor source Rock fragment content Sand fractions 75-85% Depth to pan 20 to 40"	0.00 0.80 0.96
169: Sueredo-----	55	Fair source Bottom layer not a source Thickest layer possible source	0.00 0.11	Fair source Bottom layer is a possible source Thickest layer possible source	0.09 0.11	Poor source Slope > 15% Sand fractions > 85% Hard to reclaim Rock fragment content	0.00 0.00 0.00 0.00
Rock outcrop, cliffs-----	20	Not rated		Not rated		Not rated	
Scoured-----	15	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Poor source Bottom layer not a source Thickest layer not a source	0.00 0.00	Poor source Slope > 15% Rock fragment content Depth to bedrock 20 to 40" Sand fractions 75-85%	0.00 0.00 0.52 0.98
170: Rock outcrop, rhyodacite-----	35	Not rated		Not rated		Not rated	
Emeraldlake-----	20	Poor source Thickest layer not a source due to fines or thin layer Bottom layer not a source	0.00 0.00	Poor source Bottom layer not a source Thickest layer not a source	0.00 0.00	Poor source Slope > 15% Rock fragment content Hard to reclaim Sand fractions 75-85%	0.00 0.00 0.00 0.05
Rubble land-----	18	Not rated		Not rated		Not rated	

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Table 22.—Construction Materials, Part I—Continued

Map symbol and soil name	Pct of map unit	Potential source of gravel		Potential source of sand		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
170: Readingpeak-----	15	Fair source Thickest layer possible source Bottom layer possible source	0.03 0.03	Fair source Bottom layer is a possible source Thickest layer possible source	0.03 0.03	Poor source Slope > 15% Hard to reclaim Rock fragment content Sand fractions 75-85%	0.00 0.00 0.00 0.32
171: Aquepts-----	50	Poor source Thickest layer not a source due to fines or thin layer Bottom layer not a source	0.00 0.00	Fair source Thickest layer possible source Bottom layer is a possible source	0.02 0.03	Poor source Saturation < 1' depth Rock fragment content Hard to reclaim Slope > 15%	0.00 0.00 0.00 0.00
Typic Petraquepts, bedrock-----	35	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Thickest layer possible source Bottom layer is a possible source	0.05 0.10	Poor source Saturation < 1' depth Rock fragment content Slope > 15% Depth to bedrock 20 to 40"	0.00 0.00 0.00 0.78
172: Badgerflat-----	90	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Thickest layer not a source Bottom layer is a possible source	0.00 0.10	Poor source Hard to reclaim Rock fragment content Sand fractions 75-85%	0.00 0.00 0.30
173: Badgerwash-----	90	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Bottom layer is a possible source Thickest layer possible source	0.03 0.03	Poor source Rock fragment content Depth to pan 20 to 40"	0.00 0.90
174: Vitrandic Cryorthents-----	60	Fair source Thickest layer not a source due to fines or thin layer Bottom layer possible source	0.00 0.03	Fair source Thickest layer possible source Bottom layer is a possible source	0.36 0.66	Poor source Sand fractions > 85% Rock fragment content Hard to reclaim	0.00 0.00 0.00
Readingpeak-----	20	Fair source Thickest layer possible source Bottom layer possible source	0.03 0.03	Fair source Bottom layer is a possible source Thickest layer possible source	0.03 0.03	Poor source Hard to reclaim Rock fragment content Slope > 15% Sand fractions 75-85%	0.00 0.00 0.00 0.32

Table 22.—Construction Materials, Part I—Continued

Map symbol and soil name	Pct of map unit	Potential source of gravel		Potential source of sand		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
174: Rock outcrop-----	10	Not rated		Not rated		Not rated	
175: Shadowlake-----	75	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Bottom layer not a source Thickest layer possible source	0.00 0.04	Poor source Rock fragment content Not hard to reclaim	0.00 1.00
Vitrandic Cryofluvents-----	15	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Good source Thickest layer not a source	0.00	Poor source Saturation < 1' depth	0.00
176: Juniperlake, bouldery-----	85	Fair source Thickest layer not a source due to fines or thin layer Bottom layer possible source	0.00 0.15	Fair source Thickest layer not a source Bottom layer is a possible source	0.00 0.04	Poor source Hard to reclaim Rock fragment content Slope > 15%	0.00 0.00 0.00
177: Vitrandic Cryorthents, debris flows, high elevation----	85	Fair source Thickest layer not a source due to fines or thin layer Bottom layer possible source	0.00 0.45	Fair source Bottom layer is a possible source Thickest layer possible source	0.10 0.10	Poor source Slope > 15% Rock fragment content Hard to reclaim Sand fractions 75-85%	0.00 0.00 0.00 0.13
200: Cinder land-----	100	Not rated		Not rated		Not rated	
201: Lava flows-----	100	Not rated		Not rated		Not rated	
202: Typic Xerorthents, tephra-----	85	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Thickest layer possible source Bottom layer is a possible source	0.07 0.95	Poor source Sand fractions > 85% Hard to reclaim Rock fragment content	0.00 0.00 0.00

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Table 22.—Construction Materials, Part I—Continued

Map symbol and soil name	Pct of map unit	Potential source of gravel		Potential source of sand		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
202: Typic Xerorthents, welded-----	10	Fair source Thickest layer not a source due to fines or thin layer Bottom layer possible source	0.00 0.65	Fair source Thickest layer not a source Bottom layer is a possible source	0.00 0.71	Poor source Sand fractions > 85% Rock fragment content Slope > 15%	0.00 0.00 0.00
203: Typic Xerorthents, tephra-----	90	Poor source Bottom layer not a source Thickest layer not a source due to fines or thin layer	0.00 0.00	Fair source Thickest layer possible Bottom layer is a possible source	0.07 0.95	Poor source Sand fractions > 85% Hard to reclaim Rock fragment content Slope 8 to 12%	0.00 0.00 0.00 0.63
205: Beaches-----	100	Not rated		Not rated		Not rated	
W: Water-----	100	Not rated		Not rated		Not rated	

The interpretation for gravel source evaluates coarse fragments greater than .2 inch in size in the bottom layer or in the thickest layer of the soil. The interpretation for sand source evaluates the amount of sand and fine gravel in the thickest layer or in the bottom layer of the soil. Organic soil layers with a Unified engineering class for peat (PT) are also evaluated.

The interpretation for topsoil source evaluates the following soil properties at various depths: calcium carbonates, clay amount, soil bulk density, sand amount, soil wetness, coarse fragments .2 inch to 3 inches in size, fragments greater than 3 inches in size, organic matter content (OM), sodium content expressed as the sodium adsorption ratio (SAR), salinity expressed as dS/m of electrical conductivity (EC), depth to bedrock, slope, and soil pH.

Table 22.—Construction Materials, Part II

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.00 to 0.99. The closer the value is to 0, the greater the potential limitation. Values of 0 are absolute limitations based on the soil property criteria used to develop the interpretation. Values closer to 1.0 have less of a limitation. Limiting features with values = 1 have absolutely no limitation and are not shown in this report. Rating classes are determined by the most limiting value. Fine-earth fractions and fragment-limiting features are reported on a weight basis. A brief summary of rating criteria and abbreviations are listed on the last page of this report)

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value
100: Buttelake-----	85	Poor source WEG = 1 or 2 AWC < 3" to 60" depth pH is between 4 and 6.5 above 40"	0.00 0.00 0.76	Good source	
101: Buttewash-----	85	Poor source WEG = 1 or 2 AWC 3 - 6" to 60" depth pH is between 4 and 6.5 above 40"	0.00 0.38 0.72	Fair source Depth to pan 40-60"	0.18
102: Ashbutte-----	65	Poor source WEG = 1 or 2 AWC < 3" to 60" depth	0.00 0.00	Poor source Slopes > 25%	0.00
Vitrandic Xerorthents-----	25	Poor source WEG = 1 or 2 AWC < 3" to 60" depth Sand fractions 75 to 85% pH is between 4 and 6.5 above 40" Fragments >10" are 5-15%	0.00 0.00 0.34 0.84 0.87	Poor source Slopes > 25%	0.00
103: Scoured-----	75	Poor source Fragments >10" are > 15% AWC < 3" to 60" depth pH is between 4 and 6.5 above 40"	0.00 0.00 0.72	Poor source Depth to bedrock < 40"	0.00
104: Scoured-----	55	Poor source Fragments >10" are > 15% AWC < 3" to 60" depth pH is between 4 and 6.5 above 40"	0.00 0.00 0.72	Poor source Depth to bedrock < 40" Slopes > 25%	0.00 0.00
Juniperlake-----	20	Fair source AWC 3 - 6" to 60" depth pH is between 4 and 6.5 above 40" Fragments 3-10" < 25% or NULL data	0.03 0.76 1.00	Poor source Slopes > 25% Fragments >3" are 25 to 50%	0.00 0.99

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Table 22.—Construction Materials, Part II—Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value
104: Rock outcrop-----	15	Not rated		Not rated	
105: Juniperlake-----	85	Fair source AWC 3 - 6" to 60" depth pH is between 4 and 6.5 above 40" Fragments 3-10" < 25% or NULL data	0.03 0.76 1.00	Poor source Slopes > 25% Fragments >3" are 25 to 50%	0.00 0.99
106: Cenplat-----	70	Poor source WEG = 1 or 2 AWC < 3" to 60" depth Fragments >10" are > 15% pH is between 4 and 6.5 above 40" Fragments 3-10" < 25% or NULL data	0.00 0.00 0.00 0.92 1.00	Poor source Depth to bedrock < 40" Fragments >3" are 25 to 50%	0.00 1.00
107: Badgerflat-----	40	Poor source Fragments >10" are > 15% AWC < 3" to 60" depth Sand fractions 75 to 85% pH is between 4 and 6.5 above 40"	0.00 0.00 0.65 0.92	Fair source Slopes 15 to 25%	0.50
Cenplat-----	35	Poor source AWC < 3" to 60" depth Fragments >10" are > 15% Sand fractions 75 to 85% pH is between 4 and 6.5 above 40"	0.00 0.00 0.46 0.60	Poor source Depth to bedrock < 40" Slopes > 25%	0.00 0.00
108: Typic Xerorthents-----	80	Poor source Sand fractions > 85% WEG = 1 or 2 AWC < 3" to 60" depth OM < .5%	0.00 0.00 0.00 0.00	Good source	
109: Prospectpeak-----	85	Poor source WEG = 1 or 2 Fragments >10" are > 15% AWC < 3" to 60" depth Fragments 3-10" are 25 to 50% pH is between 4 and 6.5 above 40" Sand fractions 75 to 85%	0.00 0.00 0.00 0.91 0.96 0.98	Fair source Depth to bedrock 40 to 60" Fragments >3" are 25 to 50%	0.58 0.96

Table 22.—Construction Materials, Part II—Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value
110: Bearrubble-----	50	Poor source WEG = 1 or 2 Fragments >10" are > 15% AWC 3 - 6" to 60" depth pH is between 4 and 6.5 above 40"	0.00 0.00 0.05 0.88	Good source	
Rubble land-----	35	Not rated		Not rated	
111: Vitrandic Xerorthents, debris fan-	95	Poor source OM < .5% AWC < 3" to 60" depth Sand fractions 75 to 85% pH is between 4 and 6.5 above 40" Fragments >10" are 5-15% Fragments 3-10" are 25 to 50%	0.00 0.00 0.41 0.84 0.95 0.97	Good source Fragments >3" are 25 to 50%	1.00
112: Cascadesprings-----	85	Poor source WEG = 1 or 2 AWC < 3" to 60" depth pH is between 4 and 6.5 above 40" Fragments >10" are 5-15%	0.00 0.00 0.32 0.53	Good source	
113: Terracelake-----	35	Poor source AWC < 3" to 60" depth Fragments >10" are > 15% pH is between 4 and 6.5 above 40"	0.00 0.00 0.60	Poor source Depth to bedrock < 40" Slopes > 25%	0.00 0.00
Emeraldlake-----	25	Poor source AWC < 3" to 60" depth Fragments >10" are > 15% Sand fractions 75 to 85% pH is between 4 and 6.5 above 40"	0.00 0.00 0.12 0.60	Poor source Slopes > 25%	0.00
Readingpeak-----	20	Poor source AWC < 3" to 60" depth Fragments >10" are > 15% pH is between 4 and 6.5 above 40" Sand fractions 75 to 85%	0.00 0.00 0.64 0.68	Poor source Slopes > 25% Depth to bedrock 40 to 60"	0.00 0.58
Rock outcrop-----	10	Not rated		Not rated	

Table 22.—Construction Materials, Part II—Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value
114: Emeraldlake-----	25	Poor source AWC < 3" to 60" depth Fragments >10" are > 15% Sand fractions 75 to 85% pH is between 4 and 6.5 above 40"	0.00 0.00 0.12 0.60	Poor source Slopes > 25%	0.00
Terracelake-----	23	Poor source AWC < 3" to 60" depth Fragments >10" are > 15% pH is between 4 and 6.5 above 40"	0.00 0.00 0.60	Poor source Depth to bedrock < 40" Slopes > 25%	0.00 0.00
Readingpeak-----	20	Poor source AWC < 3" to 60" depth Fragments >10" are > 15% pH is between 4 and 6.5 above 40" Sand fractions 75 to 85%	0.00 0.00 0.64 0.68	Poor source Slopes > 25% Depth to bedrock 40 to 60"	0.00 0.58
Rock outcrop-----	15	Not rated		Not rated	
Rubble land-----	12	Not rated		Not rated	
115: Shadowlake-----	85	Fair source AWC 3 - 6" to 60" depth pH is between 4 and 6.5 above 40"	0.32 0.80	Good source	
116: Xeric Vitricryands, tephra over till-----	30	Poor source WEG = 1 or 2 AWC < 3" to 60" depth Sand fractions 75 to 85% pH is between 4 and 6.5 above 40" Fragments >10" are 5-15%	0.00 0.00 0.05 0.12 0.45	Fair source Slopes 15 to 25%	0.18
Terracelake-----	25	Poor source AWC < 3" to 60" depth Fragments >10" are > 15% pH is between 4 and 6.5 above 40"	0.00 0.00 0.60	Poor source Depth to bedrock < 40" Slopes > 25%	0.00 0.00
Rock outcrop-----	15	Not rated		Not rated	
Xeric Vitricryands, cirque floor--	15	Poor source OM < .5% AWC 3 - 6" to 60" depth pH is between 4 and 6.5 above 40"	0.00 0.07 0.80	Good source	

Table 22.—Construction Materials, Part II—Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value
117: Humic Haploxerands, moist lake terrace-----	90	Poor source WEG = 1 or 2 AWC < 3" to 60" depth Fragments >10" are > 15% Depth to pan 20 to 40"	0.00 0.00 0.00 0.58	Poor source Depth to pan < 40" Saturation from 1 to 3'	0.00 0.18
118: Typic Dystroxerepts, landslides---	90	Poor source Fragments >10" are > 15% pH is between 4 and 6.5 above 40" AWC 3 - 6" to 60" depth	0.00 0.12 0.81	Fair source LEP 3 to 9	0.98
119: Diamondpeak-----	30	Fair source pH is between 4 and 6.5 above 40"	0.28	Poor source AASHTO GIN > 8 (low soil strength) Slopes > 25%	0.00 0.00
Brokeoff-----	25	Poor source AWC < 3" to 60" depth pH is between 4 and 6.5 above 40" Fragments >10" are 5-15% Fragments 3-10" are 25 to 50%	0.00 0.32 0.67 0.84	Poor source Depth to bedrock < 40" Slopes > 25% Fragments >3" are 25 to 50%	0.00 0.00 0.84
Endoaquepts-----	14	Fair source Clay 27 to 40% Fragments >10" are 5-15%	0.92 0.94	Poor source Saturation < 1' depth Slopes > 25% AASHTO GIN > 8 (low soil strength) LEP 3 to 9	0.00 0.00 0.00 0.60
Aquic Dystroxerepts, debris flows-	11	Poor source pH is < 4 below 40" AWC 3 - 6" to 60" depth	0.00 0.57	Poor source Saturation < 1' depth Slopes 15 to 25% LEP 3 to 9	0.00 0.82 0.89
Typic Dystroxerepts-----	10	Poor source AWC < 3" to 60" depth pH is < 4 below 40" OM is .5 to 1% K factor .10 -.35	0.00 0.00 0.68 0.90	Poor source Depth to bedrock < 40" Slopes > 25%	0.00 0.00
120: Buttelake-----	65	Poor source WEG = 1 or 2 AWC < 3" to 60" depth pH is between 4 and 6.5 above 40"	0.00 0.00 0.76	Poor source Slopes > 25%	0.00

Table 22.—Construction Materials, Part II—Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value
120: Sunhoff-----	15	Poor source WEG = 1 or 2 AWC < 3" to 60" depth Fragments >10" are 5-15% Sand fractions 75 to 85% pH is between 4 and 6.5 above 40"	0.00 0.00 0.20 0.76 0.96	Poor source Slopes > 25%	0.00
Talved-----	10	Poor source Fragments >10" are > 15% AWC < 3" to 60" depth	0.00 0.00	Poor source Slopes > 25% Fragments >3" are 25 to 50%	0.00 0.98
122: Xeric Vitricryands, colluvium----	35	Fair source AWC 3 - 6" to 60" depth	0.06	Poor source Slopes > 25%	0.00
Xeric Vitricryands, ash over cinders-----	30	Poor source AWC < 3" to 60" depth pH is between 4 and 6.5 above 40"	0.00 0.60	Fair source Slopes 15 to 25%	0.18
Xeric Vitricryands, bedrock-----	20	Poor source WEG = 1 or 2 Fragments >10" are > 15% AWC < 3" to 60" depth	0.00 0.00 0.00	Poor source Depth to bedrock < 40"	0.00
125: Humic Haploxerands, stream terrace	55	Poor source Fragments >10" are > 15% AWC < 3" to 60" depth Sand fractions 75 to 85% pH is between 4 and 6.5 above 40"	0.00 0.00 0.56 0.80	Good source	
Aquandic Humaquepts, flood plains-	40	Fair source Fragments >10" are 5-15% pH is between 4 and 6.5 above 40" AWC 3 - 6" to 60" depth	0.11 0.88 0.99	Poor source Saturation < 1' depth	0.00
126: Kingsiron-----	45	Poor source AWC < 3" to 60" depth	0.00	Poor source Slopes > 25%	0.00
Dittmar-----	20	Poor source AWC < 3" to 60" depth Fragments >10" are > 15% pH is between 4 and 6.5 above 40"	0.00 0.00 0.60	Poor source Depth to bedrock < 40" Slopes > 25%	0.00 0.00
Rock outcrop-----	15	Not rated		Not rated	

Table 22.—Construction Materials, Part II—Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value
127: Humic Haploxerands, strath terrace	65	Poor source AWC < 3" to 60" depth pH is between 4 and 6.5 above 40"	0.00 0.80	Poor source Depth to bedrock < 40"	0.00
Aquepts-----	15	Poor source AWC < 3" to 60" depth Fragments >10" are > 15% pH is between 4 and 6.5 above 40"	0.00 0.00 0.40	Poor source Saturation < 1' depth	0.00
129: Humic Haploxerands, colluvium----	80	Poor source AWC < 3" to 60" depth pH is between 4 and 6.5 above 40"	0.00 0.80	Fair source Slopes 15 to 25%	0.02
130: Histic Humaquepts, lake sediments-	55	Poor source WEG = 1 or 2 pH is between 4 and 6.5 above 40"	0.00 0.80	Poor source Saturation < 1' depth	0.00
Histic Humaquepts, frequently flooded-----	30	Fair source pH is between 4 and 6.5 above 40" Clay 27 to 40%	0.64 0.82	Poor source Saturation < 1' depth LEP 3 to 9	0.00 0.96
Typic Endoaquands-----	15	Fair source AWC 3 - 6" to 60" depth pH is between 4 and 6.5 above 40"	0.08 0.68	Poor source Saturation < 1' depth	0.00
132: Vitrandic Cryorthents, debris flows-----	90	Poor source WEG = 1 or 2 AWC < 3" to 60" depth Sand fractions 75 to 85% Fragments >10" are 5-15% pH is between 4 and 6.5 above 40"	0.00 0.00 0.46 0.68 0.80	Good source	
133: Vitrandic Xerofluvents-----	55	Poor source WEG = 1 or 2 OM < .5% AWC 3 - 6" to 60" depth Sand fractions 75 to 85%	0.00 0.00 0.36 0.68	Good source	
Typic Endoaquents-----	30	Poor source Sand fractions > 85% AWC < 3" to 60" depth OM < .5%	0.00 0.00 0.00	Poor source Saturation < 1' depth	0.00

Table 22.—Construction Materials, Part II—Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value
134: Chaos-----	85	Poor source Sand fractions > 85% OM < .5% AWC 3 - 6" to 60" depth pH is between 4 and 6.5 above 40"	0.00 0.00 0.04 0.52	Good source	
136: Terracelake-----	45	Poor source AWC < 3" to 60" depth Fragments >10" are > 15% pH is between 4 and 6.5 above 40"	0.00 0.00 0.60	Poor source Depth to bedrock < 40" Slopes > 25%	0.00 0.00
Rock outcrop-----	20	Not rated		Not rated	
Xeric Vitricryands, cirque floor--	15	Poor source OM < .5% AWC 3 - 6" to 60" depth pH is between 4 and 6.5 above 40"	0.00 0.07 0.80	Good source	
137: Xeric Vitricryands-----	75	Poor source WEG = 1 or 2 OM < .5% Sand fractions 75 to 85% AWC 3 - 6" to 60" depth K factor < .10 or is NULL	0.00 0.00 0.34 0.83 0.99	Good source	
Rock outcrop, rhyodacite-----	20	Not rated		Not rated	
138: Vitrandic Xerofluvents, debris flows-----	80	Poor source WEG = 1 or 2 OM < .5% AWC 3 - 6" to 60" depth Sand fractions 75 to 85% pH is between 4 and 6.5 above 40"	0.00 0.00 0.55 0.56 0.80	Poor source Saturation < 1' depth	0.00
Typic Endoaquents-----	10	Poor source Sand fractions > 85% AWC < 3" to 60" depth OM < .5%	0.00 0.00 0.00	Poor source Saturation < 1' depth	0.00

Table 22.—Construction Materials, Part II—Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value
139: Duric Vitraquands-----	60	Poor source WEG = 1 or 2 AWC < 3" to 60" depth pH is between 4 and 6.5 above 40" Sand fractions < 75% or is NULL	0.00 0.00 0.32 1.00	Poor source Saturation < 1' depth Depth to pan 40-60"	0.00 0.12
Typic Endoaquands-----	20	Fair source AWC 3 - 6" to 60" depth pH is between 4 and 6.5 above 40"	0.08 0.68	Poor source Saturation < 1' depth	0.00
Aquandic Cryaquents-----	15	Fair source K factor .10 -.35 AWC 3 - 6" to 60" depth	0.90 0.95	Poor source Saturation < 1' depth	0.00
140: Vitrixerands-----	90	Poor source WEG = 1 or 2 AWC < 3" to 60" depth pH is between 4 and 6.5 above 40" Depth to pan 20 to 40" Fragments >10" are 5-15%	0.00 0.00 0.56 0.96 0.98	Poor source Depth to pan < 40"	0.00
141: Humic Haploxerands-----	40	Poor source WEG = 1 or 2 Fragments >10" are > 15% AWC 3 - 6" to 60" depth pH is between 4 and 6.5 above 40"	0.00 0.00 0.19 0.80	Fair source Slopes 15 to 25%	0.18
Typic Haploxerands-----	35	Fair source AWC 3 - 6" to 60" depth Fragments >10" are 5-15%	0.27 0.40	Poor source Slopes > 25%	0.00
Bearrubble-----	15	Poor source WEG = 1 or 2 Fragments >10" are > 15% AWC 3 - 6" to 60" depth pH is between 4 and 6.5 above 40"	0.00 0.00 0.05 0.88	Good source	
Rubble land-----	10	Not rated		Not rated	
142: Cragwash-----	85	Poor source WEG = 1 or 2 AWC < 3" to 60" depth Sand fractions 75 to 85% pH is between 4 and 6.5 above 40"	0.00 0.00 0.19 0.60	Fair source Depth to pan 40-60"	0.97

Table 22.—Construction Materials, Part II—Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value
143: Andic Durixerpts-----	95	Poor source WEG = 1 or 2 AWC < 3" to 60" depth Depth to pan 20 to 40" pH is between 4 and 6.5 above 40"	0.00 0.00 0.08 0.68	Poor source Depth to pan < 40"	0.00
144: Xeric Vitricryands, cirque floor--	55	Poor source OM < .5% AWC 3 - 6" to 60" depth pH is between 4 and 6.5 above 40"	0.00 0.07 0.80	Good source	
Humic Xeric Vitricryands-----	30	Poor source AWC < 3" to 60" depth pH is between 4 and 6.5 above 40"	0.00 0.40	Poor source Slopes > 25%	0.00
145: Sueredo-----	85	Poor source Sand fractions > 85% WEG = 1 or 2 Fragments >10" are > 15% AWC < 3" to 60" depth pH is between 4 and 6.5 above 40"	0.00 0.00 0.00 0.00 0.60	Good source	
146: Sueredo-----	90	Poor source Sand fractions > 85% WEG = 1 or 2 Fragments >10" are > 15% AWC < 3" to 60" depth pH is between 4 and 6.5 above 40"	0.00 0.00 0.00 0.00 0.60	Poor source Slopes > 25%	0.00
147: Summertown-----	85	Poor source WEG = 1 or 2 AWC < 3" to 60" depth Fragments >10" are > 15% Sand fractions 75 to 85% pH is between 4 and 6.5 above 40" Fragments 3-10" are 25 to 50%	0.00 0.00 0.00 0.61 0.68 0.92	Fair source Slopes 15 to 25% Fragments >3" are 25 to 50%	0.50 0.95
148: Humic Haploxerands, lake terrace--	70	Poor source AWC < 3" to 60" depth Fragments >10" are > 15% Depth to pan 20 to 40"	0.00 0.00 0.23	Poor source Depth to pan < 40"	0.00

Table 22.—Construction Materials, Part II—Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value
148: Typic Endoaquands-----	15	Fair source AWC 3 - 6" to 60" depth pH is between 4 and 6.5 above 40"	0.08 0.68	Poor source Saturation < 1' depth	0.00
149: Rubble land-----	45	Not rated		Not rated	
Rock outcrop, cliffs-----	30	Not rated		Not rated	
Emeraldlake-----	15	Poor source AWC < 3" to 60" depth Fragments >10" are > 15% Sand fractions 75 to 85% pH is between 4 and 6.5 above 40"	0.00 0.00 0.12 0.60	Poor source Slopes > 25%	0.00
150: Shadowlake-----	40	Fair source AWC 3 - 6" to 60" depth pH is between 4 and 6.5 above 40"	0.32 0.80	Poor source Slopes > 25%	0.00
Terracelake-----	30	Poor source AWC < 3" to 60" depth Fragments >10" are > 15% pH is between 4 and 6.5 above 40"	0.00 0.00 0.60	Poor source Depth to bedrock < 40" Slopes > 25%	0.00 0.00
Acroph-----	15	Poor source WEG = 1 or 2 AWC < 3" to 60" depth Sand fractions 75 to 85% pH is between 4 and 6.5 above 40"	0.00 0.00 0.34 0.64	Poor source Depth to bedrock < 40" Slopes > 25%	0.00 0.00
Rock outcrop-----	10	Not rated		Not rated	
151: Terracelake-----	40	Poor source AWC < 3" to 60" depth Fragments >10" are > 15% pH is between 4 and 6.5 above 40"	0.00 0.00 0.60	Poor source Depth to bedrock < 40" Slopes > 25%	0.00 0.00
Acroph-----	20	Poor source WEG = 1 or 2 AWC < 3" to 60" depth Sand fractions 75 to 85% pH is between 4 and 6.5 above 40"	0.00 0.00 0.34 0.64	Poor source Depth to bedrock < 40" Slopes > 25%	0.00 0.00
Rock outcrop-----	15	Not rated		Not rated	

Table 22.-Construction Materials, Part II-Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value
151: Shadowlake-----	15	Fair source AWC 3 - 6" to 60" depth pH is between 4 and 6.5 above 40"	0.32 0.80	Fair source Slopes 15 to 25%	0.50
152: Terracelake-----	35	Poor source AWC < 3" to 60" depth Fragments >10" are > 15% pH is between 4 and 6.5 above 40"	0.00 0.00 0.60	Poor source Depth to bedrock < 40"	0.00
Shadowlake-----	30	Fair source AWC 3 - 6" to 60" depth pH is between 4 and 6.5 above 40"	0.32 0.80	Good source	
Acroph-----	15	Poor source WEG = 1 or 2 AWC < 3" to 60" depth Sand fractions 75 to 85% pH is between 4 and 6.5 above 40"	0.00 0.00 0.34 0.64	Poor source Depth to bedrock < 40"	0.00
Rock outcrop-----	10	Not rated		Not rated	
153: Typic Vitriixerands-----	50	Poor source AWC 3 - 6" to 60" depth Sand fractions 75 to 85% pH is between 4 and 6.5 above 40"	0.00 0.46 0.80	Good source	
Vitrandic Xerorthents, moraine----	45	Poor source OM < .5% AWC < 3" to 60" depth pH is between 4 and 6.5 above 40" Sand fractions 75 to 85%	0.00 0.00 0.64 0.78	Fair source Slopes 15 to 25%	0.82
154: Typic Vitriixerands-----	45	Poor source AWC 3 - 6" to 60" depth Sand fractions 75 to 85% pH is between 4 and 6.5 above 40"	0.00 0.46 0.80	Poor source Slopes > 25%	0.00
Vitrandic Xerorthents, moraine----	35	Poor source OM < .5% AWC < 3" to 60" depth pH is between 4 and 6.5 above 40" Sand fractions 75 to 85%	0.00 0.00 0.64 0.78	Poor source Slopes > 25%	0.00

Table 22.—Construction Materials, Part II—Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value
155: Xeric Vitricryands, pyroclastic surge-----	90	Poor source AWC < 3" to 60" depth	0.00	Fair source Slopes 15 to 25%	0.98
156: Xeric Vitricryands, pyroclastic surge-----	90	Poor source AWC < 3" to 60" depth	0.00	Poor source Slopes > 25%	0.00
157: Typic Vitriixerands, very deep----	90	Poor source AWC < 3" to 60" depth Fragments >10" are > 15% pH is between 4 and 6.5 above 40"	0.00 0.00 0.92	Good source	
158: Typic Vitriixerands, unglaciated---	75	Poor source AWC < 3" to 60" depth Sand fractions 75 to 85% pH is between 4 and 6.5 above 40"	0.00 0.56 0.68	Poor source Depth to bedrock < 40"	0.00
Rock outcrop, rhyodacite-----	20	Not rated		Not rated	
159: Typic Vitriixerands, bouldery-----	40	Poor source Sand fractions > 85% Fragments >10" are > 15% AWC < 3" to 60" depth	0.00 0.00 0.00	Poor source Slopes > 25%	0.00
Typic Vitriixerands, tephra over colluvium-----	35	Poor source AWC 3 - 6" to 60" depth pH is between 4 and 6.5 above 40" Fragments >10" are 5-15%	0.00 0.60 0.89	Poor source Slopes > 25%	0.00
Rubble land-----	15	Not rated		Not rated	
160: Aeric Endoaquents-----	45	Poor source Sand fractions > 85% WEG = 1 or 2 OM < .5% AWC < 3" to 60" depth	0.00 0.00 0.00 0.00	Fair source Saturation from 1 to 3'	0.01

Table 22.—Construction Materials, Part II—Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value
160: Humic Haploxerands, stream terrace	35	Poor source Fragments >10" are > 15% AWC < 3" to 60" depth Sand fractions 75 to 85% pH is between 4 and 6.5 above 40"	0.00 0.00 0.56 0.80	Good source	
Riverwash-----	15	Not rated		Not rated	
161: Typic Psammaquents-----	95	Poor source Sand fractions > 85% WEG = 1 or 2 OM < .5% AWC 3 - 6" to 60" depth pH is between 4 and 6.5 above 40"	0.00 0.00 0.00 0.02 0.80	Poor source Saturation < 1' depth	0.00
162: Humic Haploxerands, outwash-----	95	Poor source Fragments >10" are > 15% AWC < 3" to 60" depth Sand fractions 75 to 85% pH is between 4 and 6.5 above 40"	0.00 0.00 0.65 0.88	Good source	
163: Vitrandic Cryofluvents-----	65	Fair source pH is between 4 and 6.5 above 40"	0.48	Poor source Saturation < 1' depth AASHTO GIN > 8 (low soil strength)	0.00 0.00
Aquandic Cryaquents-----	30	Fair source K factor .10 -.35 AWC 3 - 6" to 60" depth	0.90 0.95	Poor source Saturation < 1' depth	0.00
164: Aquepts-----	35	Poor source AWC < 3" to 60" depth Fragments >10" are > 15% pH is between 4 and 6.5 above 40"	0.00 0.00 0.40	Poor source Saturation < 1' depth	0.00
Typic Petraquepts, bedrock-----	25	Poor source Fragments >10" are > 15% AWC 3 - 6" to 60" depth pH is between 4 and 6.5 above 40"	0.00 0.01 0.80	Poor source Depth to bedrock < 40" Saturation < 1' depth Slopes 15 to 25%	0.00 0.00 0.50
Aquic Haploxerands-----	20	Fair source AWC 3 - 6" to 60" depth pH is between 4 and 6.5 above 40" Depth to pan > 40" or NULL data	0.04 0.48 1.00	Poor source Depth to pan < 40" Saturation from 1 to 3'	0.00 0.07

Table 22.—Construction Materials, Part II—Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value
164: Typic Petraquepts-----	10	Fair source Depth to pan 20 to 40" AWC 3 - 6" to 60" depth K factor .10 -.35	0.16 0.53 0.90	Poor source Saturation < 1' depth Depth to pan < 40"	0.00 0.00
165: Aquandic Humaquepts-----	35	Fair source AWC 3 - 6" to 60" depth pH is between 4 and 6.5 above 40"	0.18 0.96	Poor source Saturation < 1' depth	0.00
Histic Humaquepts-----	25	Fair source pH is between 4 and 6.5 above 40" Fragments >10" are 5-15%	0.40 0.98	Poor source Saturation < 1' depth	0.00
Aquandic Endoaquepts-----	20	Fair source pH is between 4 and 6.5 above 40" K factor .10 -.35	0.88 0.90	Poor source Saturation < 1' depth	0.00
Terric Haplohemists-----	15	Poor source WEG = 1 or 2 pH is between 4 and 6.5 above 40" AWC 3 - 6" to 60" depth	0.00 0.40 0.64	Poor source Saturation < 1' depth AASHTO GIN > 8 (low soil strength)	0.00 0.00
166: Aquic Haploxerands-----	50	Fair source AWC 3 - 6" to 60" depth pH is between 4 and 6.5 above 40" Depth to pan > 40" or NULL data	0.04 0.48 1.00	Poor source Depth to pan < 40" Saturation from 1 to 3'	0.00 0.07
Humic Haploxerands, outwash terrace-----	40	Poor source AWC < 3" to 60" depth Depth to pan 20 to 40" pH is between 4 and 6.5 above 40"	0.00 0.65 0.80	Poor source Depth to pan < 40"	0.00
167: Emeraldlake-----	35	Poor source AWC < 3" to 60" depth Fragments >10" are > 15% Sand fractions 75 to 85% pH is between 4 and 6.5 above 40"	0.00 0.00 0.12 0.60	Poor source Slopes > 25%	0.00
Readingpeak-----	20	Poor source AWC < 3" to 60" depth Fragments >10" are > 15% pH is between 4 and 6.5 above 40" Sand fractions 75 to 85%	0.00 0.00 0.64 0.68	Poor source Slopes > 25% Depth to bedrock 40 to 60"	0.00 0.58

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Table 22.—Construction Materials, Part II—Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value
167: Terracelake-----	15	Poor source AWC < 3" to 60" depth Fragments >10" are > 15% pH is between 4 and 6.5 above 40"	0.00 0.00 0.60	Poor source Depth to bedrock < 40" Slopes > 25%	0.00 0.00
Rock outcrop, dacite-----	15	Not rated		Not rated	
168: Vitrixerands, low elevation-----	90	Poor source WEG = 1 or 2 AWC < 3" to 60" depth pH is between 4 and 6.5 above 40" Depth to pan 20 to 40" Fragments >10" are 5-15%	0.00 0.00 0.56 0.96 0.98	Poor source Depth to pan < 40"	0.00
169: Sueredo-----	55	Poor source Sand fractions > 85% WEG = 1 or 2 Fragments >10" are > 15% AWC < 3" to 60" depth pH is between 4 and 6.5 above 40"	0.00 0.00 0.00 0.00 0.60	Poor source Slopes > 25%	0.00
Rock outcrop, cliffs-----	20	Not rated		Not rated	
Scoured-----	15	Poor source Fragments >10" are > 15% AWC < 3" to 60" depth pH is between 4 and 6.5 above 40"	0.00 0.00 0.72	Poor source Depth to bedrock < 40" Slopes > 25%	0.00 0.00
170: Rock outcrop, rhyodacite-----	35	Not rated		Not rated	
Emeraldlake-----	20	Poor source AWC < 3" to 60" depth Fragments >10" are > 15% Sand fractions 75 to 85% pH is between 4 and 6.5 above 40"	0.00 0.00 0.12 0.60	Poor source Slopes > 25%	0.00
Rubble land-----	18	Not rated		Not rated	
Readingpeak-----	15	Poor source AWC < 3" to 60" depth Fragments >10" are > 15% pH is between 4 and 6.5 above 40" Sand fractions 75 to 85%	0.00 0.00 0.64 0.68	Poor source Slopes > 25% Depth to bedrock 40 to 60"	0.00 0.58

Table 22.—Construction Materials, Part II—Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value
171: Aquepts-----	50	Poor source AWC < 3" to 60" depth Fragments >10" are > 15% pH is between 4 and 6.5 above 40"	0.00 0.00 0.40	Poor source Saturation < 1' depth Slopes > 25%	0.00 0.00
Typic Petraquepts, bedrock-----	35	Poor source Fragments >10" are > 15% AWC 3 - 6" to 60" depth pH is between 4 and 6.5 above 40"	0.00 0.01 0.80	Poor source Depth to bedrock < 40" Saturation < 1' depth Slopes > 25%	0.00 0.00 0.00
172: Badgerflat-----	90	Poor source Fragments >10" are > 15% AWC < 3" to 60" depth Sand fractions 75 to 85% pH is between 4 and 6.5 above 40"	0.00 0.00 0.65 0.92	Good source	
173: Badgerwash-----	90	Poor source AWC < 3" to 60" depth Fragments >10" are > 15% pH is between 4 and 6.5 above 40" Depth to pan 20 to 40"	0.00 0.00 0.80 0.90	Poor source Depth to pan < 40"	0.00
174: Vitrandic Cryorthents-----	60	Poor source Sand fractions > 85% OM < .5% AWC < 3" to 60" depth pH is between 4 and 6.5 above 40"	0.00 0.00 0.00 0.88	Good source	
Readingpeak-----	20	Poor source AWC < 3" to 60" depth Fragments >10" are > 15% pH is between 4 and 6.5 above 40" Sand fractions 75 to 85%	0.00 0.00 0.64 0.68	Poor source Slopes > 25% Depth to bedrock 40 to 60"	0.00 0.58
Rock outcrop-----	10	Not rated		Not rated	
175: Shadowlake-----	75	Fair source AWC 3 - 6" to 60" depth pH is between 4 and 6.5 above 40"	0.32 0.80	Good source	
Vitrandic Cryofluvents-----	15	Fair source pH is between 4 and 6.5 above 40"	0.48	Poor source Saturation < 1' depth AASHTO GIN > 8 (low soil strength)	0.00 0.00

Table 22.—Construction Materials, Part II—Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value
176: Juniperlake, bouldery-----	85	Fair source AWC 3 - 6" to 60" depth pH is between 4 and 6.5 above 40" Fragments 3-10" < 25% or NULL data	0.03 0.76 1.00	Fair source Slopes 15 to 25% Fragments >3" are 25 to 50%	0.50 0.99
177: Vitrandic Cryorthents, debris flows, high elevation-----	85	Poor source WEG = 1 or 2 OM < .5% AWC < 3" to 60" depth Sand fractions 75 to 85% pH is between 4 and 6.5 above 40"	0.00 0.00 0.00 0.29 0.80	Poor source Slopes > 25%	0.00
200: Cinder land-----	100	Not rated		Not rated	
201: Lava flows-----	100	Not rated		Not rated	
202: Typic Xerorthents, tephra-----	85	Poor source Sand fractions > 85% WEG = 1 or 2 OM < .5% AWC < 3" to 60" depth pH is between 4 and 6.5 above 40"	0.00 0.00 0.00 0.00 0.96	Good source	
Typic Xerorthents, welded-----	10	Poor source Sand fractions > 85% WEG = 1 or 2 AWC < 3" to 60" depth OM < .5%	0.00 0.00 0.00 0.00	Good source	
203: Typic Xerorthents, tephra-----	90	Poor source Sand fractions > 85% WEG = 1 or 2 OM < .5% AWC < 3" to 60" depth pH is between 4 and 6.5 above 40"	0.00 0.00 0.00 0.00 0.96	Good source	
205: Beaches-----	100	Not rated		Not rated	

Table 22.—Construction Materials, Part II—Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value
W: Water-----	100	Not rated		Not rated	

The interpretation for reclamation material evaluates the following soil properties at variable depths in the soil: the amount of sand, clay, fragments, organic matter content (OM), the Wind Erodibility Group (WEG), available water (AWC), soil pH, salinity (EC), amount of sodium (SAR), carbonates, and susceptibility of the soil to erosion by water (K factor).

The interpretation for roadfill evaluates the following soil properties at variable depths in the soil: shrink-swell potential expressed as linear extensibility percent (LEP), depth to rock or cemented pans, wetness, slope, soil strength expressed as AASHTO Group Index Number (AASHTO GIN) and fragment content.

Table 23.—Water Management

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. The rating is based on the limitation with the highest value. Only three highest value limitations are listed. There may be more limitations. Fine-earth fractions and coarse fragments are reported on a weight basis. A brief summary of rating criteria and abbreviations are listed on the last page of this report)

Map symbol and soil name	Pct. of map unit	Embankments, dikes, and levees		Pond reservoir areas	
		Limitation	Value	Limitation	Value
100: Buttelake-----	85	No limitations		Limitations Permeability > 2"/hr (seepage) Slopes > 7%	1.00 1.00
101: Buttewash-----	85	Limitations Thin layer	0.24	Limitations Permeability > 2"/hr (seepage) Depth to pan 20 to 60"	1.00 0.24
102: Ashbutte-----	65	Limitations Seepage problem Fragments (>3") 15-35%	1.00 0.01	Limitations Slopes > 7% Permeability > 2"/hr (seepage)	1.00 1.00
Vitrandic Xerorthents-----	25	Limitations Seepage problem Fragments (>3") 15-35%	1.00 0.08	Limitations Slopes > 7% Permeability > 2"/hr (seepage)	1.00 1.00
103: Scoured-----	75	Limitations Fragments (>3") > 35% Thin layer	1.00 0.86	Limitations Permeability > 2"/hr (seepage) Depth to bedrock from 20-60" Slopes 2 to 7%	1.00 0.86 0.31
104: Scoured-----	55	Limitations Fragments (>3") > 35% Thin layer	1.00 0.86	Limitations Permeability > 2"/hr (seepage) Slopes > 7% Depth to bedrock from 20-60"	1.00 1.00 0.86
Juniperlake-----	20	Limitations Fragments (>3") 15-35%	0.67	Limitations Permeability > 2"/hr (seepage) Slopes > 7%	1.00 1.00
Rock outcrop-----	15	Not rated		Not rated	
105: Juniperlake-----	85	Limitations Fragments (>3") 15-35%	0.67	Limitations Permeability > 2"/hr (seepage) Slopes > 7%	1.00 1.00

Table 23.—Water Management—Continued

Map symbol and soil name	Pct. of map unit	Embankments, dikes, and levees		Pond reservoir areas	
		Limitation	Value	Limitation	Value
106: Cenplat-----	70	Limitations Fragments (>3") > 35% Thin layer	1.00 0.84	Limitations Permeability > 2"/hr (seepage) Slopes > 7% Depth to bedrock from 20-60"	1.00 1.00 0.84
107: Badgerflat-----	40	Limitations Fragments (>3") > 35% Seepage problem	1.00 1.00	Limitations Slopes > 7% Permeability > 2"/hr (seepage)	1.00 1.00
Cenplat-----	35	Limitations Seepage problem Thin layer Fragments (>3") 15-35%	1.00 0.54 0.23	Limitations Slopes > 7% Permeability > 2"/hr (seepage) Depth to bedrock from 20-60"	1.00 1.00 0.54
108: Typic Xerorthents-----	80	Limitations Seepage problem	1.00	Limitations Permeability > 2"/hr (seepage) Slopes 2 to 7%	1.00 0.01
109: Prospectpeak-----	85	Limitations Fragments (>3") > 35% Thin layer	1.00 0.11	Limitations Slopes > 7% Permeability > 2"/hr (seepage) Depth to bedrock from 20-60"	1.00 1.00 0.11
110: Bearrubble-----	50	Limitations Fragments (>3") > 35%	1.00	Limitations Permeability > 2"/hr (seepage) Slopes > 7%	1.00 1.00
Rubble land-----	35	Not rated		Not rated	
111: Vitrandic Xerorthents, debris fan-----	95	Limitations Seepage problem Fragments (>3") 15-35%	1.00 0.61	Limitations Permeability > 2"/hr (seepage) Slopes 2 to 7%	1.00 0.66
112: Cascadesprings-----	85	Limitations Seepage problem Fragments (>3") 15-35%	1.00 0.92	Limitations Permeability > 2"/hr (seepage) Slopes > 7%	1.00 1.00
113: Terracelake-----	35	Limitations Fragments (>3") 15-35% Thin layer	0.93 0.59	Limitations Slopes > 7% Permeability > 2"/hr (seepage) Depth to bedrock from 20-60"	1.00 1.00 0.59

Table 23.—Water Management—Continued

Map symbol and soil name	Pct. of map unit	Embankments, dikes, and levees		Pond reservoir areas	
		Limitation	Value	Limitation	Value
113: Emeraldlake-----	25	Limitations Seepage problem Fragments (>3") 15-35%	1.00 0.19	Limitations Slopes > 7% Permeability > 2"/hr (seepage)	1.00 1.00
Readingpeak-----	20	Limitations Seepage problem Fragments (>3") > 35% Thin layer	1.00 0.99 0.11	Limitations Slopes > 7% Permeability > 2"/hr (seepage) Depth to bedrock from 20-60"	1.00 1.00 0.11
Rock outcrop-----	10	Not rated		Not rated	
114: Emeraldlake-----	25	Limitations Seepage problem Fragments (>3") 15-35%	1.00 0.19	Limitations Slopes > 7% Permeability > 2"/hr (seepage)	1.00 1.00
Terracelake-----	23	Limitations Fragments (>3") 15-35% Thin layer	0.93 0.59	Limitations Slopes > 7% Permeability > 2"/hr (seepage) Depth to bedrock from 20-60"	1.00 1.00 0.59
Readingpeak-----	20	Limitations Seepage problem Fragments (>3") > 35% Thin layer	1.00 0.99 0.11	Limitations Slopes > 7% Permeability > 2"/hr (seepage) Depth to bedrock from 20-60"	1.00 1.00 0.11
Rock outcrop-----	15	Not rated		Not rated	
Rubble land-----	12	Not rated		Not rated	
115: Shadowlake-----	85	Limitations Seepage problem	1.00	Limitations Permeability > 2"/hr (seepage)	1.00
116: Xeric Vitricryands, tephra over till-----	30	Limitations Seepage problem Fragments (>3") 15-35%	1.00 0.17	Limitations Permeability > 2"/hr (seepage) Slopes > 7%	1.00 1.00
Terracelake-----	25	Limitations Fragments (>3") 15-35% Thin layer	0.93 0.59	Limitations Permeability > 2"/hr (seepage) Slopes > 7% Depth to bedrock from 20-60"	1.00 1.00 0.59
Rock outcrop-----	15	Not rated		Not rated	

Table 23.—Water Management—Continued

Map symbol and soil name	Pct. of map unit	Embankments, dikes, and levees		Pond reservoir areas	
		Limitation	Value	Limitation	Value
116: Xeric Vitricryands, cirque floor--	15	No limitations		Limitations Permeability > 2"/hr (seepage) Slopes > 7%	1.00 1.00
117: Humic Haploxerands, moist lake terrace-----	90	Limitations Saturation < 2' depth Fragments (>3") > 35% Thin layer	1.00 1.00 0.85	Limitations Permeability > 2"/hr (seepage) Slopes 2 to 7% Depth to pan 20 to 60"	1.00 0.91 0.85
118: Typic Dystroxerepts, landslides---	90	Limitations Fragments (>3") 15-35% Shrink-swell (LEP 3-6)	0.39 0.22	Limitations Slopes > 7% Permeability .6-2"/hr (some seepage)	1.00 0.50
119: Diamondpeak-----	30	Limitations High piping potential Shrink-swell (LEP 3-6)	0.19 0.01	Limitations Slopes > 7% Permeability .6-2"/hr (some seepage)	1.00 0.50
Brokeoff-----	25	Limitations Fragments (>3") > 35% Thin layer	1.00 0.61	Limitations Slopes > 7% Depth to bedrock from 20-60" Permeability .6-2"/hr (some seepage)	1.00 0.61 0.50
Endoaquepts-----	14	Limitations Saturation < 2' depth Shrink-swell (LEP >6) MH or CH Unified and PI <40%	1.00 1.00 0.50	Limitations Slopes > 7%	1.00
Aquic Dystroxerepts, debris flows-	11	Limitations Saturation < 2' depth	1.00	Limitations Slopes > 7%	1.00
Typic Dystroxerepts-----	10	Limitations Thin layer	0.99	Limitations Slopes > 7% Permeability > 2"/hr (seepage) Depth to bedrock < 20"	1.00 1.00 0.99
120: Buttelake-----	65	No limitations		Limitations Slopes > 7% Permeability > 2"/hr (seepage)	1.00 1.00
Sunhoff-----	15	Limitations Seepage problem Fragments (>3") 15-35%	1.00 0.95	Limitations Slopes > 7% Permeability > 2"/hr (seepage)	1.00 1.00

Table 23.—Water Management—Continued

Map symbol and soil name	Pct. of map unit	Embankments, dikes, and levees		Pond reservoir areas	
		Limitation	Value	Limitation	Value
120: Talved-----	10	Limitations Fragments (>3") > 35%	1.00	Limitations Slopes > 7% Permeability > 2"/hr (seepage)	1.00 1.00
122: Xeric Vitricryands, colluvium----	35	Limitations Seepage problem	1.00	Limitations Slopes > 7% Permeability > 2"/hr (seepage)	1.00 1.00
Xeric Vitricryands, ash over cinders-----	30	Limitations Seepage problem	1.00	Limitations Slopes > 7% Permeability > 2"/hr (seepage)	1.00 1.00
Xeric Vitricryands, bedrock-----	20	Limitations Fragments (>3") > 35% Seepage problem Thin layer	1.00 1.00 0.99	Limitations Slopes > 7% Permeability > 2"/hr (seepage) Depth to bedrock < 20"	1.00 1.00 0.99
125: Humic Haploxerands, stream terrace	55	Limitations Seepage problem Saturation between 2-4' Fragments (>3") 15-35%	1.00 0.18 0.07	Limitations Permeability > 2"/hr (seepage) Slopes 2 to 7%	1.00 0.66
Aquandic Humaquepts, flood plains-	40	Limitations Saturation < 2' depth Fragments (>3") 15-35%	1.00 0.91	Limitations Permeability .6-2"/hr (some seepage) Slopes 2 to 7%	0.50 0.01
126: Kingsiron-----	45	No limitations	0.01	Limitations Slopes > 7% Permeability > 2"/hr (seepage)	1.00 1.00
Dittmar-----	20	Limitations Thin layer Fragments (>3") > 35%	1.00 1.00	Limitations Slopes > 7% Depth to bedrock < 20" Permeability > 2"/hr (seepage)	1.00 1.00 1.00
Rock outcrop-----	15	Not rated		Not rated	
127: Humic Haploxerands, strath terrace	65	Limitations Thin layer Fragments (>3") 15-35%	0.91 0.48	Limitations Permeability > 2"/hr (seepage) Slopes > 7% Depth to bedrock from 20-60"	1.00 1.00 0.91

Table 23.—Water Management—Continued

Map symbol and soil name	Pct. of map unit	Embankments, dikes, and levees		Pond reservoir areas	
		Limitation	Value	Limitation	Value
127: Aquepts-----	15	Limitations Saturation < 2' depth Fragments (>3") > 35%	1.00 1.00	Limitations Permeability > 2"/hr (seepage) Slopes > 7%	1.00 1.00
129: Humic Haploxerands, colluvium----	80	No limitations	0.07	Limitations Slopes > 7% Permeability > 2"/hr (seepage)	1.00 1.00
130: Histic Humaquepts, lake sediments-	55	Limitations Ponded (any duration) Saturation < 2' depth MH or CH Unified and PI <40%	1.00 1.00 0.50	Limitations Permeability > 2"/hr (seepage)	1.00
Histic Humaquepts, frequently flooded-----	30	Limitations Saturation < 2' depth Shrink-swell (LEP 3-6)	1.00 0.78	Limitations Permeability > 2"/hr (seepage)	1.00
Typic Endoaquands-----	15	Limitations Saturation < 2' depth	1.00	Limitations Permeability > 2"/hr (seepage) Slopes 2 to 7%	1.00 0.01
132: Vitrandic Cryorthents, debris flows-----	90	Limitations Seepage problem Fragments (>3") 15-35%	1.00 0.59	Limitations Slopes > 7% Permeability > 2"/hr (seepage)	1.00 1.00
133: Vitrandic Xerofluvents-----	55	Limitations Seepage problem	1.00	Limitations Permeability > 2"/hr (seepage)	1.00
Typic Endoaquents-----	30	Limitations Saturation < 2' depth Seepage problem	1.00 1.00	Limitations Permeability > 2"/hr (seepage)	1.00
134: Chaos-----	85	Limitations Seepage problem	1.00	Limitations Permeability > 2"/hr (seepage) Slopes 2 to 7%	1.00 0.66
136: Terracelake-----	45	Limitations Fragments (>3") 15-35% Thin layer	0.93 0.59	Limitations Permeability > 2"/hr (seepage) Slopes > 7% Depth to bedrock from 20-60"	1.00 1.00 0.59

Table 23.—Water Management—Continued

Map symbol and soil name	Pct. of map unit	Embankments, dikes, and levees		Pond reservoir areas	
		Limitation	Value	Limitation	Value
136: Rock outcrop-----	20	Not rated		Not rated	
Xeric Vitricryands, cirque floor--	15	No limitations		Limitations Permeability > 2"/hr (seepage) Slopes > 7%	1.00 1.00
137: Xeric Vitricryands-----	75	Limitations Possible seepage problem Fragments (>3") 15-35%	0.50 0.01	Limitations Slopes > 7% Permeability > 2"/hr (seepage)	1.00 1.00
Rock outcrop, rhyodacite-----	20	Not rated		Not rated	
138: Vitrandic Xerofluvents, debris flows-----	80	Limitations Saturation < 2' depth Seepage problem	1.00 1.00	Limitations Permeability > 2"/hr (seepage)	1.00
Typic Endoaquents-----	10	Limitations Saturation < 2' depth Seepage problem	1.00 1.00	Limitations Permeability > 2"/hr (seepage)	1.00
139: Duric Vitraquands-----	60	Limitations Saturation < 2' depth Seepage problem Thin layer	1.00 1.00 0.29	Limitations Permeability > 2"/hr (seepage) Depth to pan 20 to 60"	1.00 0.29
Typic Endoaquands-----	20	Limitations Saturation < 2' depth	1.00	Limitations Permeability > 2"/hr (seepage) Slopes 2 to 7%	1.00 0.01
Aquandic Cryaquents-----	15	Limitations Saturation < 2' depth Seepage problem	1.00 1.00	Limitations Permeability > 2"/hr (seepage)	1.00
140: Vitrixerands-----	90	Limitations Seepage problem Thin layer	1.00 0.63	Limitations Permeability > 2"/hr (seepage) Depth to pan 20 to 60" Slopes 2 to 7%	1.00 0.63 0.01
141: Humic Haploxerands-----	40	Limitations Fragments (>3") > 35%	1.00	Limitations Permeability > 2"/hr (seepage) Slopes > 7%	1.00 1.00

Table 23.—Water Management—Continued

Map symbol and soil name	Pct. of map unit	Embankments, dikes, and levees		Pond reservoir areas	
		Limitation	Value	Limitation	Value
141: Typic Haploxerands-----	35	Limitations Fragments (>3") 15-35%	0.41	Limitations Permeability > 2"/hr (seepage) Slopes > 7%	1.00 1.00
Bearrubble-----	15	Limitations Fragments (>3") > 35%	1.00	Limitations Permeability > 2"/hr (seepage) Slopes > 7%	1.00 0.99
Rubble land-----	10	Not rated		Not rated	
142: Cragwash-----	85	Limitations Seepage problem Thin layer	1.00 0.01	Limitations Permeability > 2"/hr (seepage) Slopes 2 to 7% Depth to pan 20 to 60"	1.00 0.31 0.01
143: Andic Durixerpts-----	95	Limitations Thin layer Fragments (>3") 15-35%	0.98 0.30	Limitations Permeability > 2"/hr (seepage) Depth to pan 20 to 60" Slopes 2 to 7%	1.00 0.98 0.91
144: Xeric Vitricryands, cirque floor--	55	No limitations		Limitations Permeability > 2"/hr (seepage) Slopes 2 to 7%	1.00 0.66
Humic Xeric Vitricryands-----	30	No limitations		Limitations Permeability > 2"/hr (seepage) Slopes > 7%	1.00 1.00
145: Sueredo-----	85	Limitations Seepage problem Fragments (>3") 15-35%	1.00 0.91	Limitations Permeability > 2"/hr (seepage) Slopes > 7%	1.00 0.99
146: Sueredo-----	90	Limitations Seepage problem Fragments (>3") 15-35%	1.00 0.91	Limitations Slopes > 7% Permeability > 2"/hr (seepage)	1.00 1.00
147: Summertown-----	85	Limitations Fragments (>3") > 35%	1.00	Limitations Permeability > 2"/hr (seepage) Slopes > 7%	1.00 1.00

Table 23.—Water Management—Continued

Map symbol and soil name	Pct. of map unit	Embankments, dikes, and levees		Pond reservoir areas	
		Limitation	Value	Limitation	Value
148: Humic Haploxerands, lake terrace--	70	Limitations Fragments (>3") > 35% Thin layer	1.00 0.94	Limitations Permeability > 2"/hr (seepage) Depth to pan 20 to 60"	1.00 0.94
Typic Endoaquands-----	15	Limitations Saturation < 2' depth	1.00	Limitations Permeability > 2"/hr (seepage)	1.00
149: Rubble land-----	45	Not rated		Not rated	
Rock outcrop, cliffs-----	30	Not rated		Not rated	
Emeraldlake-----	15	Limitations Seepage problem Fragments (>3") 15-35%	1.00 0.19	Limitations Slopes > 7% Permeability > 2"/hr (seepage)	1.00 1.00
150: Shadowlake-----	40	Limitations Seepage problem	1.00	Limitations Slopes > 7% Permeability > 2"/hr (seepage)	1.00 1.00
Terracelake-----	30	Limitations Fragments (>3") 15-35% Thin layer	0.93 0.59	Limitations Slopes > 7% Permeability > 2"/hr (seepage) Depth to bedrock from 20-60"	1.00 1.00 0.59
Acroph-----	15	Limitations Thin layer Seepage problem Fragments (>3") 15-35%	1.00 1.00 0.37	Limitations Slopes > 7% Permeability > 2"/hr (seepage) Depth to bedrock < 20"	1.00 1.00 1.00
Rock outcrop-----	10	Not rated		Not rated	
151: Terracelake-----	40	Limitations Fragments (>3") 15-35% Thin layer	0.93 0.59	Limitations Slopes > 7% Permeability > 2"/hr (seepage) Depth to bedrock from 20-60"	1.00 1.00 0.59
Acroph-----	20	Limitations Thin layer Seepage problem Fragments (>3") 15-35%	1.00 1.00 0.37	Limitations Slopes > 7% Permeability > 2"/hr (seepage) Depth to bedrock < 20"	1.00 1.00 1.00
Rock outcrop-----	15	Not rated		Not rated	
Shadowlake-----	15	Limitations Seepage problem	1.00	Limitations Slopes > 7% Permeability > 2"/hr (seepage)	1.00 1.00

Table 23.—Water Management—Continued

Map symbol and soil name	Pct. of map unit	Embankments, dikes, and levees		Pond reservoir areas	
		Limitation	Value	Limitation	Value
152: Terracelake-----	35	Limitations Fragments (>3") 15-35% Thin layer	0.93 0.59	Limitations Permeability > 2"/hr (seepage) Slopes > 7% Depth to bedrock from 20-60"	1.00 0.99 0.59
Shadowlake-----	30	Limitations Seepage problem	1.00	Limitations Permeability > 2"/hr (seepage) Slopes > 7%	1.00 0.99
Acroph-----	15	Limitations Thin layer Seepage problem Fragments (>3") 15-35%	1.00 1.00 0.37	Limitations Permeability > 2"/hr (seepage) Depth to bedrock < 20" Slopes > 7%	1.00 1.00 0.99
Rock outcrop-----	10	Not rated		Not rated	
153: Typic Vitrixerands-----	50	No limitations		Limitations Permeability > 2"/hr (seepage) Slopes > 7%	1.00 1.00
Vitrandic Xerorthents, moraine----	45	No limitations		Limitations Permeability > 2"/hr (seepage) Slopes > 7%	1.00 1.00
154: Typic Vitrixerands-----	45	No limitations		Limitations Slopes > 7% Permeability > 2"/hr (seepage)	1.00 1.00
Vitrandic Xerorthents, moraine----	35	No limitations		Limitations Slopes > 7% Permeability > 2"/hr (seepage)	1.00 1.00
155: Xeric Vitricryands, pyroclastic surge-----	90	Limitations Fragments (>3") 15-35%	0.18	Limitations Permeability > 2"/hr (seepage) Slopes > 7%	1.00 1.00
156: Xeric Vitricryands, pyroclastic surge-----	90	Limitations Fragments (>3") 15-35%	0.18	Limitations Slopes > 7% Permeability > 2"/hr (seepage)	1.00 1.00

Table 23.—Water Management—Continued

Map symbol and soil name	Pct. of map unit	Embankments, dikes, and levees		Pond reservoir areas	
		Limitation	Value	Limitation	Value
157: Typic Vitrixerands, very deep-----	90	Limitations Seepage problem Fragments (>3") 15-35%	1.00 0.17	Limitations Permeability > 2"/hr (seepage) Slopes > 7%	1.00 1.00
158: Typic Vitrixerands, unglaciated---	75	Limitations Seepage problem Thin layer	1.00 0.50	Limitations Permeability > 2"/hr (seepage) Slopes > 7% Depth to bedrock from 20-60"	1.00 1.00 0.50
Rock outcrop, rhyodacite-----	20	Not rated		Not rated	
159: Typic Vitrixerands, bouldery-----	40	Limitations Fragments (>3") > 35% Seepage problem	1.00 1.00	Limitations Slopes > 7% Permeability > 2"/hr (seepage)	1.00 1.00
Typic Vitrixerands, tephra over colluvium-----	35	No limitations		Limitations Slopes > 7% Permeability > 2"/hr (seepage)	1.00 1.00
Rubble land-----	15	Not rated		Not rated	
160: Aeric Endoaquents-----	45	Limitations Saturation < 2' depth Seepage problem	1.00 1.00	Limitations Permeability > 2"/hr (seepage) Slopes 2 to 7%	1.00 0.08
Humic Haploxerands, stream terrace	35	Limitations Seepage problem Fragments (>3") 15-35%	1.00 0.07	Limitations Permeability > 2"/hr (seepage) Slopes 2 to 7%	1.00 0.08
Riverwash-----	15	Not rated		Not rated	
161: Typic Psammaquents-----	95	Limitations Saturation < 2' depth Seepage problem	1.00 1.00	Limitations Permeability > 2"/hr (seepage)	1.00
162: Humic Haploxerands, outwash-----	95	Limitations Seepage problem Fragments (>3") 15-35%	1.00 0.74	Limitations Permeability > 2"/hr (seepage) Slopes 2 to 7%	1.00 0.08

Table 23.—Water Management—Continued

Map symbol and soil name	Pct. of map unit	Embankments, dikes, and levees		Pond reservoir areas	
		Limitation	Value	Limitation	Value
163: Vitrandic Cryofluvents-----	65	Limitations Ponded (any duration) Saturation < 2' depth Organic matter (PT, OL, OH)	1.00 1.00 1.00	Limitations Permeability > 2"/hr (seepage)	1.00
Aquandic Cryaquepts-----	30	Limitations Saturation < 2' depth Seepage problem	1.00 1.00	Limitations Permeability > 2"/hr (seepage)	1.00
164: Aquepts-----	35	Limitations Saturation < 2' depth Fragments (>3") > 35%	1.00 1.00	Limitations Permeability > 2"/hr (seepage) Slopes > 7%	1.00 1.00
Typic Petraquepts, bedrock-----	25	Limitations Saturation < 2' depth Fragments (>3") > 35% Thin layer	1.00 1.00 0.70	Limitations Permeability > 2"/hr (seepage) Slopes > 7% Depth to bedrock from 20-60"	1.00 1.00 0.70
Aquic Haploxerands-----	20	Limitations Saturation < 2' depth Thin layer	1.00 0.52	Limitations Permeability > 2"/hr (seepage) Slopes > 7% Depth to pan 20 to 60"	1.00 1.00 0.52
Typic Petraquepts-----	10	Limitations Saturation < 2' depth Thin layer High piping potential	1.00 0.96 0.93	Limitations Slopes > 7% Depth to pan 20 to 60" Permeability .6-2"/hr (some seepage)	1.00 0.96 0.50
165: Aquandic Humaquepts-----	35	Limitations Ponded (any duration) Saturation < 2' depth	1.00 1.00	Limitations Permeability > 2"/hr (seepage)	1.00
Histic Humaquepts-----	25	Limitations Saturation < 2' depth	1.00	Limitations Permeability > 2"/hr (seepage)	1.00
Aquandic Endoaquepts-----	20	Limitations Saturation < 2' depth	1.00	Limitations Permeability > 2"/hr (seepage) Slopes 2 to 7%	1.00 0.08
Terric Haplohemists-----	15	Limitations Ponded (any duration) Saturation < 2' depth MH or CH Unified and PI <40%	1.00 1.00 0.50	Limitations Permeability > 2"/hr (seepage)	1.00

Table 23.—Water Management—Continued

Map symbol and soil name	Pct. of map unit	Embankments, dikes, and levees		Pond reservoir areas	
		Limitation	Value	Limitation	Value
166: Aquic Haploxerands-----	50	Limitations Saturation < 2' depth Thin layer	1.00 0.52	Limitations Permeability > 2"/hr (seepage) Depth to pan 20 to 60" Slopes 2 to 7%	1.00 0.52 0.08
Humic Haploxerands, outwash terrace-----	40	Limitations Thin layer Possible seepage problem	0.83 0.50	Limitations Permeability > 2"/hr (seepage) Slopes > 7% Depth to pan 20 to 60"	1.00 1.00 0.83
167: Emeraldlake-----	35	Limitations Seepage problem Fragments (>3") 15-35%	1.00 0.19	Limitations Slopes > 7% Permeability > 2"/hr (seepage)	1.00 1.00
Readingpeak-----	20	Limitations Seepage problem Fragments (>3") > 35% Thin layer	1.00 0.99 0.11	Limitations Slopes > 7% Permeability > 2"/hr (seepage) Depth to bedrock from 20-60"	1.00 1.00 0.11
Terracelake-----	15	Limitations Fragments (>3") 15-35% Thin layer	0.93 0.59	Limitations Slopes > 7% Permeability > 2"/hr (seepage) Depth to bedrock from 20-60"	1.00 1.00 0.59
Rock outcrop, dacite-----	15	Not rated		Not rated	
168: Vitrixerands, low elevation-----	90	Limitations Seepage problem Thin layer	1.00 0.63	Limitations Permeability > 2"/hr (seepage) Depth to pan 20 to 60"	1.00 0.63
169: Sueredo-----	55	Limitations Seepage problem Fragments (>3") 15-35%	1.00 0.91	Limitations Slopes > 7% Permeability > 2"/hr (seepage)	1.00 1.00
Rock outcrop, cliffs-----	20	Not rated		Not rated	
Scoured-----	15	Limitations Fragments (>3") > 35% Thin layer	1.00 0.86	Limitations Slopes > 7% Permeability > 2"/hr (seepage) Depth to bedrock from 20-60"	1.00 1.00 0.86

Table 23.—Water Management—Continued

Map symbol and soil name	Pct. of map unit	Embankments, dikes, and levees		Pond reservoir areas	
		Limitation	Value	Limitation	Value
170: Rock outcrop, rhyodacite-----	35	Not rated		Not rated	
Emeraldlake-----	20	Limitations		Limitations	
		Seepage problem	1.00	Slopes > 7%	1.00
		Fragments (>3") 15-35%	0.19	Permeability > 2"/hr (seepage)	1.00
Rubble land-----	18	Not rated		Not rated	
Readingpeak-----	15	Limitations		Limitations	
		Seepage problem	1.00	Slopes > 7%	1.00
		Fragments (>3") > 35%	0.99	Permeability > 2"/hr (seepage)	1.00
		Thin layer	0.11	Depth to bedrock from 20-60"	0.11
171: Aquepts-----	50	Limitations		Limitations	
		Saturation < 2' depth	1.00	Permeability > 2"/hr (seepage)	1.00
		Fragments (>3") > 35%	1.00	Slopes > 7%	1.00
Typic Petraquepts, bedrock-----	35	Limitations		Limitations	
		Saturation < 2' depth	1.00	Permeability > 2"/hr (seepage)	1.00
		Fragments (>3") > 35%	1.00	Slopes > 7%	1.00
		Thin layer	0.70	Depth to bedrock from 20-60"	0.70
172: Badgerflat-----	90	Limitations		Limitations	
		Fragments (>3") > 35%	1.00	Permeability > 2"/hr (seepage)	1.00
		Seepage problem	1.00	Slopes 2 to 7%	0.66
173: Badgerwash-----	90	Limitations		Limitations	
		Fragments (>3") > 35%	1.00	Permeability > 2"/hr (seepage)	1.00
		Thin layer	0.70	Depth to pan 20 to 60"	0.70
174: Vitrandic Cryorthents-----	60	Limitations		Limitations	
		Seepage problem	1.00	Permeability > 2"/hr (seepage)	1.00
				Slopes 2 to 7%	0.66
Readingpeak-----	20	Limitations		Limitations	
		Seepage problem	1.00	Permeability > 2"/hr (seepage)	1.00
		Fragments (>3") > 35%	0.99	Slopes > 7%	1.00
		Thin layer	0.11	Depth to bedrock from 20-60"	0.11
Rock outcrop-----	10	Not rated		Not rated	

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Table 23.—Water Management—Continued

Map symbol and soil name	Pct. of map unit	Embankments, dikes, and levees		Pond reservoir areas	
		Limitation	Value	Limitation	Value
175: Shadowlake-----	75	Limitations Seepage problem	1.00	Limitations Permeability > 2"/hr (seepage) Slopes 2 to 7%	1.00 0.66
Vitrandic Cryofluvents-----	15	Limitations Ponded (any duration) Saturation < 2' depth Organic matter (PT, OL, OH)	1.00 1.00 1.00	Limitations Permeability > 2"/hr (seepage)	1.00
176: Juniperlake, bouldery-----	85	Limitations Fragments (>3") 15-35%	0.67	Limitations Slopes > 7% Permeability > 2"/hr (seepage)	1.00 1.00
177: Vitrandic Cryorthents, debris flows, high elevation-----	85	Limitations Seepage problem	1.00	Limitations Slopes > 7% Permeability > 2"/hr (seepage)	1.00 1.00
200: Cinder land-----	100	Not rated		Not rated	
201: Lava flows-----	100	Not rated		Not rated	
202: Typic Xerorthents, tephra-----	85	Limitations Seepage problem	1.00	Limitations Permeability > 2"/hr (seepage) Slopes 2 to 7%	1.00 0.66
Typic Xerorthents, welded-----	10	Limitations Thin layer Seepage problem	1.00 1.00	Limitations Permeability > 2"/hr (seepage) Slopes > 7%	1.00 1.00
203: Typic Xerorthents, tephra-----	90	Limitations Seepage problem	1.00	Limitations Permeability > 2"/hr (seepage) Slopes > 7%	1.00 1.00
205: Beaches-----	100	Not rated		Not rated	

Table 23.—Water Management—Continued

Map symbol and soil name	Pct. of map unit	Embankments, dikes, and levees		Pond reservoir areas	
		Limitation	Value	Limitation	Value
W: Water-----	100	Not rated		Not rated	

The interpretation for embankments evaluates the following soil properties at variable depths in the soil: ponding; wetness; depth to restrictive layer; fragments greater than 3 inches; salinity (EC); Unified classes for high organic content (PT, OL, or OH); Unified classes that are hard to pack (MH or CH); permeability that is too high, allowing seepage; and piping as determined by Atterberg limits of liquid limit (LL) and plasticity index (PI), sodium content (SAR), and gypsum content.

The interpretation for pond reservoir areas evaluates the following soil properties at variable depths in the soil: slope, depth to hard or soft bedrock, depth to cemented pans, marly textures, gypsum content, and permeability that is too high, allowing seepage.

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Table 24.—Lab Sampled Pedons

Correlated name	Pedon type	Sampled as name	User site ID	User pedon ID	Lab source	Lab pedon number
Andic Durixerepts	Modal pedon for series	Andic Durixerepts, high outwash terrace	07CA089003	789229	NSSL	08N0099
Ashbutte	Typical pedon for series	Ashbutte	789201	789201	NSSL	08N0483
Buttelake	Typical pedon for series		S06CA035002	789179	NSSL	07N0128
Buttewash	Typical pedon for series		S06CA035001	789178	NSSL	07N0127
Cascadesprings	Typical pedon for series	Ovlov	07CA089004	789226	NSSL	08N0100
Chaos	Typical pedon for series		07CA089006	789359	NSSL	08N0102
Cragwash	Typical pedon for series		07CA089001	789357	NSSL	08N0097
Diamondpeak	Typical pedon for series		S06CA089003	789210	NSSL	07N0140
Duric Vitraquands	Modal pedon for series	Duric Vitraquands	789193	789193	NSSL	08N0484
Emeraldlake	Typical pedon for series		789208	789208	NSSL	08N0485
Histic Humaquepts	Modal pedon for series		R06CA063003	789204	NSSL	07N0141
Juniperlake	Typical pedon for series		S06CA063001	789148	NSSL	07N0136
Prospectpeak	Typical pedon for series	Andic Dystroxerepts	S06CA089001	789112	NSSL	07N0138
Scoured	Typical pedon for series		S06CA063002	789180	NSSL	07N0137
Sueredo	Typical pedon for series	Typic Vitrixerands, crags tephra over till	07CA089002	789358	NSSL	08N0098
Summertown	Typical pedon for series	Humic Vitrixerands, moderately deep	789237	789237	NSSL	08N0486
Typic Xerorthents, welded	Modal pedon for series	Entic Durixerepts, cinder cone tephra	07CA035001	789190	NSSL	08N0096
Vitrantic Cryofluvents	Modal pedon for series		R06CA089004	789181	NSSL	07N0142

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Table 24.—Lab Sampled Pedons—Continued

Correlated name	Pedon type	Sampled as name	User site ID	User pedon ID	Lab source	Lab pedon number
Vitrandic Xerorthents, debris fan	Modal pedon for series		S06CA089002	789141	NSSL	07N0139
Vitriixerands	Modal pedon for series	Vitriixerands, outwash terrace	07CA089005	789225	NSSL	08N0101
Xeric Vitricryands, tephra over till	Modal pedon for series	Spodish	R06CA089005	789207	NSSL	07N0143

Table 25.—Engineering Index Properties

(Data for the representative texture is shown in this report. The representative texture is the most commonly occurring one found in a particular soil horizon or layer. Only one representative texture is assigned to a horizon or layer. Interpretations using texture criteria only consider the representative texture. Other textures occurring in the soil are described in the "Soil Series and Their Morphology" section. Absence of an entry indicates that the data were not estimated)

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO	>10 inches Pct	3-10 inches Pct	4	10	40	200		
100: Buttelake-----	<u>In</u>											
	0-0	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	0-3	Ashy sand	SP-SM, SM	A-1-b, A-2-4	0	0	89-100	66-97	47-71	8-14	0-14	NP
	3-11	Ashy coarse sand	SP-SM, SW	A-1-a, A-1-b	0	0-19	68-100	19-94	9-48	1-7	0-14	NP
	11-13	Very gravelly ash coarse sand	SW, SW-SM, SP	A-1-a, A-3	0	0-19	67-100	19-94	11-53	2-9	0-14	NP
	13-19	Very gravelly medial loamy coarse sand	SM, SP-SM	A-1-b, A-1-a	0-16	0-13	59-84	34-66	18-41	10-25	0-35	NP-5
	19-31	Very gravelly medial coarse sandy loam	GW-GM, SM	A-1-b, A-1-a, A-2-4	0-12	0-55	39-85	16-68	10-52	6-34	0-34	NP-7
	31-40	Extremely cobbly medial sandy loam	GP-GM, SM, GW-GM	A-4, A-1-a	0-12	0-55	39-85	16-68	12-58	7-37	0-34	NP-7
	40-53	Extremely gravelly loamy coarse sand	GW-GM, GM	A-1-a, A-1-b	0-25	5-25	38-63	17-49	12-37	6-20	0-19	NP-3
53-63	Gravel	GW, GM	A-1-a, A-2-4	0-24	7-24	16-65	6-51	4-41	3-28	0-19	NP-3	

Table 25.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
101: Buttewash-----	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-2	Ashy coarse sand	SP-SM, SW-SM	A-1-b	0	0	91-100	73-96	32-44	6-10	0-14	NP
	2-7	Ashy coarse sand	SP-SM	A-3, A-2-4, A-1-b	0	0	90-100	71-95	38-54	6-11	0-14	NP
	7-12	Ashy coarse sand	SP-SM, SP	A-1-b, A-1-a, A-3	0	0	78-100	27-95	15-52	1-6	0-14	NP
	12-20	Gravelly medial coarse sandy loam	SM, SP-SM	A-1-a, A-2-4, A-1-b	0	0-15	65-88	29-71	16-45	9-28	0-35	NP-7
	20-27	Medial sandy loam	SM	A-5, A-4, A-1-a	0-13	0-61	58-90	30-78	22-62	15-45	28-43	4-9
	27-45	Cobbly medial loam	ML, SM, GM	A-5, A-1-b, A-4	0-14	0-63	56-89	27-75	22-68	16-50	28-43	4-9
	45-57	Cemented extremely gravelly coarse sandy loam	GP, SM, GW-GM	A-1-a, A-1-b	0-10	14-52	28-83	9-72	5-43	3-25	0-20	NP-3
	57-66	Extremely gravelly loamy coarse sand	GW, SM	A-1-a, A-1-b	0-10	11-52	24-73	9-57	3-25	2-14	0-20	NP-3
	66-74	Cemented extremely gravelly loamy coarse sand	GW, SM	A-1-a, A-1-b	0-10	14-52	21-82	9-70	4-37	2-18	0-20	NP-3

Table 25.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
102: Ashbutte-----	0-2	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	2-6	Very gravelly ashy coarse sand	SP-SM, SW-SM	A-1-a, A-1-b	0	0-6	71-88	36-71	18-38	5-11	0-14	NP
	6-11	Gravelly ashy coarse sand	SP-SM, SW-SM, SM	A-1-a, A-1-b	0	0-6	71-88	36-71	23-46	7-15	0-14	NP
	11-15	Gravelly ashy loamy coarse sand	GP, SM	A-1-b, A-1-a	0	0-32	46-85	13-69	9-48	3-16	0-14	NP
	15-24	Gravelly ashy loamy coarse sand	SM, GP	A-1-b, A-1-a	0	0-32	46-85	13-69	8-43	3-16	0-14	NP
	24-36	Extremely cobbly medial sandy loam	GW-GM, GM	A-1-b, A-1-a	0-11	0-35	41-52	19-43	14-33	7-17	0-14	NP
	36-60	Gravel	GW, GP-GM	A-1-a	0-11	0-35	9-52	2-43	1-20	0-5	0-14	NP
Vitrandic Xerorthents-----	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-5	Very gravelly ashy loamy sand	SP-SM	A-1-a	0	0-7	68-74	27-39	21-30	7-11	0-14	NP
	5-10	Extremely gravelly ashy loamy sand	GW, GP-GM	A-1-a	0-10	11-21	24-30	5-27	4-21	1-8	0-14	NP
	10-26	Extremely cobbly ashy loamy sand	GP-GM, GW	A-1-a	0-11	14-22	16-30	5-27	4-21	1-8	0-23	NP-1
	26-34	Extremely gravelly ashy coarse sand	GP, GW	A-1-a	0	0-5	17-19	4-13	2-6	0-1	0-14	NP
	34-46	Gravel	GP, GW	A-1-a	5-24	12-24	13-16	5-16	2-7	0-2	0-14	NP
	46-61	Stones	GP, GW	A-1-a	6-23	12-23	11-17	6-17	3-8	1-2	0-14	NP

Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
103: Scoured-----	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-4	Very bouldery medial loamy sand	SP-SM, SM	A-2-4, A-1-b, A-1-a	0-87	0-14	63-92	39-88	29-67	12-30	0-14	NP
	4-10	Very bouldery medial sandy loam	SM	A-1-a, A-1-b	21-65	10-14	70-77	35-62	26-50	13-25	0-14	NP
	10-17	Very bouldery medial fine sandy loam	GW-GM, SM, OH	A-1-a, A-1-b, A-5	0-100	0-13	47-93	15-89	12-78	7-51	0-55	NP-4
	17-30	Boulders	GW, GP-GM	A-1-a	42-100	21-57	8-16	8-16	5-10	3-5	0-14	NP
	30-39	Bedrock			---	---	---	---	---	---	---	---
104: Scoured-----	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-4	Very bouldery medial loamy sand	SP-SM, SM	A-2-4, A-1-b, A-1-a	0-87	0-14	63-92	39-88	29-67	12-30	0-14	NP
	4-10	Very bouldery medial sandy loam	SM	A-1-a, A-1-b	21-65	10-14	70-77	35-62	26-50	13-25	0-14	NP
	10-17	Very bouldery medial fine sandy loam	GW-GM, SM, OH	A-1-a, A-1-b, A-5	0-100	0-13	47-93	15-89	12-78	7-51	0-55	NP-4
	17-30	Boulders	GW, GP-GM	A-1-a	42-100	21-57	8-16	8-16	5-10	3-5	0-14	NP
	30-39	Bedrock			---	---	---	---	---	---	---	---

Table 25.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
104: Juniperlake-----	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-4	Gravelly medial sandy loam	GW-GM, SM	A-1-a, A-1-b	0-8	0-32	44-78	20-62	15-48	7-24	0-56	NP-2
	4-10	Gravelly medial sandy loam	SM, GW-GM	A-1-b, A-1-a	0-7	0-31	44-77	21-63	15-49	7-25	0-56	NP-2
	10-21	Very cobbly medial coarse sandy loam	SM, GW-GM	A-1-a, A-1-b	0-7	9-38	43-69	19-50	13-35	8-22	0-45	NP-1
	21-30	Very cobbly medial sandy loam	GM, GP	A-1-a, A-1-b	0-40	8-32	37-54	10-44	7-34	4-21	0-38	NP-2
	30-47	Very gravelly medial sandy loam	GP-GM, GM	A-1-a, A-1-b	0-40	7-30	37-54	10-45	7-34	5-23	0-33	NP-2
	47-56	Extremely gravelly coarse sandy loam	SM, GW-GM, GP	A-1-a	0-23	6-23	36-61	8-36	6-26	3-14	0-22	NP-3
Rock outcrop.												
105: Juniperlake-----	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-4	Gravelly medial sandy loam	GW-GM, SM	A-1-a, A-1-b	0-8	0-32	44-78	20-62	15-48	7-24	0-56	NP-2
	4-10	Gravelly medial sandy loam	SM, GW-GM	A-1-b, A-1-a	0-7	0-31	44-77	21-63	15-49	7-25	0-56	NP-2
	10-21	Very cobbly medial coarse sandy loam	SM, GW-GM	A-1-a, A-1-b	0-7	9-38	43-69	19-50	13-35	8-22	0-45	NP-1
	21-30	Very cobbly medial sandy loam	GM, GP	A-1-a, A-1-b	0-40	8-32	37-54	10-44	7-34	4-21	0-38	NP-2
	30-47	Very gravelly medial sandy loam	GP-GM, GM	A-1-a, A-1-b	0-40	7-30	37-54	10-45	7-34	5-23	0-33	NP-2
	47-56	Extremely gravelly coarse sandy loam	SM, GW-GM, GP	A-1-a	0-23	6-23	36-61	8-36	6-26	3-14	0-22	NP-3

Table 25.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
106: Cenplat-----	0-0	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	0-2	Ashy loamy sand	SM	A-1-b, A-2-4	0	0-17	81-95	55-84	42-66	15-24	0-14	NP
	2-5	Ashy sand	SP-SM, SP	A-3, A-1-a	0-13	0-39	76-95	37-88	28-68	2-7	0-14	NP
	5-8	Extremely cobble ash coarse sand	SW-SM, SW	A-1-a, A-1-b	0-12	0-38	77-96	39-89	17-41	4-10	0-14	NP
	8-17	Extremely cobble medial sandy loam	GP, GP-GC, SM	A-1-a, A-2-4	0-33	0-45	38-83	6-67	5-51	2-26	0-30	NP-4
	17-24	Extremely cobble medial sandy loam	SC-SM, SM, GP	A-1-a, A-2-4, A-1-b	0-33	0-47	38-84	6-69	5-55	2-30	0-24	NP-4
	24-31	Extremely gravelly medial sandy loam	GW-GM, GC-GM, GP	A-1-a, A-1-b	0-24	0-44	35-68	6-47	5-38	2-21	0-24	NP-4
	---	Bedrock			---	---	---	---	---	---	---	---
107: Badgerflat-----	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-4	Very gravelly ashy sandy loam	SM, SP-SM	A-1-b, A-1-a	0-7	0	63-80	25-50	19-40	10-21	0-30	NP-1
	4-7	Gravelly ash sandy loam	SP-SM, SM	A-1-a, A-1-b	0-7	0	63-81	25-50	19-40	10-21	0-30	NP-1
	7-11	Extremely stony ashy loamy sand	SP-SM, SM, SW	A-1-a, A-1-b	26-46	8-17	57-76	15-52	11-41	4-15	0-27	NP-1
	11-23	Extremely stony ashy loamy sand	SW, SM, SP-SM	A-1-a, A-1-b	26-46	8-17	55-76	15-52	11-41	4-15	0-27	NP-1
	23-33	Extremely stony ashy loamy sand	SW, SM, SP-SM	A-1-a, A-1-b	37-51	7-17	57-73	15-46	11-36	4-13	0-14	NP
	33-43	Extremely gravelly ash loamy coarse sand	SW-SM, SP-SM	A-1-a	0	6-17	60-71	21-42	12-25	5-11	0-14	NP

Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
107: Cenplat-----	0-2	Very gravelly ashy loamy sand	SM, SP-SM	A-2-5, A-1-a	0-33	0-24	68-88	33-69	25-57	9-22	0-50	NP-2
	2-6	Very gravelly ashy loamy sand	SP-SM, SM	A-1-a, A-2-5	0-33	0-24	67-88	33-69	25-56	9-22	0-50	NP-2
	6-12	Very gravelly ashy loamy coarse sand	SP-SM, SM	A-1-a, A-1-b	0-7	0-7	65-83	30-61	18-38	8-18	0-26	NP-3
	12-21	Extremely gravelly medial sandy loam	GW-GM, SM, GP	A-1-a, A-1-b	0-35	0-11	45-69	9-49	7-41	4-22	0-30	NP-5
	21-39	Extremely stony medial loamy sand	SM, GP, GW-GM	A-1-a, A-1-b	0-35	0-11	44-69	9-49	7-41	3-17	0-30	NP-5
	---	Bedrock										
108: Typic Xerorthents-----	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-4	Very gravelly sand	SP-SM, SW	A-3, A-1-a	0	0	83-97	34-89	26-70	2-7	0-14	NP
	4-33	Very gravelly sand	SW, SP-SM, GP	A-1-a, A-3	0-6	0-6	38-100	9-92	7-71	1-6	0-14	NP
	33-46	Extremely gravelly coarse sand	SW-SM, GP	A-1-a, A-1-b	0-6	0-6	37-100	8-92	4-42	1-10	0-14	NP
	46-50	Gravelly coarse sand	GP, SW-SM, SW	A-1-a, A-1-b	0-6	0-6	38-100	9-92	4-42	1-10	0-14	NP
	50-55	Very gravelly coarse sand	SP, GP, SW-SM	A-1-a, A-1-b	0-6	0-6	38-100	9-92	4-42	1-10	0-14	NP
	55-59	Very gravelly ashy sandy loam	SM, SC-SM	A-1-a, A-2-4	0	0	75-79	34-58	25-48	13-27	0-28	NP-6

Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
109: Prospectpeak-----	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-3	Ashy coarse sand	SP, SP-SM	A-1-b, A-1-a	0-8	0-8	84-93	49-81	29-49	4-8	0-14	NP
	3-7	Gravelly coarse sand	SW-SM, SP	A-1-a, A-1-b	0-27	0-16	61-95	8-73	3-27	1-6	0-14	NP
	7-9	Extremely gravelly ashly coarse sand	SP, SP-SM	A-1-a, A-1-b	0-27	0-16	61-95	7-71	3-34	0-5	0-14	NP
	9-14	Extremely stony ashly coarse sand	SP, SP-SM, SM	A-1-a, A-1-b	38-48	31-38	63-88	26-75	12-38	4-13	0-14	NP
	14-22	Extremely stony ashly coarse sandy loam	SM, GW-GM	A-1-a, A-1-b	31-55	31-49	51-82	26-65	16-42	8-23	0-20	NP-2
	22-50	Medial stones	GW-GM, SC-SM	A-1-a, A-1-b	31-57	31-45	40-82	20-65	13-45	6-22	0-22	NP-4
	---	Bedrock			---	---	---	---	---	---	---	---
110: Bearrubble-----	0-3	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	3-6	Ashy fine sand	SP, SM, SP-SM	A-1-b, A-2-4, A-3	0-72	0-30	86-100	42-94	39-92	4-13	0-40	NP-6
	6-13	Extremely cobbly loamy coarse sand	GW-GM, GP, SM	A-1-a, A-1-b	11-65	13-61	39-81	12-63	7-38	3-17	0-33	NP-1
	13-19	Extremely cobbly ashly sandy loam	GP, GM, SM	A-2-4, A-1-a	19-54	17-54	48-70	10-64	8-52	4-28	0-27	NP-3
	19-35	Extremely stony medial sandy loam	GM, GW-GM, SP-SM	A-1-a, A-2-4	22-53	12-53	49-75	13-70	10-57	5-31	0-27	NP-3
	35-49	Very stony medial fine sandy loam	SP-SM, SC-SM, SM	A-1-b, A-1-a, A-4	14-75	7-46	59-80	18-75	16-69	8-36	0-24	NP-4
	49-60	Very stony medial fine sandy loam	SP-SM, SC-SM, SM	A-1-b, A-1-a, A-4	14-75	7-46	59-80	18-75	16-68	8-36	0-24	NP-4
Rubble land.												

Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
111: Vitrandic Xerorthents, debris fan-----	0-4	Very gravelly ashy loamy coarse sand	SM, GP, SW-SM	A-2-4, A-1-a	0-69	0-46	45-100	14-96	9-64	3-26	0-14	NP
	4-14	Extremely gravelly ashy loamy coarse sand	GP, SM	A-1-a, A-2-4	0-69	0-46	43-100	14-96	7-54	3-23	0-14	NP
	14-31	Extremely gravelly ashy loamy coarse sand	GW-GM, GP, SM	A-1-a, A-2-4	0-69	0-46	45-100	15-96	9-62	3-25	0-14	NP
	31-42	Extremely gravelly ashy loamy coarse sand	GW-GM, GP, SM	A-1-a, A-1-b	0-39	24-44	36-81	11-67	7-44	3-17	0-14	NP
	42-60	Extremely cobbly ashy loamy coarse sand	GW, SM, GP	A-1-a, A-1-b	0-39	29-44	36-81	11-67	6-37	2-15	0-14	NP
112: Cascadesprings-----	0-0	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	0-2	Gravelly ashy loamy coarse sand	SM, SW-SM, SP-SM	A-2-5, A-1-a	0-7	0-7	54-94	26-79	16-51	7-24	0-43	NP-2
	2-9	Gravelly ashy loamy coarse sand	SW-SM, SM	A-1-a, A-1-b	0-7	0-10	54-94	26-79	15-49	7-23	0-43	NP-2
	9-17	Very gravelly medial coarse sandy loam	SM, SW-SM	A-1-a, A-2-4	0-34	0-27	56-75	21-60	13-42	7-26	0-37	NP-4
	17-27	Very stony medial loamy coarse sand	SP-SM, SM, SW-SM	A-1-a, A-1-b	0-34	0-28	56-75	21-60	11-37	6-23	0-37	NP-4
	27-33	Very cobbly ashy sandy loam	SM, GW-GM	A-1-a, A-1-b, A-4	0-30	20-34	43-96	14-70	10-55	7-37	0-20	NP-3

Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
113: Terracelake-----	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-3	Gravelly ashy sandy loam	SP-SM, SM	A-1-a, A-2-4, A-4	0-26	0-46	65-100	23-100	18-80	9-43	0-39	NP-2
	3-7	Gravelly ashy sandy loam	SM, GW-GM	A-1-b, A-1-a	0-19	0-15	44-69	15-49	12-38	6-20	0-27	NP-2
	7-19	Very gravelly ashy fine sandy loam	GM, SC-SM, GP	A-4, A-1-a	0-37	8-53	40-79	5-76	4-71	2-38	0-29	NP-5
	19-24	Extremely gravelly ashy fine sandy loam	GP-GM, GP, GM	A-1-a, A-4	0-37	8-53	40-79	5-76	4-71	2-38	0-29	NP-5
	24-37	Extremely stony ashy sandy loam	GC-GM, GP	A-1-a, A-1-b	7-53	0-16	28-51	4-42	3-34	2-19	0-23	NP-5
	---	Bedrock			---	---	---	---	---	---	---	---
Emeraldlake-----	0-1	Extremely gravelly ashy fine sandy loam	SM, SP-SM, SW-SM	A-1-a, A-1-b	0	0-12	54-76	18-53	15-47	7-24	0-34	NP-2
	1-5	Extremely gravelly ashy loamy sand	GW-GM, GP, GP-GM	A-1-a	0-7	7-16	31-44	10-36	8-29	3-11	0-33	NP-3
	5-14	Extremely gravelly ashy loamy sand	GP-GM, GP	A-1-a	0-8	7-19	28-41	9-33	6-24	2-8	0-29	NP-3
	14-25	Extremely gravelly ashy loamy coarse sand	SP-SM, GW, GP	A-1-a, A-1-b	0-10	11-21	25-64	6-50	4-31	1-12	0-30	NP-4
	25-35	Extremely gravelly ashy loamy coarse sand	SM, GP	A-1-a	0-11	11-21	25-64	6-50	3-30	1-13	0-27	NP-4
	35-51	Ashy boulders	SM, GW	A-1-a, A-1-b	3-98	0-21	16-76	5-67	3-39	1-15	0-24	NP-1
	51-60	Ashy boulders	SM, GW	A-1-a, A-2-4	3-98	0-21	16-76	5-67	4-51	2-22	0-24	NP-1

Table 25.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
113: Readingpeak-----	0-2	Very gravelly ashy sandy loam	SP-SM, SM	A-1-b, A-1-a	0-13	8-19	58-72	25-45	19-35	10-18	0-27	NP-1
	2-7	Very gravelly ashy sandy loam	SM, SP-SM	A-1-a, A-1-b	0-13	8-20	57-71	23-42	18-33	9-17	0-27	NP-1
	7-14	Extremely gravelly ashy loamy sand	GW, GP, GW-GM	A-1-a	0-16	20-27	37-49	7-23	6-18	2-7	0-26	NP-1
	14-26	Extremely cobble ashy loamy coarse sand	GP, GW-GM	A-1-a	0-16	20-27	42-49	7-23	4-14	2-6	0-26	NP-1
	26-35	Extremely cobble ashy loamy sand	GW-GM, GP	A-1-a, A-1-b	7-38	23-33	40-66	10-43	8-33	3-12	0-14	NP
	35-50	Extremely stony ashy loamy sand	GM, GW-GM, GP	A-1-a, A-1-b	7-38	23-33	40-61	10-48	8-38	3-14	0-14	NP
	---	Bedrock			---	---	---	---	---	---	---	---
Rock outcrop.												
114: Emeraldlake-----	0-1	Extremely gravelly ashy fine sandy loam	SM, SP-SM, SW-SM	A-1-a, A-1-b	0	0-12	54-76	18-53	15-47	7-24	0-34	NP-2
	1-5	Extremely gravelly ashy loamy sand	GW-GM, GP, GP-GM	A-1-a	0-7	7-16	31-44	10-36	8-29	3-11	0-33	NP-3
	5-14	Extremely gravelly ashy loamy sand	GP-GM, GP	A-1-a	0-8	7-19	28-41	9-33	6-24	2-8	0-29	NP-3
	14-25	Extremely gravelly ashy loamy coarse sand	SP-SM, GW, GP	A-1-a, A-1-b	0-10	11-21	25-64	6-50	4-31	1-12	0-30	NP-4
	25-35	Extremely gravelly ashy loamy coarse sand	SM, GP	A-1-a	0-11	11-21	25-64	6-50	3-30	1-13	0-27	NP-4
	35-51	Ashy boulders	SM, GW	A-1-a, A-1-b	3-98	0-21	16-76	5-67	3-39	1-15	0-24	NP-1
	51-60	Ashy boulders	SM, GW	A-1-a, A-2-4	3-98	0-21	16-76	5-67	4-51	2-22	0-24	NP-1

Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
114: Terracelake-----	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-3	Gravelly ashy sandy loam	SP-SM, SM	A-1-a, A-2-4, A-4	0-26	0-46	65-100	23-100	18-80	9-43	0-39	NP-2
	3-7	Gravelly ashy sandy loam	SM, GW-GM	A-1-b, A-1-a	0-19	0-15	44-69	15-49	12-38	6-20	0-27	NP-2
	7-19	Very gravelly ashy fine sandy loam	GM, SC-SM, GP	A-4, A-1-a	0-37	8-53	40-79	5-76	4-71	2-38	0-29	NP-5
	19-24	Extremely gravelly ashy fine sandy loam	GP-GM, GP, GM	A-1-a, A-4	0-37	8-53	40-79	5-76	4-71	2-38	0-29	NP-5
	24-37	Extremely stony ashy sandy loam	GC-GM, GP	A-1-a, A-1-b	7-53	0-16	28-51	4-42	3-34	2-19	0-23	NP-5
	---	Bedrock			---	---	---	---	---	---	---	---
Readingpeak-----	0-2	Very gravelly ashy sandy loam	SM, SP-SM	A-1-b, A-1-a	0-13	8-19	58-72	25-45	19-35	10-18	0-27	NP-1
	2-7	Very gravelly ashy sandy loam	SM, SP-SM	A-1-a, A-1-b	0-13	8-20	57-71	23-42	18-33	9-17	0-27	NP-1
	7-14	Extremely gravelly ashy loamy sand	GW, GP, GW-GM	A-1-a	0-16	20-27	37-49	7-23	6-18	2-7	0-26	NP-1
	14-26	Extremely cobbly ashy loamy coarse sand	GP, GW-GM	A-1-a	0-16	20-27	42-49	7-23	4-14	2-6	0-26	NP-1
	26-35	Extremely cobbly ashy loamy sand	GW-GM, GP	A-1-a, A-1-b	7-38	23-33	40-66	10-43	8-33	3-12	0-14	NP
	35-50	Extremely stony ashy loamy sand	GM, GW-GM, GP	A-1-a, A-1-b	7-38	23-33	40-61	10-48	8-38	3-14	0-14	NP
	---	Bedrock			---	---	---	---	---	---	---	---
Rock outcrop.												
Rubble land.												

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Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
115: Shadowlake-----	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-2	Gravelly ashy sandy loam	SM	A-1-b, A-2-5	0	0	80-84	42-63	31-50	16-27	0-44	NP-2
	2-6	Gravelly ashy sandy loam	SM, SP-SM	A-1-b, A-1-a, A-2-4	0-27	0-20	65-85	24-72	18-58	10-32	0-38	NP-4
	6-13	Gravelly ashy sandy loam	SP-SM, SM	A-2-4, A-1-a, A-1-b	0-27	0-20	65-85	24-72	18-58	9-32	0-38	NP-4
	13-23	Very gravelly ashy sandy loam	SP-SM, SM	A-2-4, A-1-a	0-27	0-20	65-85	24-72	18-58	10-32	0-38	NP-4
	23-41	Extremely gravelly ashy coarse sandy loam	SP-SM, SP	A-1-a	0-23	0-17	56-60	12-20	7-13	4-8	0-19	NP-2
	41-51	Loam	SM, CL-ML	A-4, A-1-b	0-45	0-17	61-96	28-79	25-78	18-60	0-23	NP-7

Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
116: Xeric Vitricryands, tephra over till-----	0-0	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	0-2	Moderately decomposed plant material			0	0	---	---	---	---	---	---
	2-3	Stony medial loamy sand	SP-SM, SM	A-1-a, A-2-5	0-19	19-23	62-97	36-94	25-72	10-32	0-70	NP-2
	3-4	Stony ashy loamy sand	SW-SM, SM	A-2-5, A-1-a	0-19	19-23	62-97	36-94	27-76	9-30	0-70	NP-2
	4-5	Stony ashy coarse sand	SM, SW-SM	A-1-b, A-1-a	9-20	9-20	68-88	36-75	16-36	6-17	0-26	NP-3
	5-8	Very stony ashy coarse sand	SW-SM, SM	A-1-a, A-1-b	9-20	9-20	68-88	36-75	16-37	5-15	0-26	NP-3
	8-10	Stony ashy loamy sand	SM, SP-SM	A-1-b, A-2-4	10-22	10-22	86-97	55-84	38-62	12-21	0-23	NP-2
	10-16	Very stony ashy loamy coarse sand	SP-SM, SM, GW-GM	A-1-a, A-1-b, A-2-4	0-15	10-27	51-88	26-76	17-52	6-21	0-26	NP-2
	16-19	Very gravelly ashy coarse sand	GW-GM, GP-GM, SM	A-1-a, A-2-4	0-13	10-27	48-88	25-75	17-53	5-19	0-26	NP-2
	19-39	Very gravelly ashy loamy coarse sand	SP-SM, SW-SM, SM	A-1-a, A-2-4	0-36	16-21	59-97	38-94	27-70	10-29	0-21	NP-2
39-60	Extremely stony ashy coarse sand	GP, GP-GM	A-1-a	7-32	13-32	41-54	25-46	11-23	3-7	0-20	NP-2	

Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
116: Terracelake-----	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-3	Gravelly ashy sandy loam	SP-SM, SM	A-1-a, A-2-4, A-4	0-26	0-46	65-100	23-100	18-80	9-43	0-39	NP-2
	3-7	Gravelly ashy sandy loam	SM, GW-GM	A-1-b, A-1-a	0-19	0-15	44-69	15-49	12-38	6-20	0-27	NP-2
	7-19	Very gravelly ashy fine sandy loam	GM, SC-SM, GP	A-4, A-1-a	0-37	8-53	40-79	5-76	4-71	2-38	0-29	NP-5
	19-24	Extremely gravelly ashy fine sandy loam	GP-GM, GP, GM	A-1-a, A-4	0-37	8-53	40-79	5-76	4-71	2-38	0-29	NP-5
	24-37	Extremely stony ashy sandy loam	GC-GM, GP	A-1-a, A-1-b	7-53	0-16	28-51	4-42	3-34	2-19	0-23	NP-5
	---	Bedrock			---	---	---	---	---	---	---	---
Rock outcrop.												
Xeric Vitricryands, cirque floor-----	0-2	Gravelly ashy sandy loam	SM, SP-SM	A-1-a, A-2-4, A-1-b	0	0	74-89	32-66	24-52	12-28	0-19	NP-3
	2-5	Very gravelly ashy sandy loam	SP-SM, SC-SM	A-1-b, A-1-a	0	0-7	68-81	27-52	20-41	10-21	15-20	1-5
	5-13	Gravelly ashy sandy loam	SC-SM, SP-SM	A-1-b, A-1-a	0	0-7	68-84	27-54	20-42	9-21	15-20	1-5
	13-26	Gravelly ashy sandy loam	SC-SM, SC, SP-SC	A-1-b, A-2-4, A-1-a	0	0-9	69-90	30-67	24-55	12-30	21-26	6-9
	26-36	Gravelly ashy sandy loam	SP-SC, SC	A-2-4, A-1-a	0	0-7	70-91	32-68	23-53	11-27	21-26	6-9
	36-46	Gravelly sandy loam	GW-GC, SC	A-1-a, A-2-4	0-54	0-21	51-93	18-75	11-58	5-30	21-26	6-9

Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
117: Humic Haploxerands, moist lake terrace-----	0-0	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	0-2	Ashy coarse sand	SP, SP-SM	A-1-b, A-3	0	0	76-100	51-90	39-69	3-7	0-14	NP
	2-5	Ashy coarse sand	SP-SM, SP	A-3, A-1-b	0	0	73-100	47-88	35-67	3-7	0-14	NP
	5-7	Gravelly ash coarse sand	SW-SM, SP-SM, SW	A-1-a, A-1-b	0	0	81-89	44-66	20-30	4-7	0-14	NP
	7-19	Very stony medial sandy loam	SM	A-2-4, A-1-b	21-29	10-22	84-100	53-84	40-65	19-33	25-33	3-4
	19-30	Very stony medial fine sandy loam	SM, GP-GM	A-1-b, A-1-a, A-2-5	0-40	11-20	52-87	18-74	17-69	8-33	30-41	5-7
	30-35	Cemented extremely gravelly medial sandy loam		A-1-a	0	7-23	16-43	8-36	---	---	---	---
118: Typic Distroxerepts, landslides-----	0-2	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	2-5	Ashy fine sandy loam	SP-SM, SM	A-7-5, A-1-a, A-2-5	0	0-16	66-95	29-89	25-89	10-50	50-77	4-20
	5-15	Very stony sandy clay loam	SC, GP, GC	A-2-6, A-1-a, A-7-6	0-28	7-34	47-79	11-75	8-75	4-48	20-53	3-27
	15-23	Very stony sandy clay loam	SC, GC, GP	A-1-a, A-2-6, A-7-6	0-28	7-34	47-79	11-75	8-75	4-48	20-53	3-27
	23-41	Very stony sandy clay loam	SC, GP, GC	A-1-a, A-2-6, A-7-6	0-28	10-34	47-79	11-75	7-74	3-47	20-53	3-27
	41-60	Very stony sandy clay loam	SC, GW	A-1-a, A-2-6, A-6	23-32	15-21	41-90	15-73	10-64	4-38	16-40	1-20

Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
119: Diamondpeak-----	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-3	Ashy loam	SM, OH	A-7-5, A-2-7	0	0	73-97	47-87	38-79	26-55	58-75	11-17
	3-10	Very paragravelly clay loam	CH, CL	A-6, A-7-6	0	0	100	100	72-87	53-68	36-55	17-29
	10-31	Very paragravelly sandy clay loam	CL, CH	A-6, A-7-6	0	0	100	100	77-92	56-71	36-55	17-29
	31-49	Extremely paragravelly loam	CL	A-6	0	0	100	100	83-90	58-65	29-37	12-17
	49-60	Extremely paragravelly loam	CL	A-6	0	0	100	100	89-96	67-74	29-37	12-17
Brokeoff-----	0-2	Gravelly ashy loam	GM, SM	A-2-6, A-7-5	0	0-6	68-78	47-61	42-61	30-46	38-61	11-20
	2-4	Gravelly ashy loam	SM, GM	A-2-6, A-7-6, A-7-5	0	0-6	68-77	47-61	41-60	30-46	38-61	11-20
	4-7	Very gravelly clay loam	GC, MH	A-2-7, A-7-5	0	2-34	52-87	23-65	20-65	16-52	42-59	18-26
	7-15	Extremely gravelly loam	MH, GC	A-2-6, A-2-7, A-7-5	0	2-33	52-88	23-66	21-66	16-53	40-57	17-26
	15-37	Cobbles			10-16	42-48	3-7	3-7	---	---	---	---
	---	Bedrock			---	---	---	---	---	---	---	---
Endoaquepts-----	0-2	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	2-4	Gravelly mucky fine sandy loam	GM, SM	A-7-5, A-1-b, A-2-5	0	0-10	60-97	52-97	45-95	19-46	49-79	3-13
	4-6	Gravelly loam	SM, GM, OH	A-2-5, A-7-5	0	0-7	63-98	55-98	47-94	33-70	49-79	3-13
	6-9	Very gravelly loam	GM, OH	A-2-4, A-7-5	0	0-6	63-98	55-98	45-90	32-67	29-53	3-14
	9-18	Silty clay loam	CL, ML	A-6, A-7-6	0	0-8	92-98	84-93	74-92	65-82	34-50	12-21
	18-30	Cobbly silty clay loam	CL, GC	A-6, A-7-6	0	0-23	71-100	56-100	52-99	46-88	37-46	17-23
	30-41	Stony silty clay loam	CL, CH	A-7-6	0-21	0-14	85-98	63-95	62-95	56-90	46-54	24-29
	41-50	Very stony clay	SC, CH	A-7-6	0-21	0-14	84-98	60-94	52-87	42-70	46-54	24-29
	50-62	Gravelly clay loam	SC, CH	A-7-6	0-20	0-13	85-98	62-95	55-90	44-72	46-54	24-29

Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
119: Aquic Dystrocherepts, debris flows-----	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-2	Moderately decomposed plant material			0	0	---	---	---	---	---	---
	2-5	Clay loam	OH	A-7-5	0	0	92-100	83-100	73-95	57-75	64-84	16-21
	5-9	Clay loam	CL, SC, CH	A-7-6, A-2-6	0	0-18	68-91	36-91	30-87	23-69	37-53	17-27
	9-24	Very gravelly clay loam	CH, SC	A-2-7, A-7-6, A-2-6	0	0-18	68-91	36-91	31-91	24-73	35-53	17-27
	24-30	Very gravelly clay loam	GM, SM	A-7-5, A-2-7	0-12	6-12	65-77	29-54	25-52	20-42	56-76	16-24
	30-48	Extremely gravelly clay loam	GC	A-2-6, A-7-6	0	3-11	49-70	23-62	20-60	15-47	34-44	16-23
	48-60	Very gravelly clay loam	GC	A-2-6, A-7-6, A-2-7	0	0-11	52-70	23-62	19-58	15-46	34-44	16-23
Typic Dystrocherepts-----	0-1	Gravelly sandy loam	SM	A-2-7, A-2-5, A-1-a	0	0	75-89	41-67	29-53	14-29	31-53	5-11
	1-4	Very gravelly loam	SC, SP-SC	A-2-7, A-2-6	0	0	64-83	16-41	14-39	11-31	34-42	16-21
	4-11	Extremely paragravelly clay loam	CL	A-6, A-7-6	0	0	100	100	86-93	66-73	34-42	16-21
	11-16	Very paragravelly loam	CL	A-6	0	0	100	100	87-91	64-68	29-35	13-16
	16-20	Extremely paragravelly sandy loam	GW-GC, GP, GP-GC	A-1-a	0	0	30-41	4-22	3-17	1-8	0-19	NP-4
	---	Bedrock					---	---	---	---	---	---

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Table 25.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
120: Buttelake-----	0-0	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	0-3	Ashy sand	SP-SM, SM	A-1-b, A-2-4	0	0	89-100	66-97	47-71	8-14	0-14	NP
	3-11	Ashy coarse sand	SP-SM, SW	A-1-a, A-1-b	0	0-19	68-100	19-94	9-48	1-7	0-14	NP
	11-13	Very gravelly ashy coarse sand	SW, SW-SM, SP	A-1-a, A-3	0	0-19	67-100	19-94	11-53	2-9	0-14	NP
	13-19	Very gravelly medial loamy coarse sand	SM, SP-SM	A-1-b, A-1-a	0-16	0-13	59-84	34-66	18-41	10-25	0-35	NP-5
	19-31	Very gravelly medial coarse sandy loam	GW-GM, SM	A-1-b, A-1-a, A-2-4	0-12	0-55	39-85	16-68	10-52	6-34	0-34	NP-7
	31-40	Extremely cobbly medial sandy loam	GP-GM, SM, GW-GM	A-4, A-1-a	0-12	0-55	39-85	16-68	12-58	7-37	0-34	NP-7
	40-53	Extremely gravelly loamy coarse sand	GW-GM, GM	A-1-a, A-1-b	0-25	5-25	38-63	17-49	12-37	6-20	0-19	NP-3
	53-63	Gravel	GW, GM	A-1-a, A-2-4	0-24	7-24	16-65	6-51	4-41	3-28	0-19	NP-3
Sunhoff-----	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-6	Ashy loamy sand	SM	A-2-4	0	0	95-100	71-100	54-80	18-30	0-38	NP-2
	6-9	Gravelly medial loamy coarse sand	SP-SM, SM, SW-SM	A-1-a, A-1-b	0-12	0-17	68-79	36-58	21-35	9-16	0-39	NP-2
	9-29	Extremely cobbly medial loamy sand	SW-SM, SM, SP-SM	A-1-b, A-1-a	6-83	20-41	54-81	20-51	15-42	5-17	0-32	NP-4
	29-39	Extremely gravelly ashy sandy loam	GM, GW-GM	A-1-b, A-1-a	0-24	6-24	40-65	18-57	14-43	7-22	0-17	NP-1

Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO	>10	3-10	4	10	40	200		
					inches Pct	inches Pct						
120: Talved-----	<u>In</u>											
	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-5	Extremely cobbly ashy loamy coarse sand	SP, SM, SP-SM	A-1-b, A-1-a	13-31	26-47	54-100	9-75	5-45	2-19	0-14	NP
	5-13	Extremely bouldery medial coarse sand	GP, SW-SM	A-1-a, A-1-b	40-64	20-32	44-73	13-73	6-34	1-9	0-14	NP
	13-26	Extremely bouldery medial coarse sandy loam	GW-GM, GC-GM	A-1-a, A-1-b	27-77	20-45	50-65	17-48	11-31	7-19	0-25	NP-4
	26-39 39-60	Medial stones Extremely bouldery medial sandy loam	GC-GM, GP-GM GP-GM, GW-GM, GC-GM	A-1-b, A-1-a A-1-a, A-1-b	27-77 33-76	20-45 6-17	36-65 44-58	15-48 20-58	9-31 15-45	6-19 7-22	0-25 16-24	NP-4 1-5

Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
122: Xeric Vitricryands, colluvium-----	0-3	Very gravelly ashy fine sandy loam	SM, SP-SM	A-1-b, A-1-a	0	0	60-70	19-41	16-36	8-19	0-23	NP-3
	3-7	Very gravelly ashy fine sandy loam	SP-SM, SM	A-1-a, A-1-b	0	0	59-70	18-39	15-35	7-18	0-26	NP-3
	7-11	Very gravelly ashy fine sandy loam	SW-SM, SM	A-1-a, A-1-b	0	0	56-71	13-42	11-37	5-19	0-21	NP-3
	11-24	Very gravelly ashy fine sandy loam	SM, SW-SM	A-1-a, A-1-b	0	0	56-71	13-42	11-37	5-19	0-21	NP-3
	24-33	Extremely gravelly ashy fine sandy loam	GW-GM, SM	A-1-a, A-1-b	0	0	52-67	13-34	11-31	5-14	0-21	NP-3
	33-39	Extremely gravelly ashy fine sandy loam	SW-SM, GW-GM	A-1-a	0	0	52-67	13-34	11-31	6-16	0-21	NP-3
	39-42	Extremely gravelly ashy loamy coarse sand	GP, GW-GM, GW	A-1-a	0	0	49-53	13-24	8-15	3-7	0-18	NP-1
	42-60	Extremely gravelly ashy loamy coarse sand	GW-GM, GP	A-1-a	0	0-32	30-39	4-18	2-11	1-5	0-17	NP-1

Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
122: Xeric Vitricryands, ash over cinders-----	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-2	Ashy sandy loam	SM	A-1-a, A-2-4	0-4	0-15	71-95	40-83	29-65	15-35	0-28	NP-3
	2-6	Gravelly ashy sandy loam	SM	A-2-4, A-1-b	0	0-3	75-83	43-65	31-51	16-28	0-20	NP-3
	6-16	Very gravelly ashy sandy loam	GW, GC-GM, GP-GC	A-1-b, A-1-a	0-18	7-42	41-49	14-40	10-32	4-16	0-26	NP-6
	16-24	Very gravelly ashy sandy loam	GW-GM, GP-GM, GC-GM	A-1-a, A-1-b	0-18	7-42	41-49	14-40	10-33	5-19	0-26	NP-6
	24-30	Very gravelly ashy loamy sand	GP, GP-GM, GW-GM	A-1-a	7-19	2-21	47-54	4-35	3-28	1-10	0-18	NP-1
	30-45	Very gravelly sand	GP, GW	A-1-a	0	8-10	46-50	1-34	1-26	0-2	0-14	NP
	45-60	Very gravelly sand	GP, GW	A-1-a	0	8-10	46-51	1-35	1-27	0-2	0-14	NP
Xeric Vitricryands, bedrock	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-4	Stony ashy loamy sand	SP-SM, SM	A-1-b, A-2-4	10-17	10-17	75-97	42-87	33-68	11-24	0-14	NP
	4-9	Stony ashy loamy sand	SM, SP-SM	A-2-4, A-1-b	10-18	10-18	75-97	42-86	32-67	11-24	0-14	NP
	9-16	Extremely stony ashy sandy loam	GM, SM, SP-SM	A-1-a, A-1-b	17-26	17-33	57-69	24-61	17-47	8-23	0-42	NP-4
	16-21	Very stony medial very fine sandy loam	SM, GM	A-2-4, A-1-a, A-4	25-44	15-62	52-85	28-70	25-69	13-40	25-39	1-8
	---	Bedrock			---	---	---	---	---	---	---	---

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Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
125: Humic Haploxerands, stream terrace-----	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-4	Gravelly medial sandy loam	SM	A-4, A-1-b	0	0-8	65-100	39-94	30-76	16-42	20-27	1-4
	4-7	Gravelly medial sandy loam	SM	A-1-b, A-4, A-1-a	0	0-9	63-100	36-94	27-75	14-41	20-27	1-4
	7-17	Gravelly medial coarse sandy loam	SC-SM, SW-SM	A-1-a, A-2-4	0-8	0-32	55-86	25-72	15-46	8-27	18-27	2-6
	17-28	Extremely stony medial coarse sandy loam	GP-GM, GW-GC, SC-SM	A-1-a, A-2-4	2-45	12-45	39-65	16-48	9-29	5-17	18-28	2-7
	28-48	Extremely stony medial loamy coarse sand	GP, GC-GM	A-1-a, A-2-4	2-45	11-45	37-65	8-48	5-33	2-17	0-24	NP-7
	48-68	Ashy stones	GP, SC-SM	A-1-a, A-2-4	2-44	13-44	28-67	6-50	3-30	1-13	0-24	NP-7
	68-84	Ashy stones	GW, SC-SM	A-1-a, A-2-4	2-44	13-44	17-66	6-52	3-32	1-14	0-24	NP-7
Aquandic Humaquepts, flood plains-----	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-4	Stony ashy loam	OH, MH, SM	A-5, A-7-5	0-24	0-8	85-100	70-100	60-94	42-69	66-81	6-12
	4-7	Stony ashy loam	SM, OH	A-5, A-7-5	0-24	0-8	85-100	70-100	59-93	42-68	66-81	6-12
	7-16	Stony ashy loam	ML, OH, GC	A-7-5, A-2-4	15-24	7-12	55-96	46-92	39-83	28-61	31-51	9-13
	16-25	Very stony ashy loam	GC, OH, GM	A-2-6, A-7-5, A-2-4	15-24	7-12	55-96	46-92	38-82	27-60	31-51	9-13
	25-31	Cobbly ashy loam	SC, CL	A-6	14-19	21-26	78-95	67-91	59-82	44-62	34-39	15-17
	31-47	Cobbly ashy loam	CL, SC	A-6	14-19	21-28	78-95	67-91	60-83	45-63	34-39	15-17
	47-60	Extremely gravelly ashy sandy loam	SC, GC, GW-GC	A-2-4	0	0-23	50-71	21-56	16-43	8-22	24-31	7-9

Table 25.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
126: Kingsiron-----	0-1	Stony slightly decomposed plant material			0-10	0-15	---	---	---	---	---	---
	1-3	Extremely gravelly medial fine sandy loam	SM, GW, GP-GM	A-5, A-1-a	0-10	10	20-100	4-100	4-89	2-46	0-55	NP-2
	3-9	Extremely gravelly medial fine sandy loam	GW, SM	A-1-a, A-5	0-10	10	11-100	4-100	3-89	2-45	0-55	NP-2
	9-28	Extremely gravelly medial sandy loam	GW, GM	A-1-a, A-1-b	0-43	16-38	24-55	5-40	4-33	2-18	27-36	2-4
	28-41	Extremely gravelly medial sandy loam	GM, GP	A-1-a, A-1-b	0-43	16-38	26-55	5-40	4-32	2-18	27-36	2-4
	41-63	Extremely gravelly medial sandy loam	GM, GP	A-1-a, A-2-4	0-33	16-44	28-51	6-44	5-39	3-22	17-32	1-7
Dittmar-----	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-2	Very gravelly ashy sandy loam	SM, GW-GM	A-2-5, A-1-a	0	4-19	38-78	19-67	14-52	7-27	0-42	NP-1
	2-5	Very gravelly medial sandy loam	GW-GM, SM	A-1-a, A-2-5	0	4-20	41-77	17-65	13-50	7-26	0-42	NP-1
	5-7	Very gravelly medial fine sandy loam	GW-GM, SM	A-1-a, A-1-b, A-4	0-45	13-45	45-87	17-76	15-70	7-37	0-36	NP-4
	7-15	Extremely stony medial fine sandy loam	GW-GM, GM, SM	A-1-a, A-2-4	0-45	11-45	45-80	17-70	15-65	7-34	0-36	NP-4
	15-19	Extremely stony medial fine sandy loam	SM, GP-GM, GW-GM	A-1-a, A-2-4	0-45	11-45	43-80	17-70	15-65	7-34	0-36	NP-4
	---	Bedrock			---	---	---	---	---	---	---	---
Rock outcrop.												

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Table 25.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index	
			Unified	AASHTO	>10 inches Pct	3-10 inches Pct	4	10	40	200			
127: Humic Haploxerands, strath terrace-----	<u>In</u>												
	0-1	Slightly decomposed plant material				0	0	---	---	---	---	---	
	1-4	Gravelly ash sandy loam	SP-SM, SM	A-2-5, A-1-a, A-1-b		0	0	58-79	29-68	22-55	10-29	43-60	2-7
	4-9	Gravelly medial coarse sandy loam	SM, SW-SM	A-1-a, A-2-5		0	0	56-77	27-66	15-41	8-23	43-60	2-7
	9-16	Gravelly medial sandy loam	SM, SP-SM	A-1-a, A-2-5		0	0	60-68	36-58	25-45	12-23	40-59	4-10
	16-20	Gravelly medial sandy loam	SM, SP-SM	A-1-a, A-2-5		0	9-100	57-79	23-74	17-57	8-29	28-52	4-7
	20-28	Medial cobbles	GP-GM	A-1-a, A-2-5		0	5-100	28-40	15-25	12-20	6-11	28-52	4-7
	---	Bedrock				---	---	---	---	---	---	---	---
Aquepts-----	0-2	Slightly decomposed plant material				0	0	---	---	---	---	---	---
	2-6	Very bouldery mucky ash sandy loam	SM	A-5, A-1-b		0-34	0	71-90	52-90	39-70	20-36	0-68	NP-1
	6-11	Extremely bouldery ash sandy loam	SM	A-1-b, A-5		0-35	0-17	74-100	61-98	46-76	23-40	0-49	NP-1
	11-16	Extremely bouldery ash sandy loam	GW-GM, GP-GM, GM	A-1-b, A-1-a		12-43	16-21	43-63	19-54	14-42	7-23	23-29	3
	16-26	Extremely cobbly ash sandy loam	SM, SP-SM	A-2-4, A-1-a		0-11	0-28	60-78	28-64	21-49	11-26	18-28	2
	26-45	Extremely stony ash sandy loam	GM, GW-GM	A-1-b, A-1-a		18-26	11-21	35-63	16-54	12-42	6-22	0-14	NP

Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
129: Humic Haploxerands, colluvium-----	0-2	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	2-2	Moderately decomposed plant material			0	0	---	---	---	---	---	---
	2-4	Gravelly medial sandy loam	SP-SM, SM	A-2-5, A-1-a, A-1-b	0	0-12	57-83	32-61	24-49	12-27	0-57	NP-4
	4-8	Gravelly medial sandy loam	SM, SP-SM	A-1-b, A-1-a, A-2-5	0	0-12	57-83	32-61	24-49	12-27	0-57	NP-4
	8-15	Very gravelly medial sandy loam	SM, GP-GM	A-1-b, A-1-a	0-10	9-26	54-69	22-49	16-39	8-21	0-48	NP-4
	15-22	Very gravelly medial sandy loam	SM, GP-GM	A-1-a, A-1-b	0-10	9-26	54-69	22-49	16-38	8-19	37-49	1-5
	22-34	Extremely gravelly medial sandy loam	GM, GW-GM	A-1-a, A-1-b	3-9	19-24	39-57	16-40	12-31	6-16	25-42	1-5
	34-50	Extremely gravelly medial fine sandy loam	GW-GM, GM, GP-GM	A-1-a, A-1-b	3-9	16-35	49-60	15-43	13-40	6-18	25-37	1-5
	50-61	Extremely gravelly medial sandy loam	GW-GM, GM	A-1-a, A-1-b	3-9	15-35	50-61	16-45	12-35	6-18	25-37	1-5

Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index	
			Unified	AASHTO	>10 inches Pct	3-10 inches Pct	4	10	40	200			
130: Histic Humaquepts, lake sediments-----	<u>In</u>												
	0-6	Herbaceous mucky slightly decomposed plant material	PT			0	0	100	100	---	---	---	---
	6-10	Herbaceous mucky highly decomposed plant material	PT			0	0	100	100	---	---	---	---
	10-14	Herbaceous mucky highly decomposed plant material	PT			0	0	100	100	---	---	---	---
	14-16	Ashy coarse sand	SM, SW-SM	A-7-5, A-1-b		0	0	100	100	45-72	10-37	0-72	NP-17
	16-26	Ashy silt loam	MH, ML, OH	A-4, A-7-5		0	0	100	100	74-100	70-97	0-72	NP-17
	26-26	Muck				0	0	100	100	---	---	21-34	6-13
	26-35	Ashy silt loam	ML, CL-ML	A-4		0	0	100	100	87-99	75-87	0-23	NP-7
	35-39	Ashy silt	CL-ML, SM	A-2-4, A-4		0	0	68-100	35-100	32-100	30-98	0-23	NP-7
	39-44	Very gravelly ashy loamy coarse sand	SW-SM, SC-SM	A-2-4, A-1-a		0	0	69-100	38-100	19-61	6-27	0-23	NP-7
	44-49	Gravelly ash loamy coarse sand	SM, SC-SM, SP-SM	A-1-b, A-1-a, A-4		0	0	69-100	38-100	22-70	9-36	0-23	NP-7
49-59	Ashy loamy sand	SM, SC-SM, SW-SM	A-1-a, A-2-4, A-4		0	0	69-100	38-100	29-88	10-38	0-23	NP-7	

Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
130: Histic Humaquepts, frequently flooded-----	0-2	Herbaceous peat	PT		0	0	100	100	---	---	---	---
	2-5	Herbaceous muck	PT		0	0	100	100	---	---	---	---
	5-9	Herbaceous muck	PT		0	0	100	100	---	---	---	---
	9-13	Ashy coarse sand	SW-SM	A-1-b	0	0	100	100	45-46	10-11	0-14	NP
	13-17	Mucky ash silty clay loam	OH	A-7-5	0	0	100	100	96-100	86-94	58-85	18-22
	17-28	Ashy silt loam	ML, CL, OH	A-7-6, A-6, A-7-5	0	0	100	100	89-98	77-86	31-58	11-18
	28-47	Gravelly ash sandy clay loam	SC, SM, OH	A-7-6, A-2-6, A-7-5	0	0	92-100	69-100	51-88	27-54	34-66	13-24
	47-51	Ashy coarse sandy loam	SP-SM, SM, SC-SM	A-4, A-1-a, A-2-4	0	0	78-100	35-100	19-63	10-36	0-20	NP-4
	51-55	Very gravelly ashy coarse sand	SC-SM, SW-SM, SW	A-1-a, A-2-4	0	0	79-100	38-100	17-53	4-18	0-20	NP-4
Typic Endoaquands-----	0-2	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	2-3	Mucky highly decomposed plant material			0	0	---	---	---	---	---	---
	3-11	Gravelly medial sandy loam	SM	A-1-b, A-2-4, A-4	0	0	74-100	49-97	34-77	15-40	26-38	3-9
	11-17	Gravelly medial sandy loam	SM	A-4, A-2-4, A-1-b	0	0	73-100	46-97	31-75	14-39	26-38	3-9
	17-29	Gravelly medial sandy loam	GP, SM, SC	A-1-a, A-2-4, A-4	0-17	0-28	35-95	11-89	8-69	4-36	24-33	4-9
	29-52	Extremely gravelly medial coarse sandy loam	GP-GM, SM, GP	A-1-a	0	8-16	43-64	6-37	4-24	2-14	0-14	NP
	52-57	Extremely gravelly medial loamy coarse sand	GP, SP-SM	A-1-a	0	8-16	44-64	6-37	4-22	2-10	0-14	NP

Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
132: Vitrandic Cryorthents, debris flows-----	0-4	Very gravelly ashy loamy coarse sand	SP-SM, SW-SM	A-1-a	0-41	0-12	62-74	24-47	14-28	6-12	0-14	NP
	4-13	Very gravelly ashy loamy coarse sand	GP, SW-SM, SM	A-1-a, A-1-b	0-22	0-16	39-81	11-62	6-37	3-16	0-14	NP
	13-19	Extremely gravelly ashy loamy coarse sand	SM, GP	A-1-b, A-1-a	0-22	0-16	32-81	11-62	6-37	3-16	0-14	NP
	19-32	Extremely stony ashy loamy sand	GP-GM, GW-GM	A-1-a	6-85	28-39	40-45	19-33	15-26	5-10	0-14	NP
	32-41	Very cobbly ashy loamy sand	SM, SP-SM	A-1-b, A-1-a	6-79	13-36	57-66	29-51	22-40	8-15	0-14	NP
133: Vitrandic Xerofluvents-----	0-2	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	2-4	Gravelly ashy loamy sand	SM	A-2-4, A-1-b	0-14	0-4	87-93	53-74	41-58	15-21	0-14	NP
	4-6	Gravelly ashy loamy sand	SM	A-1-b, A-2-4	0-14	0-4	87-93	53-74	41-58	15-21	0-14	NP
	6-12	Gravelly ashy loamy sand	SM, GP	A-1-b, A-2-4, A-1-a	0-16	0-21	45-91	10-74	8-58	3-22	0-20	NP-1
	12-32	Very gravelly ashy loamy coarse sand	SM, GP, SW-SM	A-1-a, A-1-b	0-16	0-21	45-82	10-74	6-45	3-20	0-20	NP-1
	32-34	Ashy sand	SP-SM, SP	A-1-a, A-3	0-27	0-27	60-100	12-90	9-71	1-8	0-14	NP
	34-50	Very gravelly ashy loamy sand	SP-SM, SM, SP	A-1-a, A-2-4, A-1-b	0-27	0-27	60-100	12-90	9-71	3-26	0-14	NP
	50-51	Moderately decomposed plant material			0	0	---	---	---	---	---	---
	51-56	Gravelly ashy loamy sand	SW-SM, SM	A-1-a, A-1-b, A-2-4	0-19	0-19	79-90	36-70	27-57	9-22	0-29	NP-1
	56-62	Gravelly ashy loamy sand	SM, GW-GM	A-1-a, A-1-b, A-2-4	0-18	0-18	52-81	20-62	15-51	5-20	16-27	1-3
	62-63	Very gravelly ashy sandy loam	GW-GM, SM	A-1-a, A-1-b	0-18	0-18	52-81	20-62	14-48	6-24	16-27	1-3

Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
133: Typic Endoaquents-----	0-7	Extremely gravelly ashy sand	SP-SM, GP, SW	A-3, A-1-a	0	0-5	55-97	21-89	16-69	1-6	0-14	NP
	7-14	Very gravelly ashy sand	SP, GW, SP-SM	A-1-a, A-3	0	0-5	55-97	21-89	16-69	1-6	0-14	NP
	14-17	Ashy sand	GW, SP-SM	A-1-a, A-3	0	0-5	55-97	21-89	16-69	1-6	0-14	NP
	17-19	Very gravelly ashy sand	SP, GW, SP-SM	A-1-a, A-3	0	0-5	55-97	21-89	16-69	1-6	0-14	NP
	19-26	Gravelly ashy sand	SP, GP	A-1-a, A-1-b	0	0-5	46-93	13-78	10-60	1-5	0-14	NP
	26-31	Very gravelly ashy sand	SW, GP, SP	A-1-a, A-1-b	0	0-5	46-93	13-78	10-60	1-5	0-14	NP
	31-39	Extremely gravelly ashy coarse sand	GP, SP-SM	A-1-a, A-1-b	0	0-5	46-93	14-79	6-36	1-8	0-14	NP
134: Chaos-----	0-0	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	0-4	Extremely gravelly ashy coarse sand	SW-SM, GP	A-1-b, A-1-a	0-6	0-5	43-93	19-80	8-35	2-10	0-14	NP
	4-9	Gravel	GW, GP-GM	A-1-a	0-12	5-54	17-43	6-33	3-17	1-6	0-14	NP
	9-21	Extremely gravelly ashy coarse sand	GW, SM, GP	A-1-a, A-1-b	0-36	4-46	34-88	8-80	4-48	1-18	0-16	NP-1
	21-23	Gravelly ashy sandy loam	SM, GP	A-1-a, A-2-4	0-36	4-46	34-88	8-80	6-65	3-35	0-16	NP-1
	23-27	Very gravelly ashy loamy coarse sand	SM, GP	A-1-a, A-2-4	0-36	3-46	35-89	8-81	6-58	2-26	0-16	NP-1
	27-36	Gravelly ashy loamy coarse sand	SM, GP	A-1-a, A-2-4	0-36	4-47	34-87	7-78	5-55	2-26	0-16	NP-1
	36-56	Very gravelly ashy loamy coarse sand	SW-SM, SM, GP	A-1-a, A-1-b	0-36	4-47	34-87	7-78	4-44	2-21	0-16	NP-1
	56-75	Extremely gravelly ashy loamy coarse sand	SM, GP, SW-SM	A-1-a, A-1-b	0-36	4-46	34-88	8-80	4-49	2-22	0-16	NP-1
	75-87	Very gravelly ashy loamy sand	GP, SM	A-1-a, A-1-b, A-2-4	0-36	4-46	34-88	8-79	6-61	2-27	0-16	NP-1

Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
136: Terracelake-----	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-3	Gravelly ashy sandy loam	SP-SM, SM	A-1-a, A-2-4, A-4	0-26	0-46	65-100	23-100	18-80	9-43	0-39	NP-2
	3-7	Gravelly ashy sandy loam	SM, GW-GM	A-1-b, A-1-a	0-19	0-15	44-69	15-49	12-38	6-20	0-27	NP-2
	7-19	Very gravelly ashy fine sandy loam	GM, SC-SM, GP	A-4, A-1-a	0-37	8-53	40-79	5-76	4-71	2-38	0-29	NP-5
	19-24	Extremely gravelly ashy fine sandy loam	GP-GM, GP, GM	A-1-a, A-4	0-37	8-53	40-79	5-76	4-71	2-38	0-29	NP-5
	24-37	Extremely stony ashy sandy loam	GC-GM, GP	A-1-a, A-1-b	7-53	0-16	28-51	4-42	3-34	2-19	0-23	NP-5
	---	Bedrock			---	---	---	---	---	---	---	---
Rock outcrop.												
Xeric Vitricryands, cirque floor-----	0-2	Gravelly ashy sandy loam	SM, SP-SM	A-1-a, A-2-4, A-1-b	0	0	74-89	32-66	24-52	12-28	0-19	NP-3
	2-5	Very gravelly ashy sandy loam	SP-SM, SC-SM	A-1-b, A-1-a	0	0-7	68-81	27-52	20-41	10-21	15-20	1-5
	5-13	Gravelly ashy sandy loam	SC-SM, SP-SM	A-1-b, A-1-a	0	0-7	68-84	27-54	20-42	9-21	15-20	1-5
	13-26	Gravelly ashy sandy loam	SC-SM, SC, SP-SC	A-1-b, A-2-4, A-1-a	0	0-9	69-90	30-67	24-55	12-30	21-26	6-9
	26-36	Gravelly ashy sandy loam	SP-SC, SC	A-2-4, A-1-a	0	0-7	70-91	32-68	23-53	11-27	21-26	6-9
	36-46	Gravelly sandy loam	GW-GC, SC	A-1-a, A-2-4	0-54	0-21	51-93	18-75	11-58	5-30	21-26	6-9

Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
137: Xeric Vitricryands-----	0-3	Stony ashy loamy sand	SW-SM, SM	A-2-4, A-1-a, A-1-b	0-16	0-16	69-92	36-80	27-64	9-24	0-24	NP-1
	3-9	Gravelly ashy loamy sand	SM, SW-SM	A-1-b, A-1-a, A-2-4	0-16	0-19	69-92	36-80	27-64	9-24	0-24	NP-1
	9-17	Very gravelly ashy fine sandy loam	SM	A-1-b, A-1-a, A-4	0-16	0-16	69-92	36-80	30-71	15-36	0-24	NP-1
	17-23	Gravelly ashy loamy sand	SM, GW-GM	A-1-b, A-1-a, A-2-4	0-13	10-19	43-86	23-63	18-52	6-21	0-24	NP-3
	23-37	Very paragravelly ashy loamy sand	SM, SC-SM	A-2-4, A-4	0-50	12-30	100	100	76-88	26-38	0-24	NP-7
	37-48	Very paragravelly ashy loamy sand	SC-SM, SM	A-4, A-2-4	0-50	12-30	100	100	76-88	26-38	0-24	NP-7
	48-59	Stony ashy loamy sand	SM	A-2-4	0-36	10-18	100	100	77-78	27-28	0-14	NP
Rock outcrop, rhyodacite.												

Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO	>10 inches Pct	3-10 inches Pct	4	10	40	200		
138: Vitrandic Xerofluvents, debris flows-----	<u>In</u>											
	0-1	Slightly decomposed plant material				0	0	---	---	---	---	---
	1-3	Moderately decomposed plant material				0	0	---	---	---	---	---
	3-6	Ashy very fine sandy loam	SM, CL-ML, ML	A-2-4, A-4		0-15	0-7	80-100	60-94	55-93	32-58	0-23 NP-4
	6-9	Ashy very fine sandy loam	SM, SC-SM	A-4, A-1-b		0-15	0-7	80-100	60-94	50-86	20-38	0-23 NP-4
	9-13	Ashy very fine sandy loam	SM, SC-SM	A-1-b, A-4		0-15	0-7	80-100	60-94	49-85	24-45	0-23 NP-4
	13-17	Ashy loamy coarse sand	SM, SC-SM, SW-SM	A-1-a, A-2-4		0-12	0-6	74-100	48-93	27-60	11-29	0-23 NP-4
	17-35	Very gravelly ashy loamy coarse sand	SP-SM, SM	A-2-4, A-1-a		0-12	0-6	72-100	21-90	12-54	5-24	0-14 NP
	35-50	Ashy extremely gravelly loamy coarse sand	SP-SM, SM	A-2-4, A-1-a		0-12	0-6	68-100	21-90	12-54	5-24	0-14 NP
	50-55	Very gravelly ashy fine sandy loam	SW-SM, SM	A-2-4, A-1-a, A-1-b		0	0	70-89	33-68	29-65	12-30	0-35 NP-7
	55-67	Very gravelly ashy fine sandy loam	SM, SP-SM	A-1-a, A-2-4, A-1-b		0	0	70-89	33-68	28-63	12-30	0-35 NP-7
Typic Endoaquents-----	0-7	Extremely gravelly ashy sand	SP-SM, GP, SW	A-3, A-1-a		0	0-5	55-97	21-89	16-69	1-6	0-14 NP
	7-14	Very gravelly ashy sand	SP, GW, SP-SM	A-1-a, A-3		0	0-5	55-97	21-89	16-69	1-6	0-14 NP
	14-17	Ashy sand	GW, SP-SM	A-1-a, A-3		0	0-5	55-97	21-89	16-69	1-6	0-14 NP
	17-19	Very gravelly ashy sand	SP, GW, SP-SM	A-1-a, A-3		0	0-5	55-97	21-89	16-69	1-6	0-14 NP
	19-26	Gravelly ashy sand	SP, GP	A-1-a, A-1-b		0	0-5	46-93	13-78	10-60	1-5	0-14 NP
	26-31	Very gravelly ashy sand	SW, GP, SP	A-1-a, A-1-b		0	0-5	46-93	13-78	10-60	1-5	0-14 NP
	31-39	Extremely gravelly ashy coarse sand	GP, SP-SM	A-1-a, A-1-b		0	0-5	46-93	14-79	6-36	1-8	0-14 NP

Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
139: Duric Vitraquands-----	0-2	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	2-4	Gravelly ashy loamy coarse sand	SM	A-1-b	0	0	86-93	65-78	31-40	14-20	0-32	NP-2
	4-7	Gravelly ashy loamy coarse sand	SM, SP-SM	A-1-b	0	0	81-93	56-78	29-44	12-20	0-25	NP-2
	7-13	Gravelly ashy loamy coarse sand	SM, SP-SM	A-1-b	0	0	81-93	56-78	29-43	12-20	0-25	NP-2
	13-17	Gravelly ashy coarse sandy loam	SM	A-1-b, A-2-4	0	0	80-100	50-75	33-52	18-29	0-30	NP-3
	17-23	Gravelly ashy coarse sandy loam	SM, SP-SM	A-1-a, A-1-b	0-21	10-21	67-88	34-64	23-47	12-25	0-26	NP-3
	23-34	Very gravelly ashy loamy coarse sand	SW-SM, SP-SM, SM	A-1-a, A-1-b	0	17-28	67-79	25-47	17-33	8-16	0-25	NP-2
	34-44	Very gravelly ashy loamy coarse sand	SM, SP-SM	A-1-a, A-1-b	0	17-28	67-79	25-47	16-31	7-14	0-25	NP-2
	44-49	Cemented extremely gravelly ashy sandy loam	SP-SM, SM	A-1-a, A-2-4	0-19	0-25	62-82	23-64	16-48	9-29	0-21	NP-3

Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
139: Typic Endoaquands-----	0-2	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	2-3	Mucky highly decomposed plant material			0	0	---	---	---	---	---	---
	3-11	Gravelly medial sandy loam	SM	A-1-b, A-2-4, A-4	0	0	74-100	49-97	34-77	15-40	26-38	3-9
	11-17	Gravelly medial sandy loam	SM	A-4, A-2-4, A-1-b	0	0	73-100	46-97	31-75	14-39	26-38	3-9
	17-29	Gravelly medial sandy loam	GP, SM, SC	A-1-a, A-2-4, A-4	0-17	0-28	35-95	11-89	8-69	4-36	24-33	4-9
	29-52	Extremely gravelly medial coarse sandy loam	GP-GM, SM, GP	A-1-a	0	8-16	43-64	6-37	4-24	2-14	0-14	NP
	52-57	Extremely gravelly medial loamy coarse sand	GP, SP-SM	A-1-a	0	8-16	44-64	6-37	4-22	2-10	0-14	NP
	Aquandic Cryaquents-----	0-7	Silty clay loam	MH, ML, OH	A-6, A-7-5	0	0	92-100	84-100	75-100	72-100	40-66
7-12		Silty clay loam	ML, MH, OH	A-7-5, A-6	0	0	92-100	84-100	75-100	72-100	40-66	13-24
12-14		Ashy silt loam	ML, CL, SM	A-6, A-2-4	0	0-6	75-100	43-100	35-100	33-96	0-40	NP-13
14-20		Very gravelly ashy coarse sand	SW, SW-SM, SM	A-2-6, A-1-a	0	0-6	76-100	47-100	21-64	3-27	0-40	NP-13
20-28		Mucky silty clay loam	OH	A-7-5	0	0	100	100	97-100	93-100	58-90	18-25
28-34		Very gravelly ashy coarse sandy loam	SW-SM, SM	A-6, A-1-b, A-1-a	0	0-6	73-100	44-100	23-73	12-47	0-40	NP-13
34-47		Very gravelly ashy coarse sand	SW, SP-SM, SM	A-2-6, A-1-b, A-1-a	0	0-6	76-100	47-100	21-64	3-27	0-40	NP-13

Table 25.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO	>10 inches Pct	3-10 inches Pct	4	10	40	200		
140: Vitrixerands-----	<u>In</u>											
	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-4	Gravelly ashy loamy coarse sand	SP-SM, SM	A-1-b, A-1-a	0	0	69-90	38-69	22-40	9-17	0-14	NP
	4-8	Gravelly ashy loamy coarse sand	SM, SP-SM	A-1-a, A-1-b	0	0	70-90	39-69	25-45	10-19	0-14	NP
	8-12	Gravelly ashy loamy coarse sand	SM, SP-SM	A-1-a, A-1-b	0	0	69-90	39-69	25-46	10-20	0-14	NP
	12-21	Gravelly ashy loamy sand	SM, SW-SM	A-1-a, A-1-b	0	0-9	69-80	38-60	26-44	11-20	0-29	NP-2
	21-37	Very stony medial loamy sand	GW-GM, SM	A-1-a, A-1-b	0-14	12-32	41-73	19-43	14-32	6-14	0-14	NP
37-46	Cemented duripan			0	0	100	100	68-70	39-41	---	---	
141: Humic Haploxerands-----	0-2	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	2-3	Highly decomposed plant material			0	0	---	---	---	---	---	---
	3-4	Medial fine sandy loam	SM	A-5	0	0	93-97	86-95	75-85	38-44	42-56	1-2
	4-6	Medial sandy loam	SM	A-2-5, A-1-b, A-5	0-67	0-6	76-92	55-87	42-69	22-37	37-57	1-3
	6-15	Extremely stony medial sandy loam	SM	A-5, A-1-b, A-2-4	0-67	0-6	76-92	55-86	43-69	22-37	37-57	1-3
	15-24	Very stony medial sandy loam	SM	A-2-5, A-1-b	0-25	0-25	75-87	59-77	45-62	23-32	29-44	5-7
	24-29	Cobbly medial sandy loam	SM	A-1-b, A-2-4, A-2-5	0-25	0-27	75-87	59-77	43-59	20-29	29-44	5-7
	29-42	Cobbly sandy loam	SM, SP-SM	A-2-4, A-2-6, A-2-7	0-27	11-26	60-85	32-72	23-59	11-32	34-54	9-15
	42-60	Very stony medial loam	GM, OH	A-2-4, A-2-6, A-7-5	0-27	11-20	57-85	32-72	31-72	24-60	34-54	9-15

Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
141: Typic Haploxerands-----	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-2	Gravelly medial sandy loam	SM	A-1-b, A-2-4	0	0	80-89	50-75	38-58	19-30	0-14	NP
	2-5	Gravelly medial sandy loam	SM	A-1-b, A-2-5, A-1-a	0	0	65-81	39-69	29-55	15-29	0-44	NP-2
	5-12	Very gravelly medial sandy loam	SM, GP-GM	A-1-b, A-1-a	0-13	17-27	54-66	24-47	18-38	9-21	0-35	NP-4
	12-20	Very cobbly medial sandy loam	GP-GM, SM	A-1-b, A-1-a	0-13	17-27	54-66	24-47	18-37	9-21	0-35	NP-4
	20-30	Very gravelly medial sandy loam	SM, SP-SM	A-1-a, A-1-b	0-13	16-26	55-68	26-50	19-38	9-19	0-35	NP-4
	30-37	Extremely gravelly medial sandy loam	GP-GM, GW-GC, SM	A-1-a, A-2-4	6-66	8-13	51-80	20-61	15-49	8-26	21-33	4-8
	37-44	Extremely stony medial sandy loam	SM, SP, SC-SM	A-1-a, A-2-4	6-58	6-11	54-74	9-49	6-38	3-19	21-33	4-8
	44-50	Stony medial sandy loam	SC-SM, SC, SM	A-4, A-2-4	9-90	9-21	100	100	71-77	33-39	21-33	4-9
	50-61	Extremely paragravelly medial sandy loam	SC, SC-SM	A-4	0	0	100	100	74-78	36-40	20-28	6-9

Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	<u>In</u>				<u>Pct</u>	<u>Pct</u>					<u>Pct</u>	
141: Bearrubble-----	0-3	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	3-6	Ashy fine sand	SP, SM, SP-SM	A-1-b, A-2-4, A-3	0-72	0-30	86-100	42-94	39-92	4-13	0-40	NP-6
	6-13	Extremely cobbly loamy coarse sand	GW-GM, GP, SM	A-1-a, A-1-b	11-65	13-61	39-81	12-63	7-38	3-17	0-33	NP-1
	13-19	Extremely cobbly ashy sandy loam	GP, GM, SM	A-2-4, A-1-a	19-54	17-54	48-70	10-64	8-52	4-28	0-27	NP-3
	19-35	Extremely stony medial sandy loam	GM, GW-GM, SP-SM	A-1-a, A-2-4	22-53	12-53	49-75	13-70	10-57	5-31	0-27	NP-3
	35-49	Very stony medial fine sandy loam	SP-SM, SC-SM, SM	A-1-b, A-1-a, A-4	14-75	7-46	59-80	18-75	16-69	8-36	0-24	NP-4
	49-60	Very stony medial fine sandy loam	SP-SM, SC-SM, SM	A-1-b, A-1-a, A-4	14-75	7-46	59-80	18-75	16-68	8-36	0-24	NP-4
Rubble land.												

Table 25.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
142: Cragwash-----	0-2	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	2-3	Ashy loamy coarse sand	SP-SM, SM	A-1-a, A-1-b	0	0	81-97	42-82	21-44	11-25	0-44	NP-2
	3-5	Gravelly ashly coarse sand	SM, SP-SM, SW-SM	A-1-b, A-1-a	0	0	83-98	50-86	17-32	8-17	0-44	NP-2
	5-11	Very gravelly ashly coarse sandy loam	SM, SC-SM, GW-GM	A-1-a, A-4	0	0	48-100	18-98	10-61	6-38	0-22	NP-4
	11-17	Very gravelly ashly loamy coarse sand	SW-SM, SM	A-2-4, A-1-a	0-28	0-21	57-97	29-85	17-54	8-27	0-29	NP-3
	17-27	Very gravelly ashly loamy coarse sand	GP, SM, GW-GM	A-1-b, A-1-a	0-22	0-45	45-80	13-70	8-47	3-21	0-23	NP-3
	27-38	Extremely gravelly ashly loamy coarse sand	GP, SM, GW-GM	A-1-b, A-1-a	0-22	0-45	45-80	13-70	7-40	3-18	0-23	NP-3
	38-57	Extremely cobbly ashly coarse sand	SP-SM, GW, GP	A-1-b, A-1-a	0	16-46	46-71	19-52	10-28	2-7	0-14	NP
	57-82	Cemented extremely gravelly ashly loamy coarse sand	SP-SM, SW, SM	A-1-a, A-1-b	0	0-46	57-72	14-54	10-39	4-18	0-14	NP

Table 25.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
143: Andic Durixerpts-----	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-3	Gravelly ash loamy coarse sand	SM	A-1-b	0	0	82-91	49-72	33-50	14-22	0-14	NP
	3-12	Extremely cobbly ash coarse sandy loam	GP-GM, SM, GW-GM	A-1-b, A-1-a	0	8-37	48-78	18-55	11-36	6-22	0-24	NP-2
	12-19	Extremely gravelly ash coarse sandy loam	GW-GM, SM	A-1-a, A-1-b	0	0-37	44-77	17-54	11-36	6-20	0-24	NP-2
	19-24	Extremely gravelly loamy coarse sand	SW, SP-SM	A-1-a	0	6-12	58-68	15-36	9-21	4-11	0-20	NP-1
	24-31	Cemented extremely gravelly ash coarse sandy loam	SM, SP-SM	A-1-a, A-1-b	0	5-11	61-79	22-47	15-33	10-22	0-14	NP
144: Xeric Vitricryands, cirque floor-----	0-2	Gravelly ash sandy loam	SM, SP-SM	A-1-a, A-2-4, A-1-b	0	0	74-89	32-66	24-52	12-28	0-19	NP-3
	2-5	Very gravelly ash sandy loam	SP-SM, SC-SM	A-1-b, A-1-a	0	0-7	68-81	27-52	20-41	10-21	15-20	1-5
	5-13	Gravelly ash sandy loam	SC-SM, SP-SM	A-1-b, A-1-a	0	0-7	68-84	27-54	20-42	9-21	15-20	1-5
	13-26	Gravelly ash sandy loam	SC-SM, SC, SP-SC	A-1-b, A-2-4, A-1-a	0	0-9	69-90	30-67	24-55	12-30	21-26	6-9
	26-36	Gravelly ash sandy loam	SP-SC, SC	A-2-4, A-1-a	0	0-7	70-91	32-68	23-53	11-27	21-26	6-9
	36-46	Gravelly sandy loam	GW-GC, SC	A-1-a, A-2-4	0-54	0-21	51-93	18-75	11-58	5-30	21-26	6-9

Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO	>10	3-10	4	10	40	200		
					inches	inches						
	<u>In</u>				<u>Pct</u>	<u>Pct</u>					<u>Pct</u>	
144: Humic Xeric Vitricryands---	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-4	Gravelly medial sandy loam	SM	A-1-b, A-2-4, A-2-5	0	6-15	84-89	55-68	42-53	21-28	0-58	NP-1
	4-6	Gravelly ashy sandy loam	SM	A-2-4, A-1-b	0	10-16	70-86	40-72	31-57	16-31	0-23	NP-3
	6-12	Very gravelly ashy sandy loam	SM, SP-SM	A-2-4, A-1-b, A-1-a	0-11	0-14	61-81	30-61	23-48	12-26	18-28	2-3
	12-18	Very gravelly ashy sandy loam	SM, SP-SM	A-1-b, A-2-4, A-1-a	0-11	0-14	59-81	30-61	23-48	12-26	18-28	2-3
	18-24	Gravelly ashy sandy loam	SM, SP-SM	A-1-b, A-2-4, A-1-a	0-11	0-14	61-81	30-61	23-48	12-26	18-29	2-3
	24-30	Very gravelly coarse sandy loam	SM	A-1-b, A-1-a	0	5-13	60-73	36-59	23-39	14-24	17-21	1-3

Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
145: Sueredo-----	0-2	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	2-5	Moderately decomposed plant material			0	0	---	---	---	---	---	---
	5-9	Bouldery ashy loamy coarse sand	SP-SM, SM	A-1-a, A-2-4, A-1-b	0-17	0-8	77-100	40-88	21-51	11-28	0-26	NP-3
	9-13	Bouldery ashy loamy coarse sand	SM, SP-SM	A-1-b, A-2-4, A-1-a	0-17	0-8	78-100	40-88	23-55	12-30	0-26	NP-3
	13-16	Bouldery ashy loamy coarse sand	GP, SM	A-1-a, A-1-b, A-2-4	0-43	0-21	43-100	7-98	3-54	2-30	0-24	NP-3
	16-18	Very bouldery ashy coarse sand	SW, SM, GP	A-1-a, A-1-b	0-43	0-21	43-100	7-98	1-26	0-14	0-24	NP-3
	18-26	Very bouldery ashy loamy coarse sand	SW-SM, SM, SP-SM	A-1-a, A-1-b	0-64	0-32	72-88	24-76	14-48	5-22	0-28	NP-5
	26-50	Extremely cobbly ashy coarse sand	GW-GM, SC-SM, GP	A-1-a, A-2-4	0-34	8-40	44-85	13-71	9-53	3-20	0-25	NP-4
	50-76	Ashy stones	GP, GP-GM	A-1-a	0-38	20-44	26-45	8-34	5-22	1-5	0-14	NP
	76-83	Extremely bouldery ashy loamy coarse sand	SP-SM, GP, SM	A-1-a, A-1-b	0-15	0-21	43-83	7-58	4-32	2-18	0-14	NP

Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO	>10 inches Pct	3-10 inches Pct	4	10	40	200		
146: Sueredo-----	<u>In</u>											
	0-2	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	2-5	Moderately decomposed plant material			0	0	---	---	---	---	---	---
	5-9	Bouldery ashy loamy coarse sand	SP-SM, SM	A-1-a, A-2-4, A-1-b	0-17	0-8	77-100	40-88	21-51	11-28	0-26	NP-3
	9-13	Bouldery ashy loamy coarse sand	SM, SP-SM	A-1-b, A-2-4, A-1-a	0-17	0-8	78-100	40-88	23-55	12-30	0-26	NP-3
	13-16	Bouldery ashy loamy coarse sand	GP, SM	A-1-a, A-1-b, A-2-4	0-43	0-21	43-100	7-98	3-54	2-30	0-24	NP-3
	16-18	Very bouldery ashy coarse sand	SW, SM, GP	A-1-a, A-1-b	0-43	0-21	43-100	7-98	1-26	0-14	0-24	NP-3
	18-26	Very bouldery ashy loamy coarse sand	SW-SM, SM, SP-SM	A-1-a, A-1-b	0-64	0-32	72-88	24-76	14-48	5-22	0-28	NP-5
	26-50	Extremely cobbly ashy coarse sand	GW-GM, SC-SM, GP	A-1-a, A-2-4	0-34	8-40	44-85	13-71	9-53	3-20	0-25	NP-4
	50-76	Ashy stones	GP, GP-GM	A-1-a	0-38	20-44	26-45	8-34	5-22	1-5	0-14	NP
	76-83	Extremely bouldery ashy loamy coarse sand	SP-SM, GP, SM	A-1-a, A-1-b	0-15	0-21	43-83	7-58	4-32	2-18	0-14	NP

Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
147: Summertown-----	0-2	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	2-4	Highly decomposed plant material			0	0	---	---	---	---	---	---
	4-6	Gravelly ashy loamy coarse sand	SP-SM, SM	A-1-b, A-2-4, A-1-a	0-11	0-27	62-95	33-83	21-56	9-24	0-29	NP-1
	6-15	Cobbly ashy loamy coarse sand	SM	A-2-4, A-1-b	4-23	4-17	89-97	57-85	36-55	16-25	0-23	NP-1
	15-22	Very cobbly ashy loamy coarse sand	SM, GW-GM	A-1-a, A-1-b, A-2-4	0-45	8-45	47-88	16-73	11-53	5-24	0-27	NP-3
	22-31	Extremely cobbly ashy loamy sand	GW, SP-SM, SM	A-1-a, A-2-4	0-45	8-47	47-88	16-73	11-54	4-23	0-27	NP-3
	31-43	Extremely stony ashy loamy coarse sand	GP, SP-SM, SM	A-1-a, A-1-b	6-70	19-44	44-80	10-60	6-37	2-16	0-20	NP-2
148: Humic Haploxerands, lake terrace-----	0-0	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	0-3	Medial sandy loam	GW-GM, SM	A-5, A-1-a, A-2-4	0-49	0-12	50-89	20-84	16-72	8-41	0-61	NP-7
	3-11	Very bouldery medial fine sandy loam	SM, GP-GM	A-1-b, A-1-a, A-5	0-50	0-12	50-89	20-84	18-81	9-44	0-61	NP-7
	11-18	Extremely bouldery medial fine sandy loam	SM, GP-GM	A-1-a, A-1-b, A-5	0-52	0-13	50-89	20-84	18-81	9-44	0-61	NP-7
	18-26	Very cobbly medial fine sandy loam	SM, GW-GM, GM	A-1-a, A-1-b	0-7	17-22	39-68	16-47	14-43	7-23	25-50	1-5
	26-35	Cemented very gravelly medial sandy loam		A-1-a	0	7-11	28-64	10-47	---	---	---	---

Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
148: Typic Endoaquands-----	0-2	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	2-3	Mucky highly decomposed plant material			0	0	---	---	---	---	---	---
	3-11	Gravelly medial sandy loam	SM	A-1-b, A-2-4, A-4	0	0	74-100	49-97	34-77	15-40	26-38	3-9
	11-17	Gravelly medial sandy loam	SM	A-4, A-2-4, A-1-b	0	0	73-100	46-97	31-75	14-39	26-38	3-9
	17-29	Gravelly medial sandy loam	GP, SM, SC	A-1-a, A-2-4, A-4	0-17	0-28	35-95	11-89	8-69	4-36	24-33	4-9
	29-52	Extremely gravelly medial coarse sandy loam	GP-GM, SM, GP	A-1-a	0	8-16	43-64	6-37	4-24	2-14	0-14	NP
	52-57	Extremely gravelly medial loamy coarse sand	GP, SP-SM	A-1-a	0	8-16	44-64	6-37	4-22	2-10	0-14	NP
149: Rubble land. Rock outcrop, cliffs.												
Emeraldlake-----	0-1	Extremely gravelly ashy fine sandy loam	SM, SP-SM, SW-SM	A-1-a, A-1-b	0	0-12	54-76	18-53	15-47	7-24	0-34	NP-2
	1-5	Extremely gravelly ashy loamy sand	GW-GM, GP, GP-GM	A-1-a	0-7	7-16	31-44	10-36	8-29	3-11	0-33	NP-3
	5-14	Extremely gravelly ashy loamy sand	GP-GM, GP	A-1-a	0-8	7-19	28-41	9-33	6-24	2-8	0-29	NP-3
	14-25	Extremely gravelly ashy loamy coarse sand	SP-SM, GW, GP	A-1-a, A-1-b	0-10	11-21	25-64	6-50	4-31	1-12	0-30	NP-4
	25-35	Extremely gravelly ashy loamy coarse sand	SM, GP	A-1-a	0-11	11-21	25-64	6-50	3-30	1-13	0-27	NP-4
	35-51	Ashy boulders	SM, GW	A-1-a, A-1-b	3-98	0-21	16-76	5-67	3-39	1-15	0-24	NP-1
	51-60	Ashy boulders	SM, GW	A-1-a, A-2-4	3-98	0-21	16-76	5-67	4-51	2-22	0-24	NP-1

Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
150: Shadowlake-----	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-2	Gravelly ash sandy loam	SM	A-1-b, A-2-5	0	0	80-84	42-63	31-50	16-27	0-44	NP-2
	2-6	Gravelly ash sandy loam	SM, SP-SM	A-1-b, A-1-a, A-2-4	0-27	0-20	65-85	24-72	18-58	10-32	0-38	NP-4
	6-13	Gravelly ash sandy loam	SP-SM, SM	A-2-4, A-1-a, A-1-b	0-27	0-20	65-85	24-72	18-58	9-32	0-38	NP-4
	13-23	Very gravelly ash sandy loam	SP-SM, SM	A-2-4, A-1-a	0-27	0-20	65-85	24-72	18-58	10-32	0-38	NP-4
	23-41	Extremely gravelly ash coarse sandy loam	SP-SM, SP	A-1-a	0-23	0-17	56-60	12-20	7-13	4-8	0-19	NP-2
	41-51	Loam	SM, CL-ML	A-4, A-1-b	0-45	0-17	61-96	28-79	25-78	18-60	0-23	NP-7
Terracelake-----	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-3	Gravelly ash sandy loam	SP-SM, SM	A-1-a, A-2-4, A-4	0-26	0-46	65-100	23-100	18-80	9-43	0-39	NP-2
	3-7	Gravelly ash sandy loam	SM, GW-GM	A-1-b, A-1-a	0-19	0-15	44-69	15-49	12-38	6-20	0-27	NP-2
	7-19	Very gravelly ash fine sandy loam	GM, SC-SM, GP	A-4, A-1-a	0-37	8-53	40-79	5-76	4-71	2-38	0-29	NP-5
	19-24	Extremely gravelly ash fine sandy loam	GP-GM, GP, GM	A-1-a, A-4	0-37	8-53	40-79	5-76	4-71	2-38	0-29	NP-5
	24-37	Extremely stony ash sandy loam	GC-GM, GP	A-1-a, A-1-b	7-53	0-16	28-51	4-42	3-34	2-19	0-23	NP-5
	---	Bedrock			---	---	---	---	---	---	---	---

Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
150: Acroph-----	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-2	Ashy highly organic sand	SP-SM, SP	A-2-4, A-3, A-1-b	0	0	86-100	56-94	43-74	4-8	0-23	NP-2
	2-5	Ashy highly organic loamy sand	SM	A-2-4, A-1-b	0	0	86-100	56-94	42-74	15-27	0-23	NP-2
	5-11	Very cobbly ashy loamy sand	SP-SM, SM	A-1-b, A-2-4, A-1-a	0-8	10-33	64-81	24-64	19-52	7-20	0-23	NP-2
	11-15	Extremely cobbly ashy loamy sand	GW-GM, SW-SM, SM	A-1-a, A-2-4	0-6	10-33	54-81	24-64	19-52	7-20	0-23	NP-2
	---	Bedrock			---	---	---	---	---	---	---	---
Rock outcrop.												
151: Terracelake-----	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-3	Gravelly ashy sandy loam	SP-SM, SM	A-1-a, A-2-4, A-4	0-26	0-46	65-100	23-100	18-80	9-43	0-39	NP-2
	3-7	Gravelly ashy sandy loam	SM, GW-GM	A-1-b, A-1-a	0-19	0-15	44-69	15-49	12-38	6-20	0-27	NP-2
	7-19	Very gravelly ashy fine sandy loam	GM, SC-SM, GP	A-4, A-1-a	0-37	8-53	40-79	5-76	4-71	2-38	0-29	NP-5
	19-24	Extremely gravelly ashy fine sandy loam	GP-GM, GP, GM	A-1-a, A-4	0-37	8-53	40-79	5-76	4-71	2-38	0-29	NP-5
	24-37	Extremely stony ashy sandy loam	GC-GM, GP	A-1-a, A-1-b	7-53	0-16	28-51	4-42	3-34	2-19	0-23	NP-5
	---	Bedrock			---	---	---	---	---	---	---	---

Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
151: Acroph-----	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-2	Ashy highly organic sand	SP-SM, SP	A-2-4, A-3, A-1-b	0	0	86-100	56-94	43-74	4-8	0-23	NP-2
	2-5	Ashy highly organic loamy sand	SM	A-2-4, A-1-b	0	0	86-100	56-94	42-74	15-27	0-23	NP-2
	5-11	Very cobbly ashy loamy sand	SP-SM, SM	A-1-b, A-2-4, A-1-a	0-8	10-33	64-81	24-64	19-52	7-20	0-23	NP-2
	11-15	Extremely cobbly ashy loamy sand	GW-GM, SW-SM, SM	A-1-a, A-2-4	0-6	10-33	54-81	24-64	19-52	7-20	0-23	NP-2
	---	Bedrock			---	---	---	---	---	---	---	---
Rock outcrop.												
Shadowlake-----	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-2	Gravelly ashy sandy loam	SM	A-1-b, A-2-5	0	0	80-84	42-63	31-50	16-27	0-44	NP-2
	2-6	Gravelly ashy sandy loam	SM, SP-SM	A-1-b, A-1-a, A-2-4	0-27	0-20	65-85	24-72	18-58	10-32	0-38	NP-4
	6-13	Gravelly ashy sandy loam	SP-SM, SM	A-2-4, A-1-a, A-1-b	0-27	0-20	65-85	24-72	18-58	9-32	0-38	NP-4
	13-23	Very gravelly ashy sandy loam	SP-SM, SM	A-2-4, A-1-a	0-27	0-20	65-85	24-72	18-58	10-32	0-38	NP-4
	23-41	Extremely gravelly ashy coarse sandy loam	SP-SM, SP	A-1-a	0-23	0-17	56-60	12-20	7-13	4-8	0-19	NP-2
	41-51	Loam	SM, CL-ML	A-4, A-1-b	0-45	0-17	61-96	28-79	25-78	18-60	0-23	NP-7

Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
152: Terracelake-----	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-3	Gravelly ashy sandy loam	SP-SM, SM	A-1-a, A-2-4, A-4	0-26	0-46	65-100	23-100	18-80	9-43	0-39	NP-2
	3-7	Gravelly ashy sandy loam	SM, GW-GM	A-1-b, A-1-a	0-19	0-15	44-69	15-49	12-38	6-20	0-27	NP-2
	7-19	Very gravelly ashy fine sandy loam	GM, SC-SM, GP	A-4, A-1-a	0-37	8-53	40-79	5-76	4-71	2-38	0-29	NP-5
	19-24	Extremely gravelly ashy fine sandy loam	GP-GM, GP, GM	A-1-a, A-4	0-37	8-53	40-79	5-76	4-71	2-38	0-29	NP-5
	24-37	Extremely stony ashy sandy loam	GC-GM, GP	A-1-a, A-1-b	7-53	0-16	28-51	4-42	3-34	2-19	0-23	NP-5
	---	Bedrock			---	---	---	---	---	---	---	---
Shadowlake-----	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-2	Gravelly ashy sandy loam	SM	A-1-b, A-2-5	0	0	80-84	42-63	31-50	16-27	0-44	NP-2
	2-6	Gravelly ashy sandy loam	SM, SP-SM	A-1-b, A-1-a, A-2-4	0-27	0-20	65-85	24-72	18-58	10-32	0-38	NP-4
	6-13	Gravelly ashy sandy loam	SP-SM, SM	A-2-4, A-1-a, A-1-b	0-27	0-20	65-85	24-72	18-58	9-32	0-38	NP-4
	13-23	Very gravelly ashy sandy loam	SP-SM, SM	A-2-4, A-1-a	0-27	0-20	65-85	24-72	18-58	10-32	0-38	NP-4
	23-41	Extremely gravelly ashy coarse sandy loam	SP-SM, SP	A-1-a	0-23	0-17	56-60	12-20	7-13	4-8	0-19	NP-2
	41-51	Loam	SM, CL-ML	A-4, A-1-b	0-45	0-17	61-96	28-79	25-78	18-60	0-23	NP-7

Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
152: Acroph-----	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-2	Ashy highly organic sand	SP-SM, SP	A-2-4, A-3, A-1-b	0	0	86-100	56-94	43-74	4-8	0-23	NP-2
	2-5	Ashy highly organic loamy sand	SM	A-2-4, A-1-b	0	0	86-100	56-94	42-74	15-27	0-23	NP-2
	5-11	Very cobbly ashy loamy sand	SP-SM, SM	A-1-b, A-2-4, A-1-a	0-8	10-33	64-81	24-64	19-52	7-20	0-23	NP-2
	11-15	Extremely cobbly ashy loamy sand	GW-GM, SW-SM, SM	A-1-a, A-2-4	0-6	10-33	54-81	24-64	19-52	7-20	0-23	NP-2
	---	Bedrock			---	---	---	---	---	---	---	---
Rock outcrop.												
153: Typic Vitrixerands-----	0-2	Very gravelly ashy loamy sand	SM, SP-SM	A-1-a, A-2-4, A-1-b	0-14	0-7	69-89	30-67	23-52	8-19	0-14	NP
	2-4	Gravelly ashy loamy fine sand	SP-SM, SM	A-1-b, A-2-4, A-1-a	0-14	0-7	69-89	30-67	28-64	10-23	0-14	NP
	4-8	Gravelly ashy loamy fine sand	SP-SM, SM	A-1-b, A-2-4, A-1-a	0-14	0-14	61-78	29-56	26-54	9-20	0-23	NP-2
	8-18	Gravelly ashy loamy sand	SP-SM, SM	A-1-b, A-1-a	0-14	0-14	61-78	29-56	22-45	7-17	0-23	NP-2
	18-31	Very gravelly ashy loamy sand	SM, SP-SM	A-1-b, A-1-a	0-14	0-14	62-78	28-56	21-45	7-17	0-23	NP-2
	31-52	Very gravelly ashy loamy sand	SP-SM, SM	A-1-b, A-1-a	0-12	0-12	61-63	28-48	21-38	7-15	0-17	NP-2

Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
153: Vitrandic Xerorthents, moraine-----	0-3	Gravelly ashy sandy loam	SM	A-1-a, A-1-b, A-2-4	0-13	0-6	71-92	35-66	27-51	13-27	0-14	NP
	3-9	Gravelly ashy sandy loam	SM	A-1-b, A-1-a, A-2-4	0-13	0-6	71-92	35-66	26-51	13-26	0-14	NP
	9-16	Gravelly ashy coarse sandy loam	SM	A-1-b, A-1-a	0-13	0-6	71-92	35-66	22-42	13-25	0-14	NP
	16-23	Very gravelly ashy sandy loam	SM, SP-SM	A-1-b, A-1-a	0-14	8-14	74-81	30-42	22-33	11-17	0-19	NP-2
	23-37	Extremely gravelly ashy loamy sand	SP-SM	A-1-a	0-11	0-11	69-79	19-37	11-22	5-10	0-17	NP-2
154: Typic Vitriixerands-----	0-2	Very gravelly ashy loamy sand	SM, SP-SM	A-1-a, A-2-4, A-1-b	0-14	0-7	69-89	30-67	23-52	8-19	0-14	NP
	2-4	Gravelly ashy loamy fine sand	SP-SM, SM	A-1-b, A-2-4, A-1-a	0-14	0-7	69-89	30-67	28-64	10-23	0-14	NP
	4-8	Gravelly ashy loamy fine sand	SP-SM, SM	A-1-b, A-2-4, A-1-a	0-14	0-14	61-78	29-56	26-54	9-20	0-23	NP-2
	8-18	Gravelly ashy loamy sand	SP-SM, SM	A-1-b, A-1-a	0-14	0-14	61-78	29-56	22-45	7-17	0-23	NP-2
	18-31	Very gravelly ashy loamy sand	SM, SP-SM	A-1-b, A-1-a	0-14	0-14	62-78	28-56	21-45	7-17	0-23	NP-2
	31-52	Very gravelly ashy loamy sand	SP-SM, SM	A-1-b, A-1-a	0-12	0-12	61-63	28-48	21-38	7-15	0-17	NP-2

Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
154: Vitrandic Xerorthents, moraine-----	0-3	Gravelly ashy sandy loam	SM	A-1-a, A-1-b, A-2-4	0-13	0-6	71-92	35-66	27-51	13-27	0-14	NP
	3-9	Gravelly ashy sandy loam	SM	A-1-b, A-1-a, A-2-4	0-13	0-6	71-92	35-66	26-51	13-26	0-14	NP
	9-16	Gravelly ashy coarse sandy loam	SM	A-1-b, A-1-a	0-13	0-6	71-92	35-66	22-42	13-25	0-14	NP
	16-23	Very gravelly ashy sandy loam	SM, SP-SM	A-1-b, A-1-a	0-14	8-14	74-81	30-42	22-33	11-17	0-19	NP-2
	23-37	Extremely gravelly ashy loamy sand	SP-SM	A-1-a	0-11	0-11	69-79	19-37	11-22	5-10	0-17	NP-2
155: Xeric Vitricryands, pyroclastic surge-----	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-3	Moderately decomposed plant material			0	0	---	---	---	---	---	---
	3-6	Very gravelly ashy loamy coarse sand	SM, SP-SM	A-2-4, A-1-a	0	0	63-100	20-90	12-54	5-24	0-14	NP
	6-10	Very gravelly medial loamy coarse sand	SP-SM, SM	A-1-a, A-1-b	0	0-24	74-81	39-53	23-31	10-14	0-14	NP
	10-15	Very gravelly medial sandy loam	SM, GW-GM	A-1-a, A-1-b	0-12	16-22	47-77	15-55	11-42	6-23	0-23	NP-2
	15-27	Very cobbly medial sandy loam	SM, GW-GM	A-1-a, A-1-b	0-12	16-21	47-77	15-55	11-43	6-23	0-14	NP
	27-39	Extremely gravelly medial sandy loam	GP-GM, GW-GM, GM	A-1-a, A-1-b	0-36	25-30	47-57	17-43	13-33	6-17	0-14	NP
	39-48	Extremely gravelly medial sandy loam	GM, SP-SM, GW-GM	A-1-a, A-1-b	0-36	26-30	47-60	17-43	12-32	6-17	0-23	NP-2
	48-60	Very gravelly loamy coarse sand	SM, SW-SM, SW	A-1-a, A-1-b	0-32	6-32	62-84	15-51	9-30	4-13	0-14	NP

Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index	
			Unified	AASHTO	>10 inches Pct	3-10 inches Pct	4	10	40	200			
156: Xeric Vitricryands, pyroclastic surge-----	<u>In</u>												
	0-1	Slightly decomposed plant material				0	0	---	---	---	---	---	---
	1-3	Moderately decomposed plant material				0	0	---	---	---	---	---	---
	3-6	Very gravelly ashly loamy coarse sand	SM, SP-SM	A-2-4, A-1-a		0	0	63-100	20-90	12-54	5-24	0-14	NP
	6-10	Very gravelly medial loamy coarse sand	SP-SM, SM	A-1-a, A-1-b		0	0-24	74-81	39-53	23-31	10-14	0-14	NP
	10-15	Very gravelly medial sandy loam	SM, GW-GM	A-1-a, A-1-b		0-12	16-22	47-77	15-55	11-42	6-23	0-23	NP-2
	15-27	Very cobbly medial sandy loam	SM, GW-GM	A-1-a, A-1-b		0-12	16-21	47-77	15-55	11-43	6-23	0-14	NP
	27-39	Extremely gravelly medial sandy loam	GP-GM, GW-GM, GM	A-1-a, A-1-b		0-36	25-30	47-57	17-43	13-33	6-17	0-14	NP
	39-48	Extremely gravelly medial sandy loam	GM, SP-SM, GW-GM	A-1-a, A-1-b		0-36	26-30	47-60	17-43	12-32	6-17	0-23	NP-2
48-60	Very gravelly loamy coarse sand	SM, SW-SM, SW	A-1-a, A-1-b		0-32	6-32	62-84	15-51	9-30	4-13	0-14	NP	

Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
157: Typic Vitrixerands, very deep-----	0-2	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	2-4	Moderately decomposed plant material			0	0	---	---	---	---	---	---
	4-6	Gravelly ashy sandy loam	SM	A-2-4, A-1-b	0	0	91-100	47-76	35-60	18-32	0-28	NP-2
	6-10	Gravelly ashy sandy loam	SM	A-1-b, A-2-4	0	0	91-100	47-76	35-60	18-32	0-28	NP-2
	10-22	Stony ashy sandy loam	SM	A-1-b, A-2-4, A-1-a	6-36	0-29	79-95	37-71	28-55	14-29	0-23	NP-2
	22-31	Very stony ashy loamy sand	SM, SW-SM	A-1-b, A-2-4, A-1-a	6-36	0-29	79-95	37-71	29-57	10-22	0-23	NP-2
	31-39	Extremely gravelly ashy loamy sand	SM, GW-GM, GW	A-1-b, A-1-a	8-34	8-17	48-69	13-48	10-39	3-15	0-23	NP-2
	39-60	Extremely stony ashy loamy sand	GW-GM, SM, GW	A-1-b, A-1-a	8-34	8-17	46-69	13-48	10-38	3-14	0-14	NP
158: Typic Vitrixerands, unglaciated-----	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-3	Ashy fine sandy loam	SM	A-2-4, A-4	0	0	90-100	62-92	52-82	26-41	0-27	NP-1
	3-8	Ashy sandy loam	SM, GW-GM	A-2-4, A-1-a	0	0-20	47-95	20-83	15-64	7-34	0-25	NP-2
	8-15	Gravelly ashy sandy loam	GW-GM, SM	A-1-a, A-2-4	0	0-20	47-95	20-83	15-64	7-34	0-25	NP-2
	15-25	Very gravelly ashy loamy coarse sand	GW-GM, SP-SM, SM	A-1-a, A-2-4	0	0-20	47-95	20-83	11-51	5-23	0-25	NP-2
	25-39	Very gravelly ashy loamy coarse sand	GP, SP-SM	A-1-a	6-17	7-34	48-66	11-43	6-26	3-12	0-18	NP-1
	---	Weathered bedrock			---	---	---	---	---	---	---	---
Rock outcrop, rhyodacite.												

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Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
159: Typic Vitrixerands, bouldery-----	0-2	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	2-5	Very stony ashy sand	SP-SM, SP	A-1-a, A-3, A-1-b	23-85	23-28	69-91	23-75	18-59	2-7	0-14	NP
	5-11	Very stony ashy loamy coarse sand	SM, SP-SM	A-1-b, A-1-a	25-85	25-29	69-91	23-75	13-46	6-20	0-22	NP-1
	11-34	Ashy boulders	SP, SP-SM	A-1-b, A-3	63-100	5-19	80-100	59-100	44-78	3-9	0-14	NP
	34-56	Ashy boulders	SP, SP-SM	A-3, A-1-a	63-100	5-19	68-100	36-100	28-78	3-9	0-14	NP
	56-60	Ashy boulders	GW, SC-SM	A-1-a, A-2-4	63-100	5-19	47-100	20-100	16-82	3-16	0-25	NP-6
Typic Vitrixerands, tephra over colluvium-----	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-2	Ashy sandy loam	SM	A-1-b, A-5, A-2-4	0	0	90-100	62-88	46-68	23-36	0-43	NP-2
	2-4	Ashy sandy loam	SM	A-2-4, A-5, A-1-b	0	0	90-100	62-88	45-68	23-36	0-43	NP-2
	4-7	Ashy fine sandy loam	SM, SC-SM, GP	A-2-4, A-4, A-1-a	0-5	0-11	44-100	10-95	8-86	3-38	0-25	NP-4
	7-14	Extremely gravelly ashy coarse sand	SC-SM, GP	A-1-a, A-1-b	0-5	0-11	44-100	11-95	5-50	1-17	0-25	NP-4
	14-20	Very gravelly ashy sandy loam	SM, SP-SM	A-1-a, A-1-b	0-7	0-14	59-66	25-41	19-32	10-17	0-26	NP-3
	20-28	Very gravelly ashy sandy loam	SP-SM, SM	A-1-a, A-1-b	0-7	0-14	59-75	25-41	19-32	10-17	0-23	NP-3
	28-41	Very gravelly ashy sandy loam	SP-SM, SM	A-1-a, A-1-b	0-7	0-14	59-75	25-41	19-32	10-17	0-23	NP-3
	41-51	Extremely cobbly ashy sandy loam	GM, GW-GM, GP	A-1-a	8-28	16-28	36-56	12-39	9-30	4-15	0-14	NP
	51-61	Extremely stony ashy loamy coarse sand	GW-GM, GP	A-1-a	8-28	11-28	36-58	12-41	7-24	3-11	0-14	NP
Rubble land.												

Table 25.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
160: Aeric Endoaquents-----	0-2	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	2-3	Moderately decomposed plant material			0	0	---	---	---	---	---	---
	3-5	Loamy very fine sand	GM, ML	A-4, A-1-b	0-2	0-6	49-100	37-100	36-100	22-63	0-14	NP
	5-7	Sand	SP-SM, GP	A-3, A-1-a	0-2	0-6	50-100	37-100	28-78	2-9	0-14	NP
	7-13	Very gravelly coarse sand	GP, SM	A-1-a, A-1-b	0-2	0-5	51-100	39-100	17-48	4-13	0-14	NP
	13-24	Extremely gravelly sand	GP, GW, SP-SM	A-3, A-1-a	0-15	7-31	17-91	9-91	7-70	0-6	0-14	NP
	24-30	Stony fine sand	SP-SM, GP	A-1-a, A-3, A-2-4	0-15	7-31	36-92	9-91	8-86	1-9	0-14	NP
	30-33	Very gravelly fine sand	SP, SP-SM, GP	A-1-b, A-1-a, A-3	0-15	7-31	36-91	9-91	8-86	1-9	0-14	NP
	33-38	Extremely gravelly coarse sand	GP, SW-SM	A-1-b, A-1-a	0-15	7-31	36-92	9-92	4-42	1-10	0-14	NP
	38-63	Extremely cobbly coarse sand	GP, SW-SM	A-1-b, A-1-a	0-15	7-31	31-92	9-92	4-42	1-10	0-14	NP
Humic Haploxerands, stream terrace-----	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-4	Gravelly medial sandy loam	SM	A-4, A-1-b	0	0-8	65-100	39-94	30-76	16-42	20-27	1-4
	4-7	Gravelly medial sandy loam	SM	A-1-b, A-4, A-1-a	0	0-9	63-100	36-94	27-75	14-41	20-27	1-4
	7-17	Gravelly medial coarse sandy loam	SC-SM, SW-SM	A-1-a, A-2-4	0-8	0-32	55-86	25-72	15-46	8-27	18-27	2-6
	17-28	Extremely stony medial coarse sandy loam	GP-GM, GW-GC, SC-SM	A-1-a, A-2-4	2-45	12-45	39-65	16-48	9-29	5-17	18-28	2-7
	28-48	Extremely stony medial loamy coarse sand	GP, GC-GM	A-1-a, A-2-4	2-45	11-45	37-65	8-48	5-33	2-17	0-24	NP-7
	48-68	Ashy stones	GP, SC-SM	A-1-a, A-2-4	2-44	13-44	28-67	6-50	3-30	1-13	0-24	NP-7
	68-84	Ashy stones	GW, SC-SM	A-1-a, A-2-4	2-44	13-44	17-66	6-52	3-32	1-14	0-24	NP-7
Riverwash.												

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Table 25.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
161: Typic Psammaquents-----	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-4	Ashy fine sand	SP-SM	A-3	0	0-7	92-100	85-100	79-94	7-10	0-14	NP
	4-5	Gravelly ash loamy coarse sand	SP-SM, SM	A-1-b, A-1-a	0	0-6	75-86	50-71	29-42	12-18	0-14	NP
	5-9	Gravelly ash coarse sand	SW-SM	A-1-b	0	0-6	80-100	61-100	27-46	6-11	0-14	NP
	9-17	Ashy sand	SP-SM, SP	A-3, A-1-b	0	0-6	80-100	59-100	45-77	3-7	0-14	NP
	17-26	Gravelly ash coarse sand	SP-SM	A-1-b	0	0-6	80-100	61-100	27-46	6-11	0-14	NP
	26-33	Gravelly ash coarse sand	SP-SM	A-1-b	0	0-6	80-100	61-100	27-46	6-11	0-14	NP
	33-39	Ashy sand	SP-SM, SP	A-1-b, A-3	0	0-6	80-100	59-100	45-77	3-7	0-14	NP
	39-48	Ashy fine sand	SP-SM	A-3	0	0-6	80-100	59-100	56-95	5-10	0-14	NP
	48-55	Ashy very fine sand	SM	A-2-4, A-4	0	0-6	79-100	58-100	58-100	26-45	0-14	NP
	55-63	Ashy sand	SP, SP-SM	A-1-b, A-3	0	0-6	80-100	59-100	45-77	3-7	0-14	NP
162: Humic Haploxerands, outwash	0-2	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	2-8	Medial sandy loam	SM	A-1-a, A-5	0-22	0-22	68-100	36-87	27-67	14-36	0-56	NP-2
	8-15	Very stony medial sandy loam	SM, SW-SM	A-1-b, A-1-a, A-2-5	0-22	0-22	68-100	36-87	28-69	10-27	0-56	NP-2
	15-28	Extremely cobbly medial loamy sand	SP, SP-SM, SM	A-2-5, A-1-a	0-17	19-23	56-95	12-81	9-66	3-26	0-56	NP-2
	28-41	Extremely stony ash sand	SP, SP-SM, SW	A-1-a, A-1-b	17-28	23-28	56-73	12-55	9-43	1-6	0-42	NP-2
	41-59	Extremely stony ash sand	SW, SP	A-1-a	20-27	23-27	55-61	9-35	7-27	1-3	0-32	NP-1

Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
163: Vitrandic Cryofluvents-----	0-3	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	3-8	Gravelly ashy sandy loam	SM	A-5, A-2-4	0	0	85-100	64-92	48-74	26-42	31-46	5-9
	8-11	Very gravelly ashy coarse sand	SW-SM, SM	A-1-a, A-1-b	0	0	76-100	40-93	13-33	6-15	0-14	NP
	11-13	Mucky clay loam	OH	A-7-5	0	0	91-100	86-100	73-100	61-96	51-90	13-25
	13-16	Silty clay	OH	A-7-5	0	0	91-100	86-100	64-100	62-97	51-95	13-33
	16-23	Silty clay loam	MH, OH, SC-SM	A-7-5, A-4	0	0	86-100	57-91	43-91	39-86	27-66	6-24
	23-28	Gravelly ashy coarse sandy loam	SC-SM, OH, SM	A-7-5, A-1-b	0	0	86-100	58-92	34-76	18-51	27-66	6-24
	28-36	Ashy silt loam	ML, OH, SC-SM	A-7-5, A-4	0	0	86-100	57-91	49-91	40-87	27-66	6-24
	36-55	Ashy silt loam	OH	A-7-5	0	0	92-100	87-100	80-100	65-100	51-75	13-16
	55-61	Extremely gravelly ashy coarse sand	SW, SP	A-1-a	0	0	57-70	19-40	6-14	1-2	0-14	NP
Aquandic Cryaquents-----	0-7	Silty clay loam	MH, ML, OH	A-6, A-7-5	0	0	92-100	84-100	75-100	72-100	40-66	13-24
	7-12	Silty clay loam	ML, MH, OH	A-7-5, A-6	0	0	92-100	84-100	75-100	72-100	40-66	13-24
	12-14	Ashy silt loam	ML, CL, SM	A-6, A-2-4	0	0-6	75-100	43-100	35-100	33-96	0-40	NP-13
	14-20	Very gravelly ashy coarse sand	SW, SW-SM, SM	A-2-6, A-1-a	0	0-6	76-100	47-100	21-64	3-27	0-40	NP-13
	20-28	Mucky silty clay loam	OH	A-7-5	0	0	100	100	97-100	93-100	58-90	18-25
	28-34	Very gravelly ashy coarse sandy loam	SW-SM, SM	A-6, A-1-b, A-1-a	0	0-6	73-100	44-100	23-73	12-47	0-40	NP-13
	34-47	Very gravelly ashy coarse sand	SW, SP-SM, SM	A-2-6, A-1-b, A-1-a	0	0-6	76-100	47-100	21-64	3-27	0-40	NP-13

Table 25.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO	>10 inches Pct	3-10 inches Pct	4	10	40	200		
164: Aquepts-----	<u>In</u>											
	0-2	Slightly decomposed plant material				0	0	---	---	---	---	---
	2-6	Very bouldery mucky ashy sandy loam	SM	A-5, A-1-b	0-34	0	71-90	52-90	39-70	20-36	0-68	NP-1
	6-11	Extremely bouldery ashy sandy loam	SM	A-1-b, A-5	0-35	0-17	74-100	61-98	46-76	23-40	0-49	NP-1
	11-16	Extremely bouldery ashy sandy loam	GW-GM, GP-GM, GM	A-1-b, A-1-a	12-43	16-21	43-63	19-54	14-42	7-23	23-29	3
	16-26	Extremely cobbly ashy sandy loam	SM, SP-SM	A-2-4, A-1-a	0-11	0-28	60-78	28-64	21-49	11-26	18-28	2
	26-45	Extremely stony ashy sandy loam	GM, GW-GM	A-1-b, A-1-a	18-26	11-21	35-63	16-54	12-42	6-22	0-14	NP
Typic Petraquepts, bedrock-	0-2	Slightly decomposed plant material				0	0	---	---	---	---	---
	2-7	Slightly decomposed plant material				0	0	---	---	---	---	---
	7-13	Very bouldery ashy loamy sand	GP-GM, SM	A-1-a, A-1-b, A-2-4	18-38	18-21	52-79	29-69	22-55	8-20	0-14	NP
	13-28	Extremely bouldery ashy coarse sandy loam	SM, GP-GM	A-1-b, A-1-a, A-2-4	19-38	19-23	52-79	28-68	17-44	10-26	0-14	NP
	28-35	Extremely bouldery ashy loamy coarse sand	SP-SM, SP, SW-SM	A-1-a	17-36	17-26	57-73	13-45	8-27	3-12	0-14	NP
	---	Bedrock				---	---	---	---	---	---	---

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Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO	>10 inches Pct	3-10 inches Pct	4	10	40	200		
164: Aquic Haploxerands-----	<u>In</u>											
	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-2	Gravelly medial sandy loam	SM	A-2-5, A-1-b, A-1-a	0	0-13	75-87	34-74	26-58	14-31	27-48	2
	2-4	Gravelly medial sandy loam	SM	A-1-b, A-2-5, A-1-a	0	0-13	75-87	34-74	26-58	14-31	27-48	2
	4-9	Gravelly medial fine sandy loam	SM	A-2-4, A-1-a, A-2-5	0	0-13	75-87	34-74	30-66	15-34	27-48	2-3
	9-16	Gravelly medial fine sandy loam	SM	A-2-4, A-1-b	0	4-13	62-76	37-64	33-59	14-27	27-38	3-5
	16-24	Gravelly medial fine sandy loam	SM	A-2-4, A-1-b	0	4-13	64-79	37-64	33-59	15-27	27-38	3-5
	24-39	Very gravelly medial coarse sandy loam	SP-SM, SM	A-1-a	0	7-19	56-68	19-36	13-24	8-15	16-19	2-3
	39-60	Cemented very gravelly sandy loam	SM, SP-SM	A-1-a, A-1-b	0	6-12	65-76	30-51	22-39	11-19	17-20	3
Typic Petraquepts-----	0-2	Peaty silt loam	OL, OH	A-5, A-4	0	0	100	100	91-93	73-75	31-60	5-6
	2-7	Mucky silt loam	OL, ML, OH	A-5, A-4	0	0	100	100	90-92	71-73	31-50	5-8
	7-12	Gravelly ashy loam	SC, SM	A-4, A-6	0	0	85-92	63-77	55-69	39-50	31-37	9-11
	12-19	Ashy loam	SC, CL, ML	A-2-4, A-6, A-7-6	0	0	86-97	57-88	47-80	33-60	27-44	9-16
	19-25	Gravelly ashy loam	SC, ML	A-6, A-7-6	0	0	86-97	57-88	49-79	36-60	31-44	13-16
	25-33	Cemented duripan		A-1-b	0	0	100	100	---	---	---	---

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Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
165: Aquandic Humaquepts-----	0-4	Peaty moderately decomposed plant material	PT		0	0	100	100	---	---	---	---
	4-11	Ashy very fine sandy loam	SM	A-1-b, A-2-4, A-5	0	0	73-92	46-84	40-78	17-36	27-42	2-5
	11-22	Very gravelly ashy very fine sandy loam	SM	A-5, A-1-b	0	0	73-92	46-84	42-80	19-39	31-46	5-9
	22-28	Extremely gravelly ashy sandy loam	GW-GM, GM, GP	A-1-a, A-2-4	0	0	50-59	12-32	9-25	4-13	27-35	6-9
	28-38	Extremely gravelly ashy sandy loam	GP, GW-GC, GM	A-1-a, A-2-4	0	0	51-59	12-32	8-25	4-13	27-35	6-9
	38-52	Gravelly ashy sandy loam	SC, SC-SM	A-2-6, A-1-b	0	0-6	70-79	46-64	35-56	18-32	22-36	6-13
Histic Humaquepts-----	0-2	Herbaceous peat	PT		0	0	100	100	---	---	---	---
	2-6	Ashy herbaceous mucky peat	PT		0	0	73-100	20-100	---	---	---	---
	6-9	Ashy muck	PT		0	0	89-100	71-100	62-100	48-83	---	---
	9-12	Ashy loam	OH, ML	A-6, A-7-5	0	0	98-100	95-100	86-98	60-70	40-58	13-18
	12-21	Ashy loam	CL, ML	A-7-6, A-6	0	0	95-100	87-100	74-93	54-69	36-47	13-18
	21-30	Ashy loam	CL	A-6, A-7-6	0	0	92-100	84-100	74-96	53-71	31-41	13-19
	30-51	Extremely cobblely ashy sandy clay loam	SC, SP-SC	A-2-6, A-1-a, A-2-7	6-18	13-30	62-75	33-58	18-40	12-29	22-41	6-17
	51-62	Very cobblely ashy coarse sandy loam	SP-SC, SC, SC-SM	A-1-a, A-2-7	6-17	13-29	63-75	34-58	16-36	9-25	22-41	6-17

Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
165: Aquandic Endoaquepts-----	0-4	Ashy very fine sandy loam	SM, ML	A-4	0	0	86-100	71-92	67-90	38-52	20-36	1-4
	4-12	Ashy very fine sandy loam	SM, ML	A-4, A-2-4	0	0	79-100	66-91	62-90	35-52	20-36	1-4
	12-22	Gravelly ash very fine sandy loam	SC-SM, SM	A-2-4, A-4	0	0-7	80-92	53-76	49-75	28-45	18-26	2-7
	22-35	Gravelly ash very fine sandy loam	SM, SC-SM	A-2-4, A-4	0	0-7	80-92	53-76	50-76	28-46	18-26	2-7
	35-41	Gravelly ash very fine sandy loam	SM, SC-SM, CL	A-4, A-1-b	0	0-7	75-97	50-93	46-93	25-56	18-31	2-9
	41-49	Ashy loamy fine sand	SC-SM, SM, SC	A-2-4, A-1-b	0	0-6	76-97	51-94	47-94	14-35	18-31	2-9
	49-59	Extremely gravelly ash loamy coarse sand	GW-GM, GP	A-1-a	0	2-16	40-51	15-38	9-23	4-10	0-14	NP
Terric Haplohemists-----	0-5	Muck	PT		0	0	100	100	---	---	---	---
	5-20	Herbaceous muck	PT		0	0	100	100	---	---	---	---
	20-30	Ashy silty clay loam	OH, ML, MH	A-7-6, A-7-5	0	0	100	100	99-100	88-93	46-62	18-22
	30-35	Ashy silt loam	ML, OH	A-7-5, A-4	0	0	100	100	87-97	72-82	37-56	9-16
	35-43	Ashy silt loam	ML, CL-ML	A-4, A-6	0	0	100	100	88-98	70-80	27-40	6-13

Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index	
			Unified	AASHTO	>10 inches Pct	3-10 inches Pct	4	10	40	200			
166: Aquic Haploxerands-----	<u>In</u>												
	0-1	Slightly decomposed plant material				0	0	---	---	---	---	---	
	1-2	Gravelly medial sandy loam	SM	A-2-5, A-1-b, A-1-a		0	0-13	75-87	34-74	26-58	14-31	27-48	2
	2-4	Gravelly medial sandy loam	SM	A-1-b, A-2-5, A-1-a		0	0-13	75-87	34-74	26-58	14-31	27-48	2
	4-9	Gravelly medial fine sandy loam	SM	A-2-4, A-1-a, A-2-5		0	0-13	75-87	34-74	30-66	15-34	27-48	2-3
	9-16	Gravelly medial fine sandy loam	SM	A-2-4, A-1-b		0	4-13	62-76	37-64	33-59	14-27	27-38	3-5
	16-24	Gravelly medial fine sandy loam	SM	A-2-4, A-1-b		0	4-13	64-79	37-64	33-59	15-27	27-38	3-5
	24-39	Very gravelly medial coarse sandy loam	SP-SM, SM	A-1-a		0	7-19	56-68	19-36	13-24	8-15	16-19	2-3
	39-60	Cemented very gravelly sandy loam	SM, SP-SM	A-1-a, A-1-b		0	6-12	65-76	30-51	22-39	11-19	17-20	3
Humic Haploxerands, outwash terrace-----													
	0-1	Slightly decomposed plant material				0	0	---	---	---	---	---	
	1-2	Moderately decomposed plant material				0	0	---	---	---	---	---	
	2-5	Medial gravelly sandy loam	SM	A-2-5, A-1-b		0	0-9	72-88	43-75	33-60	17-32	0-56	NP-2
	5-8	Medial fine sandy loam	SM	A-1-b, A-2-4, A-5		0	0-9	72-100	43-87	38-79	19-41	0-56	NP-2
	8-15	Medial gravelly sandy loam	SM	A-1-b, A-5		0	0-7	72-100	43-87	32-68	17-37	0-56	NP-2
	15-24	Gravelly medial fine sandy loam	SM	A-2-5, A-1-b		0	10-15	78-87	55-74	47-67	23-34	0-47	NP-2
	24-31	Very gravelly medial fine sandy loam	GM	A-1-a, A-1-b, A-2-4		0	9-14	47-67	30-56	26-51	13-27	0-35	NP-4
	31-39	Cemented very gravelly ashy sandy loam	GW-GM, GC-GM	A-1-a, A-1-b		0	0-6	41-48	21-40	15-31	7-16	0-24	NP-4

Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
167: Emeraldlake-----	0-1	Extremely gravelly ashy fine sandy loam	SM, SP-SM, SW-SM	A-1-a, A-1-b	0	0-12	54-76	18-53	15-47	7-24	0-34	NP-2
	1-5	Extremely gravelly ashy loamy sand	GW-GM, GP, GP-GM	A-1-a	0-7	7-16	31-44	10-36	8-29	3-11	0-33	NP-3
	5-14	Extremely gravelly ashy loamy sand	GP-GM, GP	A-1-a	0-8	7-19	28-41	9-33	6-24	2-8	0-29	NP-3
	14-25	Extremely gravelly ashy loamy coarse sand	SP-SM, GW, GP	A-1-a, A-1-b	0-10	11-21	25-64	6-50	4-31	1-12	0-30	NP-4
	25-35	Extremely gravelly ashy loamy coarse sand	SM, GP	A-1-a	0-11	11-21	25-64	6-50	3-30	1-13	0-27	NP-4
	35-51	Ashy boulders	SM, GW	A-1-a, A-1-b	3-98	0-21	16-76	5-67	3-39	1-15	0-24	NP-1
	51-60	Ashy boulders	SM, GW	A-1-a, A-2-4	3-98	0-21	16-76	5-67	4-51	2-22	0-24	NP-1
Readingpeak-----	0-2	Very gravelly ashy sandy loam	SM, SP-SM	A-1-b, A-1-a	0-13	8-19	58-72	25-45	19-35	10-18	0-27	NP-1
	2-7	Very gravelly ashy sandy loam	SM, SP-SM	A-1-a, A-1-b	0-13	8-20	57-71	23-42	18-33	9-17	0-27	NP-1
	7-14	Extremely gravelly ashy loamy sand	GW, GP, GW-GM	A-1-a	0-16	20-27	37-49	7-23	6-18	2-7	0-26	NP-1
	14-26	Extremely cobblely ashy loamy coarse sand	GP, GW-GM	A-1-a	0-16	20-27	42-49	7-23	4-14	2-6	0-26	NP-1
	26-35	Extremely cobblely ashy loamy sand	GW-GM, GP	A-1-a, A-1-b	7-38	23-33	40-66	10-43	8-33	3-12	0-14	NP
	35-50	Extremely stony ashy loamy sand	GM, GW-GM, GP	A-1-a, A-1-b	7-38	23-33	40-61	10-48	8-38	3-14	0-14	NP
	---	Bedrock			---	---	---	---	---	---	---	---

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Table 25.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
167: Terracelake-----	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-3	Gravelly ashy sandy loam	SP-SM, SM	A-1-a, A-2-4, A-4	0-26	0-46	65-100	23-100	18-80	9-43	0-39	NP-2
	3-7	Gravelly ashy sandy loam	SM, GW-GM	A-1-b, A-1-a	0-19	0-15	44-69	15-49	12-38	6-20	0-27	NP-2
	7-19	Very gravelly ashy fine sandy loam	GM, SC-SM, GP	A-4, A-1-a	0-37	8-53	40-79	5-76	4-71	2-38	0-29	NP-5
	19-24	Extremely gravelly ashy fine sandy loam	GP-GM, GP, GM	A-1-a, A-4	0-37	8-53	40-79	5-76	4-71	2-38	0-29	NP-5
	24-37	Extremely stony ashy sandy loam	GC-GM, GP	A-1-a, A-1-b	7-53	0-16	28-51	4-42	3-34	2-19	0-23	NP-5
	---	Bedrock			---	---	---	---	---	---	---	---
Rock outcrop, dacite.												
168: Vitrixerands, low elevation	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-4	Gravelly ashy loamy coarse sand	SP-SM, SM	A-1-b, A-1-a	0	0	69-90	38-69	22-40	9-17	0-14	NP
	4-8	Gravelly ashy loamy coarse sand	SM, SP-SM	A-1-a, A-1-b	0	0	70-90	39-69	25-45	10-19	0-14	NP
	8-12	Gravelly ashy loamy coarse sand	SM, SP-SM	A-1-a, A-1-b	0	0	69-90	39-69	25-46	10-20	0-14	NP
	12-21	Gravelly ashy loamy sand	SM, SW-SM	A-1-a, A-1-b	0	0-9	69-80	38-60	26-44	11-20	0-29	NP-2
	21-37	Very stony medial loamy sand	GW-GM, SM	A-1-a, A-1-b	0-14	12-32	41-73	19-43	14-32	6-14	0-14	NP
	37-46	Cemented duripan			0	0	100	100	68-70	39-41	---	---

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Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
169: Sueredo-----	0-2	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	2-5	Moderately decomposed plant material			0	0	---	---	---	---	---	---
	5-9	Bouldery ashy loamy coarse sand	SP-SM, SM	A-1-a, A-2-4, A-1-b	0-17	0-8	77-100	40-88	21-51	11-28	0-26	NP-3
	9-13	Bouldery ashy loamy coarse sand	SM, SP-SM	A-1-b, A-2-4, A-1-a	0-17	0-8	78-100	40-88	23-55	12-30	0-26	NP-3
	13-16	Bouldery ashy loamy coarse sand	GP, SM	A-1-a, A-1-b, A-2-4	0-43	0-21	43-100	7-98	3-54	2-30	0-24	NP-3
	16-18	Very bouldery ashy coarse sand	SW, SM, GP	A-1-a, A-1-b	0-43	0-21	43-100	7-98	1-26	0-14	0-24	NP-3
	18-26	Very bouldery ashy loamy coarse sand	SW-SM, SM, SP-SM	A-1-a, A-1-b	0-64	0-32	72-88	24-76	14-48	5-22	0-28	NP-5
	26-50	Extremely cobbly ashy coarse sand	GW-GM, SC-SM, GP	A-1-a, A-2-4	0-34	8-40	44-85	13-71	9-53	3-20	0-25	NP-4
	50-76	Ashy stones	GP, GP-GM	A-1-a	0-38	20-44	26-45	8-34	5-22	1-5	0-14	NP
76-83	Extremely bouldery ashy loamy coarse sand	SP-SM, GP, SM	A-1-a, A-1-b	0-15	0-21	43-83	7-58	4-32	2-18	0-14	NP	
Rock outcrop, cliffs. Scoured-----	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-4	Very bouldery medial loamy sand	SP-SM, SM	A-2-4, A-1-b, A-1-a	0-87	0-14	63-92	39-88	29-67	12-30	0-14	NP
	4-10	Very bouldery medial sandy loam	SM	A-1-a, A-1-b	21-65	10-14	70-77	35-62	26-50	13-25	0-14	NP
	10-17	Very bouldery medial fine sandy loam	GW-GM, SM, OH	A-1-a, A-1-b, A-5	0-100	0-13	47-93	15-89	12-78	7-51	0-55	NP-4
	17-30	Boulders	GW, GP-GM	A-1-a	42-100	21-57	8-16	8-16	5-10	3-5	0-14	NP
	30-39	Bedrock			---	---	---	---	---	---	---	---

Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
170: Rock outcrop, rhyodacite.												
Emeraldlake-----	0-1	Extremely gravelly ashy fine sandy loam	SM, SP-SM, SW-SM	A-1-a, A-1-b	0	0-12	54-76	18-53	15-47	7-24	0-34	NP-2
	1-5	Extremely gravelly ashy loamy sand	GW-GM, GP, GP-GM	A-1-a	0-7	7-16	31-44	10-36	8-29	3-11	0-33	NP-3
	5-14	Extremely gravelly ashy loamy sand	GP-GM, GP	A-1-a	0-8	7-19	28-41	9-33	6-24	2-8	0-29	NP-3
	14-25	Extremely gravelly ashy loamy coarse sand	SP-SM, GW, GP	A-1-a, A-1-b	0-10	11-21	25-64	6-50	4-31	1-12	0-30	NP-4
	25-35	Extremely gravelly ashy loamy coarse sand	SM, GP	A-1-a	0-11	11-21	25-64	6-50	3-30	1-13	0-27	NP-4
	35-51	Ashy boulders	SM, GW	A-1-a, A-1-b	3-98	0-21	16-76	5-67	3-39	1-15	0-24	NP-1
	51-60	Ashy boulders	SM, GW	A-1-a, A-2-4	3-98	0-21	16-76	5-67	4-51	2-22	0-24	NP-1
Rubble land.												
Readingpeak-----	0-2	Very gravelly ashy sandy loam	SM, SP-SM	A-1-b, A-1-a	0-13	8-19	58-72	25-45	19-35	10-18	0-27	NP-1
	2-7	Very gravelly ashy sandy loam	SM, SP-SM	A-1-a, A-1-b	0-13	8-20	57-71	23-42	18-33	9-17	0-27	NP-1
	7-14	Extremely gravelly ashy loamy sand	GW, GP, GW-GM	A-1-a	0-16	20-27	37-49	7-23	6-18	2-7	0-26	NP-1
	14-26	Extremely cobblely ashy loamy coarse sand	GP, GW-GM	A-1-a	0-16	20-27	42-49	7-23	4-14	2-6	0-26	NP-1
	26-35	Extremely cobblely ashy loamy sand	GW-GM, GP	A-1-a, A-1-b	7-38	23-33	40-66	10-43	8-33	3-12	0-14	NP
	35-50	Extremely stony ashy loamy sand	GM, GW-GM, GP	A-1-a, A-1-b	7-38	23-33	40-61	10-48	8-38	3-14	0-14	NP
	---	Bedrock			---	---	---	---	---	---	---	---

Table 25.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
171: Aquepts-----	0-2	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	2-6	Very bouldery mucky ashy sandy loam	SM	A-5, A-1-b	0-34	0	71-90	52-90	39-70	20-36	0-68	NP-1
	6-11	Extremely bouldery ashy sandy loam	SM	A-1-b, A-5	0-35	0-17	74-100	61-98	46-76	23-40	0-49	NP-1
	11-16	Extremely bouldery ashy sandy loam	GW-GM, GP-GM, GM	A-1-b, A-1-a	12-43	16-21	43-63	19-54	14-42	7-23	23-29	3
	16-26	Extremely cobbly ashy sandy loam	SM, SP-SM	A-2-4, A-1-a	0-11	0-28	60-78	28-64	21-49	11-26	18-28	2
	26-45	Extremely stony ashy sandy loam	GM, GW-GM	A-1-b, A-1-a	18-26	11-21	35-63	16-54	12-42	6-22	0-14	NP
Typic Petraquepts, bedrock-	0-2	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	2-7	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	7-13	Very bouldery ashy loamy sand	GP-GM, SM	A-1-a, A-1-b, A-2-4	18-38	18-21	52-79	29-69	22-55	8-20	0-14	NP
	13-28	Extremely bouldery ashy coarse sandy loam	SM, GP-GM	A-1-b, A-1-a, A-2-4	19-38	19-23	52-79	28-68	17-44	10-26	0-14	NP
	28-35	Extremely bouldery ashy loamy coarse sand	SP-SM, SP, SW-SM	A-1-a	17-36	17-26	57-73	13-45	8-27	3-12	0-14	NP
	---	Bedrock			---	---	---	---	---	---	---	---

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Table 25.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO	>10 inches Pct	3-10 inches Pct	4	10	40	200		
172: Badgerflat-----	<u>In</u>											
	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-4	Very gravelly ashy sandy loam	SM, SP-SM	A-1-b, A-1-a	0-7	0	63-80	25-50	19-40	10-21	0-30	NP-1
	4-7	Gravelly ashy sandy loam	SP-SM, SM	A-1-a, A-1-b	0-7	0	63-81	25-50	19-40	10-21	0-30	NP-1
	7-11	Extremely stony ashy loamy sand	SP-SM, SM, SW	A-1-a, A-1-b	26-46	8-17	57-76	15-52	11-41	4-15	0-27	NP-1
	11-23	Extremely stony ashy loamy sand	SW, SM, SP-SM	A-1-a, A-1-b	26-46	8-17	55-76	15-52	11-41	4-15	0-27	NP-1
	23-33	Extremely stony ashy loamy sand	SW, SM, SP-SM	A-1-a, A-1-b	37-51	7-17	57-73	15-46	11-36	4-13	0-14	NP
	33-43	Extremely gravelly ashy loamy coarse sand	SW-SM, SP-SM	A-1-a	0	6-17	60-71	21-42	12-25	5-11	0-14	NP
173: Badgerwash-----												
	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-4	Very bouldery ashy loamy coarse sand	SP-SM, SM	A-1-a, A-1-b	0-33	0-16	62-83	31-61	18-37	8-16	0-14	NP
	4-9	Very bouldery ashy loamy coarse sand	SM, SP-SM	A-1-b, A-1-a	0-33	0-16	62-83	31-61	18-37	8-16	0-14	NP
	9-13	Very bouldery ashy coarse sand	SW, SW-SM	A-1-a	16-32	0	56-61	21-40	10-19	2-5	0-14	NP
	13-20	Extremely stony ashy sandy loam	SM, SP-SM	A-1-b, A-1-a, A-2-4	17-43	26-31	63-84	25-69	19-53	10-27	0-14	NP
	20-35	Extremely stony ashy sandy loam	SM, SP-SM	A-2-4, A-1-a, A-1-b	8-37	8-31	67-84	23-69	17-53	9-28	0-34	NP-1
	35-45	Cemented extremely bouldery ashy loamy coarse sand		A-1-b, A-1-a	8-31	8-26	41-89	8-78	---	---	---	---

Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10	3-10	4	10	40	200		
					inches	inches						
	<u>In</u>				<u>Pct</u>	<u>Pct</u>					<u>Pct</u>	
174: Vitrandic Cryorthents-----	0-4	Very gravelly ashy loamy coarse sand	SP-SM, SW-SM	A-1-a	0	0	67-77	27-46	16-27	6-11	0-14	NP
	4-9	Very gravelly ashy loamy coarse sand	SP-SM	A-1-a	0	0	63-70	25-40	15-24	6-10	0-14	NP
	9-17	Extremely gravelly ashy coarse sand	SW, SW-SM, SP	A-1-a	0	0	57-84	10-46	4-21	1-5	0-14	NP
	17-19	Very gravelly ashy loamy coarse sand	SP, SW-SM	A-1-a	0	0	57-82	10-44	6-26	2-11	0-14	NP
	19-27	Extremely gravelly ashy coarse sand	SW-SM, SP	A-1-a	0	0	57-84	10-46	4-21	1-5	0-14	NP
	27-30	Extremely gravelly ashy coarse sand	SP, SW, SW-SM	A-1-a	0	0	57-84	10-46	4-21	1-5	0-14	NP
	30-35	Very gravelly ashy coarse sand	SW-SM, GP, SW	A-1-b, A-1-a	0-5	0-16	43-75	11-58	5-26	1-6	0-14	NP
	35-38	Very gravelly ashy coarse sand	GP, SW, SW-SM	A-1-b, A-1-a	0-5	0-16	43-75	11-58	5-26	1-6	0-14	NP
	38-60	Extremely gravelly ashy coarse sand	GP, SW-SM	A-1-b, A-1-a	0-5	0-16	43-75	11-58	5-26	1-6	0-14	NP

Table 25.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
174: Readingpeak-----	0-2	Very gravelly ashy sandy loam	SM, SP-SM	A-1-b, A-1-a	0-13	8-19	58-72	25-45	19-35	10-18	0-27	NP-1
	2-7	Very gravelly ashy sandy loam	SM, SP-SM	A-1-a, A-1-b	0-13	8-20	57-71	23-42	18-33	9-17	0-27	NP-1
	7-14	Extremely gravelly ashy loamy sand	GW, GP, GW-GM	A-1-a	0-16	20-27	37-49	7-23	6-18	2-7	0-26	NP-1
	14-26	Extremely cobblely ashy loamy coarse sand	GP, GW-GM	A-1-a	0-16	20-27	42-49	7-23	4-14	2-6	0-26	NP-1
	26-35	Extremely cobblely ashy loamy sand	GW-GM, GP	A-1-a, A-1-b	7-38	23-33	40-66	10-43	8-33	3-12	0-14	NP
	35-50	Extremely stony ashy loamy sand	GM, GW-GM, GP	A-1-a, A-1-b	7-38	23-33	40-61	10-48	8-38	3-14	0-14	NP
	---	Bedrock			---	---	---	---	---	---	---	---
Rock outcrop.												
175: Shadowlake-----	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-2	Gravelly ashy sandy loam	SM	A-1-b, A-2-5	0	0	80-84	42-63	31-50	16-27	0-44	NP-2
	2-6	Gravelly ashy sandy loam	SM, SP-SM	A-1-b, A-1-a, A-2-4	0-27	0-20	65-85	24-72	18-58	10-32	0-38	NP-4
	6-13	Gravelly ashy sandy loam	SP-SM, SM	A-2-4, A-1-a, A-1-b	0-27	0-20	65-85	24-72	18-58	9-32	0-38	NP-4
	13-23	Very gravelly ashy sandy loam	SP-SM, SM	A-2-4, A-1-a	0-27	0-20	65-85	24-72	18-58	10-32	0-38	NP-4
	23-41	Extremely gravelly ashy coarse sandy loam	SP-SM, SP	A-1-a	0-23	0-17	56-60	12-20	7-13	4-8	0-19	NP-2
	41-51	Loam	SM, CL-ML	A-4, A-1-b	0-45	0-17	61-96	28-79	25-78	18-60	0-23	NP-7

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Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
175: Vitrandic Cryofluvents-----	0-3	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	3-8	Gravelly ashly sandy loam	SM	A-5, A-2-4	0	0	85-100	64-92	48-74	26-42	31-46	5-9
	8-11	Very gravelly ashly coarse sand	SW-SM, SM	A-1-a, A-1-b	0	0	76-100	40-93	13-33	6-15	0-14	NP
	11-13	Mucky clay loam	OH	A-7-5	0	0	91-100	86-100	73-100	61-96	51-90	13-25
	13-16	Silty clay	OH	A-7-5	0	0	91-100	86-100	64-100	62-97	51-95	13-33
	16-23	Silty clay loam	MH, OH, SC-SM	A-7-5, A-4	0	0	86-100	57-91	43-91	39-86	27-66	6-24
	23-28	Gravelly ashly coarse sandy loam	SC-SM, OH, SM	A-7-5, A-1-b	0	0	86-100	58-92	34-76	18-51	27-66	6-24
	28-36	Ashly silt loam	ML, OH, SC-SM	A-7-5, A-4	0	0	86-100	57-91	49-91	40-87	27-66	6-24
	36-55	Ashly silt loam	OH	A-7-5	0	0	92-100	87-100	80-100	65-100	51-75	13-16
	55-61	Extremely gravelly ashly coarse sand	SW, SP	A-1-a	0	0	57-70	19-40	6-14	1-2	0-14	NP
176: Juniperlake, bouldery-----	0-1	Slightly decomposed plant material			0	0	---	---	---	---	---	---
	1-4	Gravelly medial sandy loam	GW-GM, SM	A-1-a, A-1-b	0-8	0-32	44-78	20-62	15-48	7-24	0-56	NP-2
	4-10	Gravelly medial sandy loam	SM, GW-GM	A-1-b, A-1-a	0-7	0-31	44-77	21-63	15-49	7-25	0-56	NP-2
	10-21	Very cobbly medial coarse sandy loam	SM, GW-GM	A-1-a, A-1-b	0-7	9-38	43-69	19-50	13-35	8-22	0-45	NP-1
	21-30	Very cobbly medial sandy loam	GM, GP	A-1-a, A-1-b	0-40	8-32	37-54	10-44	7-34	4-21	0-38	NP-2
	30-47	Very gravelly medial sandy loam	GP-GM, GM	A-1-a, A-1-b	0-40	7-30	37-54	10-45	7-34	5-23	0-33	NP-2
	47-56	Extremely gravelly coarse sandy loam	SM, GW-GM, GP	A-1-a	0-23	6-23	36-61	8-36	6-26	3-14	0-22	NP-3

Table 25.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
177: Vitrandic Cryorthents, debris flows, high elevation-----	0-4	Very gravelly ashy loamy coarse sand	SP-SM, SW-SM	A-1-a	0-41	0-12	62-74	24-47	14-28	6-12	0-14	NP
	4-13	Very gravelly ashy loamy coarse sand	GP, SW-SM, SM	A-1-a, A-1-b	0-22	0-16	39-81	11-62	6-37	3-16	0-14	NP
	13-60	Extremely gravelly ash loamy coarse sand	SM, GP	A-1-b, A-1-a	0-22	0-16	32-81	11-62	6-37	3-16	0-14	NP
200. Cinder land												
201. Lava flows												
202: Typic Xerorthents, tephra--	0-5	Ashy loamy sand	GP, SM	A-1-a, A-2-4	0-11	0-5	49-100	7-92	5-71	2-25	0-14	NP
	5-8	Ashy sand	SP, GP, SP-SM	A-3, A-1-a	0-11	0-5	49-100	7-92	5-71	0-6	0-14	NP
	8-12	Gravelly ash sand	GP, SP-SM, SP	A-1-b, A-1-a, A-3	0-5	0-5	49-100	7-92	5-70	0-6	0-14	NP
	12-14	Ashy loamy sand	GP, SM	A-1-a, A-2-4	0-5	0-5	49-100	7-92	5-71	2-25	0-14	NP
	14-25	Stratified gravelly coarse sand to gravelly sand	GP, SP-SM, SP	A-1-a, A-3, A-1-b	0-5	0-5	49-100	7-92	5-71	0-6	0-14	NP
	25-35	Stratified very gravelly coarse sand to gravelly sand	GP, SP-SM, SP	A-1-a, A-3	0-5	0-5	49-100	7-92	5-71	0-6	0-14	NP
	35-49	Extremely gravelly coarse sand	GP, SW-SM, SW	A-1-a, A-1-b	0-5	0-5	49-100	7-92	3-42	1-10	0-14	NP
	49-60	Gravelly coarse sand	GP, SP-SM, SP	A-1-a, A-3, A-1-b	0-5	0-5	49-100	7-92	5-71	0-6	0-14	NP

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Soil Survey of Lassen Volcanic National Park, California

Table 25.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
202: Typic Xerorthents, welded--	0-1	Gravelly ash coarse sand	SP	A-1-a, A-1-b	0	0	87-96	48-73	6-10	1-2	0-14	NP
	1-3	Very gravelly ashy coarse sand	SP	A-1-b, A-1-a	0	0	87-96	48-73	8-13	1-2	0-14	NP
	3-7	Very gravelly coarse sand	SP	A-1-b, A-1-a	0	0	87-96	48-73	6-11	1-2	0-14	NP
	7-9	Gravelly coarse sand	SP	A-1-b, A-1-a	0	0	87-95	36-72	4-9	1-2	0-14	NP
	9-12	Very gravelly coarse sand	SW	A-1-b, A-1-a	0	0	88-96	38-73	10-21	0-1	0-14	NP
	12-15	Very gravelly coarse sand	SP	A-1-b, A-1-a	0	0	87-95	36-72	4-8	1-2	0-14	NP
	15-25	Gravelly coarse sand	SP, GP	A-1-b, A-1-a	0	0	38-92	5-77	1-13	0-2	0-14	NP
	25-26	Gravelly coarse sand	GP, SP-SM, SW-SM	A-1-b, A-1-a	0	0	38-92	5-77	3-37	1-12	0-14	NP
	26-34	Gravelly coarse sand	GP, SP	A-1-b, A-1-a	0	0	38-93	5-77	1-10	0-2	0-14	NP
	34-37	Very gravelly coarse sand	GP, SP	A-1-b, A-1-a	0	0	38-92	5-77	1-9	0-2	0-14	NP
	37-39	Extremely gravelly coarse sand	SP, GW	A-1-b, A-1-a	0	0	23-92	5-77	1-8	0-1	0-14	NP
	39-43	Extremely gravelly coarse sand	GP, SP	A-1-b, A-1-a	0	0	38-92	5-77	0-5	0-1	0-14	NP
	43-59	Extremely gravelly coarse sand	SP, GW	A-1-b, A-1-a	0	0-10	24-92	5-77	1-14	0-3	0-14	NP

Table 25.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
203: Typic Xerorthents, tephra--	0-5	Ashy loamy sand	GP, SM	A-1-a, A-2-4	0-11	0-5	49-100	7-92	5-71	2-25	0-14	NP
	5-8	Ashy sand	SP, GP, SP-SM	A-3, A-1-a	0-11	0-5	49-100	7-92	5-71	0-6	0-14	NP
	8-12	Gravelly ashly sand	GP, SP-SM, SP	A-1-b, A-1-a, A-3	0-5	0-5	49-100	7-92	5-70	0-6	0-14	NP
	12-14	Ashy loamy sand	GP, SM	A-1-a, A-2-4	0-5	0-5	49-100	7-92	5-71	2-25	0-14	NP
	14-25	Stratified gravelly coarse sand to gravelly sand	GP, SP-SM, SP	A-1-a, A-3, A-1-b	0-5	0-5	49-100	7-92	5-71	0-6	0-14	NP
	25-35	Stratified very gravelly coarse sand to gravelly sand	GP, SP-SM, SP	A-1-a, A-3	0-5	0-5	49-100	7-92	5-71	0-6	0-14	NP
	35-49	Extremely gravelly coarse sand	GP, SW-SM, SW	A-1-a, A-1-b	0-5	0-5	49-100	7-92	3-42	1-10	0-14	NP
	49-60	Gravelly coarse sand	GP, SP-SM, SP	A-1-a, A-3, A-1-b	0-5	0-5	49-100	7-92	5-71	0-6	0-14	NP
205. Beaches												
W. Water												

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Soil Survey of Lassen Volcanic National Park, California

Table 26.--Physical Properties of the Soils

Map symbol and soil name	Depth	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensi- bility	Organic matter
	In	Pct	g/cc	um/sec	In/in	Pct	Pct
100: Buttelake-----	0-0	---	---	42.00-141.00	---	---	70-90
	0-3	0-2	0.80-1.00	141.00-282.00	0.03-0.15	0.0-0.0	0.5-3.5
	3-11	0-1	0.80-1.00	141.00-282.00	0.01-0.12	0.0-0.0	0.0-0.8
	11-13	0-1	0.80-1.00	141.00-282.00	0.01-0.11	0.0-0.0	0.0-0.8
	13-19	0-10	0.80-1.00	14.00-141.00	0.04-0.12	0.0-0.0	4.0-6.5
	19-31	0-12	0.80-1.00	14.00-42.00	0.01-0.16	0.0-0.0	3.0-5.5
	31-40	0-12	0.80-1.00	14.00-42.00	0.01-0.16	0.0-0.0	3.0-5.5
	40-53	0-7	1.00-1.50	0.10-1.00	0.01-0.07	0.0-0.0	0.0-0.7
	53-63	0-7	1.00-1.50	0.10-1.00	0.00-0.07	0.0-0.0	0.0-0.7
101: Buttewash-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-2	0-3	1.00-1.40	141.00-282.00	0.03-0.09	0.0-0.0	1.2-8.5
	2-7	0-3	1.00-1.30	141.00-282.00	0.03-0.09	0.0-0.0	1.2-8.5
	7-12	0-2	0.80-1.20	141.00-282.00	0.02-0.06	0.0-0.0	0.0-1.1
	12-20	3-12	0.80-1.20	14.00-42.00	0.02-0.05	0.0-0.0	3.8-6.0
	20-27	8-15	0.80-1.20	4.00-42.00	0.01-0.17	0.0-0.0	4.3-8.5
	27-45	8-15	0.75-1.30	4.00-42.00	0.01-0.17	0.0-0.0	4.3-8.5
	45-57	2-7	1.50-1.60	0.10-1.00	0.01-0.09	0.0-0.0	0.0-0.9
	57-66	2-7	1.50-1.60	42.00-141.00	0.00-0.07	0.0-0.0	0.7-1.2
	66-74	2-7	1.50-1.60	0.10-1.00	0.00-0.09	0.0-0.0	0.0-0.9
102: Ashbutte-----	0-2	---	---	141.00-423.00	---	---	70-90
	2-6	1-3	0.80-1.20	141.00-423.00	0.02-0.08	0.0-0.0	4.0-5.0
	6-11	1-3	0.80-1.20	141.00-423.00	0.02-0.08	0.0-0.0	4.0-5.0
	11-15	1-3	0.80-1.20	141.00-423.00	0.01-0.10	0.0-0.0	2.0-3.5
	15-24	1-3	0.80-1.20	141.00-423.00	0.01-0.10	0.0-0.0	2.0-3.5
	24-36	0-3	0.80-1.20	141.00-423.00	0.00-0.02	0.0-0.0	1.0-3.0
	36-60	0-3	0.80-1.20	141.00-423.00	0.00-0.02	0.0-0.0	1.0-3.0
Vitrandic Xerorthents-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-5	1-3	0.90-1.20	14.00-141.00	0.05-0.10	0.0-0.0	3.0-5.0
	5-10	2-3	0.90-1.20	14.00-141.00	0.00-0.06	0.0-0.0	2.0-3.5
	10-26	2-4	0.90-1.20	14.00-141.00	0.00-0.06	0.0-0.0	2.0-3.5
	26-34	0-2	0.90-1.20	141.00-282.00	0.00-0.02	0.0-0.0	1.0-3.0
	34-46	0-1	0.90-1.20	141.00-282.00	0.00-0.02	0.0-0.0	0.0-2.0
	46-61	0-1	0.90-1.20	141.00-282.00	0.00-0.02	0.0-0.0	0.0-2.0
103: Scoured-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-4	1-3	0.70-1.00	42.00-141.00	0.00-0.12	0.0-0.0	14-18
	4-10	1-5	0.80-1.00	14.00-42.00	0.00-0.10	0.0-0.0	12-16
	10-17	1-8	0.80-1.00	4.00-42.00	0.00-0.18	0.0-0.0	12-16
	17-30	1-3	0.80-1.00	14.00-42.00	0.00-0.02	0.0-0.0	1.0-4.0
	30-39	---	---	0.00-0.01	---	---	---
104: Scoured-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-4	1-3	0.70-1.00	42.00-141.00	0.00-0.12	0.0-0.0	14-18
	4-10	1-5	0.80-1.00	14.00-42.00	0.00-0.10	0.0-0.0	12-16
	10-17	1-8	0.80-1.00	4.00-42.00	0.00-0.18	0.0-0.0	12-16
	17-30	1-3	0.80-1.00	14.00-42.00	0.00-0.02	0.0-0.0	1.0-4.0
	30-39	---	---	0.00-0.01	---	---	---

Soil Survey of Lassen Volcanic National Park, California

Table 26.—Physical Properties of the Soils—Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensi- bility	Organic matter
	In	Pct	g/cc	um/sec	In/in	Pct	Pct
104: Juniperlake-----	0-1	---	---	42.00-141.00	---	---	50-90
	1-4	2-6	0.65-0.90	14.00-141.00	0.02-0.16	0.0-0.0	12-18
	4-10	2-6	0.65-0.90	14.00-141.00	0.02-0.16	0.0-0.0	12-18
	10-21	2-4	0.65-0.90	14.00-42.00	0.03-0.11	0.0-0.0	9.7-14
	21-30	2-5	0.70-0.90	14.00-42.00	0.00-0.11	0.0-0.0	4.5-10
	30-47	2-5	0.70-0.90	14.00-42.00	0.00-0.10	0.0-0.0	4.5-7.5
	47-56	3-6	1.20-1.50	0.10-1.00	0.00-0.07	0.0-0.0	1.0-2.5
Rock outcrop.							
105: Juniperlake-----	0-1	---	---	42.00-141.00	---	---	50-90
	1-4	2-6	0.65-0.90	14.00-141.00	0.02-0.16	0.0-0.0	12-18
	4-10	2-6	0.65-0.90	14.00-141.00	0.02-0.16	0.0-0.0	12-18
	10-21	2-4	0.65-0.90	14.00-42.00	0.03-0.11	0.0-0.0	9.7-14
	21-30	2-5	0.70-0.90	14.00-42.00	0.00-0.11	0.0-0.0	4.5-10
	30-47	2-5	0.70-0.90	14.00-42.00	0.00-0.10	0.0-0.0	4.5-7.5
	47-56	3-6	1.20-1.50	0.10-1.00	0.00-0.07	0.0-0.0	1.0-2.5
106: Cenplat-----	0-0	---	---	42.00-141.00	---	---	70-90
	0-2	1-3	0.80-1.20	42.00-141.00	0.05-0.11	0.0-0.0	4.0-10
	2-5	0-2	0.80-1.20	42.00-282.00	0.02-0.11	0.0-0.0	0.5-3.0
	5-8	0-2	0.80-1.20	42.00-282.00	0.02-0.11	0.0-0.0	0.5-3.0
	8-17	3-8	0.80-1.20	14.00-42.00	0.00-0.12	0.0-0.0	2.5-5.0
	17-24	3-8	0.80-1.20	14.00-42.00	0.00-0.12	0.0-0.0	1.2-2.5
	24-31	3-8	0.80-1.20	14.00-42.00	0.00-0.12	0.0-0.0	1.2-2.5
	---	---	---	0.00-0.01	---	---	---
107: Badgerflat-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-4	1-5	0.80-1.20	14.00-42.00	0.06-0.11	0.0-0.0	4.0-6.5
	4-7	1-5	0.80-1.20	14.00-42.00	0.06-0.11	0.0-0.0	4.0-6.5
	7-11	1-4	0.80-1.20	42.00-141.00	0.02-0.06	0.0-0.0	3.0-5.5
	11-23	1-4	0.80-1.20	42.00-141.00	0.02-0.06	0.0-0.0	3.0-5.5
	23-33	1-3	0.80-1.20	42.00-141.00	0.02-0.04	0.0-0.0	0.5-4.0
	33-43	0-3	1.20-1.40	0.10-1.00	0.02-0.05	0.0-0.0	0.0-0.7
Cenplat-----	0-2	1-6	0.80-1.20	14.00-141.00	0.01-0.13	0.0-0.0	4.0-10
	2-6	1-6	0.80-1.20	14.00-141.00	0.01-0.13	0.0-0.0	4.0-10
	6-12	2-6	0.80-1.20	14.00-141.00	0.05-0.12	0.0-0.0	2.0-4.0
	12-21	2-9	0.80-1.20	14.00-141.00	0.00-0.13	0.0-0.0	1.2-5.0
	21-39	2-9	0.80-1.20	14.00-141.00	0.00-0.13	0.0-0.0	1.2-5.0
	---	---	---	0.00-0.01	---	---	---
108: Typic Xerorthents-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-4	0-2	0.80-1.20	141.00-282.00	0.02-0.14	0.0-0.0	0.3-3.5
	4-33	0-1	0.80-1.20	141.00-282.00	0.01-0.08	0.0-0.0	0.0-0.8
	33-46	0-1	0.80-1.20	141.00-282.00	0.01-0.07	0.0-0.0	0.0-0.8
	46-50	0-1	0.80-1.20	141.00-282.00	0.00-0.07	0.0-0.0	0.0-0.8
	50-55	0-1	0.80-1.20	141.00-282.00	0.00-0.07	0.0-0.0	0.0-0.8
	55-59	3-10	0.80-1.20	14.00-42.00	0.07-0.10	0.0-0.0	0.7-3.5

Soil Survey of Lassen Volcanic National Park, California

Table 26.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensi- bility	Organic matter
	In	Pct	g/cc	um/sec	In/in	Pct	Pct
109: Prospectpeak-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-3	0-2	0.90-1.20	14.00-282.00	0.02-0.14	0.0-0.0	0.5-3.5
	3-7	0-1	0.90-1.20	141.00-282.00	0.00-0.08	0.0-0.0	0.0-0.8
	7-9	0-1	0.90-1.20	141.00-282.00	0.00-0.11	0.0-0.0	0.0-0.8
	9-14	0-2	0.90-1.30	141.00-282.00	0.00-0.07	0.0-0.0	0.7-1.5
	14-22	1-5	0.90-1.30	14.00-42.00	0.00-0.08	0.0-0.0	1.2-2.0
	22-50	2-8	0.90-1.30	14.00-141.00	0.00-0.07	0.0-0.0	0.7-1.5
	---	---	---	0.10-1.00	---	---	---
110: Bearrubble-----	0-3	---	---	42.00-141.00	---	---	70-90
	3-6	0-5	0.80-1.20	14.00-141.00	0.00-0.18	0.0-0.0	13-35
	6-13	0-4	0.80-1.20	42.00-141.00	0.00-0.07	0.0-0.0	2.0-8.0
	13-19	1-7	0.80-1.20	4.00-42.00	0.00-0.11	0.0-0.0	1.2-4.0
	19-35	1-7	0.80-1.20	4.00-42.00	0.00-0.11	0.0-0.0	1.2-4.0
	35-49	2-8	0.80-1.20	4.00-42.00	0.00-0.14	0.0-0.0	1.0-2.5
	49-60	2-8	0.80-1.20	4.00-42.00	0.00-0.14	0.0-0.0	1.0-2.5
Rubble land.							
111: Vitrandic Xerorthents, debris fan-----	0-4	0-3	1.00-1.60	42.00-282.00	0.00-0.12	0.0-0.0	0.0-0.2
	4-14	0-3	1.00-1.60	42.00-141.00	0.00-0.12	0.0-0.0	0.0-0.2
	14-31	0-3	1.00-1.60	42.00-282.00	0.00-0.11	0.0-0.0	0.0-0.2
	31-42	1-3	1.00-1.60	42.00-282.00	0.00-0.06	0.0-0.0	0.0-0.1
	42-60	1-3	1.00-1.60	42.00-282.00	0.00-0.06	0.0-0.0	0.0-0.1
112: Cascadesprings-----	0-0	---	---	42.00-141.00	---	---	70-90
	0-2	1-5	0.70-1.00	14.00-141.00	0.02-0.14	0.0-0.0	4.0-12
	2-9	1-5	0.70-1.00	14.00-141.00	0.00-0.13	0.0-0.0	4.0-12
	9-17	0-8	0.70-1.00	14.00-141.00	0.00-0.15	0.0-0.0	3.5-8.5
	17-27	0-8	0.70-1.00	14.00-141.00	0.00-0.15	0.0-0.0	3.5-8.5
	27-33	1-6	1.00-1.50	0.10-1.00	0.00-0.18	0.0-0.0	0.5-1.5
113: Terracelake-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-3	2-6	0.80-1.20	14.00-141.00	0.04-0.14	0.0-0.0	5.5-10
	3-7	3-5	0.80-1.20	14.00-42.00	0.05-0.13	0.0-0.0	3.0-5.0
	7-19	2-10	0.80-1.20	14.00-42.00	0.00-0.16	0.0-0.0	2.0-4.0
	19-24	2-10	0.80-1.20	14.00-42.00	0.00-0.16	0.0-0.0	2.0-4.0
	24-37	2-9	0.80-1.20	14.00-141.00	0.00-0.14	0.0-0.0	0.5-1.5
	---	---	---	0.00-0.01	---	---	---
Emeraldlake-----	0-1	1-4	0.80-1.20	14.00-141.00	0.04-0.13	0.0-0.0	4.5-8.0
	1-5	1-4	0.80-1.20	42.00-141.00	0.02-0.06	0.0-0.0	4.0-7.0
	5-14	1-4	0.80-1.20	42.00-141.00	0.02-0.06	0.0-0.0	4.0-7.0
	14-25	2-4	0.80-1.20	42.00-141.00	0.01-0.09	0.0-0.0	3.0-5.0
	25-35	2-4	0.80-1.20	42.00-141.00	0.01-0.09	0.0-0.0	3.0-5.0
	35-51	1-4	0.80-1.20	42.00-282.00	0.00-0.03	0.0-0.0	1.5-4.0
	51-60	1-4	0.80-1.20	42.00-282.00	0.00-0.03	0.0-0.0	1.5-4.0
Readingpeak-----	0-2	2-4	0.90-1.20	14.00-42.00	0.03-0.09	0.0-0.0	4.0-5.5
	2-7	2-4	0.90-1.20	14.00-42.00	0.03-0.09	0.0-0.0	4.0-5.5
	7-14	2-4	0.90-1.20	42.00-141.00	0.00-0.04	0.0-0.0	3.0-5.0
	14-26	2-4	0.90-1.20	42.00-141.00	0.00-0.04	0.0-0.0	3.0-5.0
	26-35	2-3	0.90-1.20	14.00-141.00	0.00-0.05	0.0-0.0	2.0-4.0
	35-50	2-3	0.90-1.20	42.00-141.00	0.00-0.05	0.0-0.0	2.0-4.0
	---	---	---	0.00-0.01	---	---	---

Soil Survey of Lassen Volcanic National Park, California

Table 26.—Physical Properties of the Soils—Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensi- bility	Organic matter
	In	Pct	g/cc	um/sec	In/in	Pct	Pct
113: Rock outcrop.							
114: Emeraldlake-----	0-1	1-4	0.80-1.20	14.00-141.00	0.04-0.13	0.0-0.0	4.5-8.0
	1-5	1-4	0.80-1.20	42.00-141.00	0.02-0.06	0.0-0.0	4.0-7.0
	5-14	1-4	0.80-1.20	42.00-141.00	0.02-0.06	0.0-0.0	4.0-7.0
	14-25	2-4	0.80-1.20	42.00-141.00	0.01-0.09	0.0-0.0	3.0-5.0
	25-35	2-4	0.80-1.20	42.00-141.00	0.01-0.09	0.0-0.0	3.0-5.0
	35-51	1-4	0.80-1.20	42.00-282.00	0.00-0.03	0.0-0.0	1.5-4.0
	51-60	1-4	0.80-1.20	42.00-282.00	0.00-0.03	0.0-0.0	1.5-4.0
Terracelake-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-3	2-6	0.80-1.20	14.00-141.00	0.04-0.14	0.0-0.0	5.5-10
	3-7	3-5	0.80-1.20	14.00-42.00	0.05-0.13	0.0-0.0	3.0-5.0
	7-19	2-10	0.80-1.20	14.00-42.00	0.00-0.16	0.0-0.0	2.0-4.0
	19-24	2-10	0.80-1.20	14.00-42.00	0.00-0.16	0.0-0.0	2.0-4.0
	24-37	2-9	0.80-1.20	14.00-141.00	0.00-0.14	0.0-0.0	0.5-1.5
	---	---	---	0.00-0.01	---	---	---
Readingpeak-----	0-2	2-4	0.90-1.20	14.00-42.00	0.03-0.09	0.0-0.0	4.0-5.5
	2-7	2-4	0.90-1.20	14.00-42.00	0.03-0.09	0.0-0.0	4.0-5.5
	7-14	2-4	0.90-1.20	42.00-141.00	0.00-0.04	0.0-0.0	3.0-5.0
	14-26	2-4	0.90-1.20	42.00-141.00	0.00-0.04	0.0-0.0	3.0-5.0
	26-35	2-3	0.90-1.20	14.00-141.00	0.00-0.05	0.0-0.0	2.0-4.0
	35-50	2-3	0.90-1.20	42.00-141.00	0.00-0.05	0.0-0.0	2.0-4.0
	---	---	---	0.00-0.01	---	---	---
Rock outcrop.							
Rubble land.							
115: Shadowlake-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-2	1-6	0.90-1.20	14.00-42.00	0.09-0.12	0.0-0.0	4.0-12
	2-6	3-8	0.80-1.20	14.00-42.00	0.01-0.13	0.0-0.0	3.5-8.6
	6-13	3-8	0.80-1.20	14.00-42.00	0.01-0.13	0.0-0.0	3.5-8.6
	13-23	3-8	0.80-1.20	14.00-42.00	0.01-0.12	0.0-0.0	3.5-8.6
	23-41	1-5	0.80-1.20	14.00-141.00	0.00-0.05	0.0-0.0	0.5-1.5
	41-51	1-12	1.20-1.50	0.10-1.00	0.01-0.17	0.0-0.0	0.0-0.3
116: Xeric Vitricryands, tephra over till-----	0-0	---	---	42.00-141.00	---	---	70-90
	0-2	---	---	42.00-141.00	---	---	40-85
	2-3	0-6	0.90-1.20	14.00-141.00	0.03-0.11	---	13-35
	3-4	0-6	0.90-1.20	14.00-141.00	0.03-0.13	---	13-35
	4-5	1-6	0.90-1.20	14.00-282.00	0.01-0.12	---	2.0-4.0
	5-8	1-6	0.90-1.20	14.00-282.00	0.01-0.12	---	2.0-4.0
	8-10	1-5	0.90-1.20	14.00-141.00	0.03-0.12	---	2.0-3.0
	10-16	1-5	0.90-1.20	42.00-141.00	0.01-0.14	---	3.5-4.5
	16-19	1-5	0.90-1.20	42.00-282.00	0.01-0.14	---	3.5-4.5
	19-39	0-5	0.90-1.20	14.00-141.00	0.00-0.15	---	1.2-2.5
	39-60	0-5	0.90-1.20	4.00-282.00	0.00-0.10	---	1.0-2.0

Soil Survey of Lassen Volcanic National Park, California

Table 26.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensi- bility	Organic matter
	In	Pct	g/cc	um/sec	In/in	Pct	Pct
116: Terracelake-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-3	2-6	0.80-1.20	14.00-141.00	0.04-0.14	0.0-0.0	5.5-10
	3-7	3-5	0.80-1.20	14.00-42.00	0.05-0.13	0.0-0.0	3.0-5.0
	7-19	2-10	0.80-1.20	14.00-42.00	0.00-0.16	0.0-0.0	2.0-4.0
	19-24	2-10	0.80-1.20	14.00-42.00	0.00-0.16	0.0-0.0	2.0-4.0
	24-37	2-9	0.80-1.20	14.00-141.00	0.00-0.14	0.0-0.0	0.5-1.5
	---	---	---	0.00-0.01	---	---	---
Rock outcrop.							
Xeric Vitricryands, cirque floor-----	0-2	2-6	0.90-1.20	14.11-42.00	0.08-0.13	0.0-0.0	0.0-0.8
	2-5	4-9	0.90-1.20	14.11-42.00	0.06-0.12	0.0-0.0	0.0-0.5
	5-13	4-9	0.90-1.20	14.11-42.00	0.06-0.12	0.0-0.0	0.0-0.5
	13-26	11-15	0.90-1.20	14.11-42.00	0.04-0.13	0.0-0.0	0.0-0.5
	26-36	11-15	0.90-1.20	4.00-42.00	0.04-0.13	0.0-0.0	0.0-0.5
	36-46	0-15	1.20-1.50	0.10-1.00	0.00-0.00	0.0-0.0	0.0-0.5
117: Humic Haploxerands, moist lake terrace-----	0-0	---	---	42.00-141.00	---	---	70-90
	0-2	1-2	0.80-1.20	42.00-282.00	0.03-0.11	0.0-0.0	1.2-8.5
	2-5	1-2	0.80-1.20	42.00-282.00	0.03-0.11	0.0-0.0	1.2-8.5
	5-7	0-1	0.80-1.20	141.00-282.00	0.03-0.05	0.0-0.0	0.0-1.1
	7-19	6-8	0.80-1.20	14.00-42.00	0.04-0.11	0.0-0.0	3.8-6.5
	19-30	10-12	0.80-1.20	14.00-42.00	0.01-0.14	0.0-0.0	4.3-8.5
	30-35	0-8	1.20-1.20	0.10-1.00	---	---	0.0-0.9
118: Typic Dystroxerepts, landslides-----	0-2	---	---	42.00-141.00	---	---	70-90
	2-5	8-30	0.90-1.20	4.00-14.00	0.06-0.18	0.0-4.0	14-18
	5-15	7-38	1.00-1.20	4.00-14.00	0.00-0.16	0.0-7.0	0.9-2.3
	15-23	7-38	1.00-1.20	4.00-14.00	0.00-0.15	0.0-7.0	0.9-2.3
	23-41	7-38	1.00-1.20	4.00-14.00	0.00-0.15	0.0-7.0	0.9-2.3
	41-60	4-28	1.00-1.20	4.00-14.00	0.00-0.09	0.0-4.0	0.5-1.2
119: Diamondpeak-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-3	18-27	0.70-1.30	4.00-14.00	0.15-0.21	0.8-3.2	14-18
	3-10	25-40	0.90-1.35	0.40-14.00	0.17-0.20	2.6-7.3	0.9-2.3
	10-31	25-40	0.90-1.35	0.40-14.00	0.15-0.18	2.6-7.3	0.9-2.3
	31-49	18-25	0.90-1.35	4.00-14.00	0.17-0.19	0.8-2.6	0.5-1.2
	49-60	18-25	0.90-1.35	4.00-14.00	0.17-0.19	0.8-2.6	0.5-1.2
Brokeoff-----	0-2	18-30	1.45-1.55	1.40-14.00	0.09-0.16	0.0-4.0	5.0-10
	2-4	18-30	1.45-1.55	1.40-14.00	0.09-0.16	0.0-4.0	5.0-10
	4-7	26-37	1.40-1.50	1.40-14.00	0.04-0.16	3.0-6.0	3.0-6.0
	7-15	26-37	1.45-1.55	1.40-14.00	0.04-0.16	0.0-3.0	3.0-6.0
	15-37	0-25	1.45-1.55	0.10-1.00	---	---	0.5-3.0
	---	---	---	0.00-0.01	---	---	---

Soil Survey of Lassen Volcanic National Park, California

Table 26.—Physical Properties of the Soils—Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensi- bility	Organic matter
	In	Pct	g/cc	um/sec	In/in	Pct	Pct
119: Endoaquepts-----	0-2	---	---	42.00-141.00	---	---	40-90
	2-4	5-15	1.00-1.40	4.00-42.00	0.08-0.22	0.0-2.0	14-22
	4-6	15-25	1.45-1.55	4.00-14.00	0.08-0.22	0.0-2.0	8.0-12
	6-9	15-25	1.45-1.55	4.00-14.00	0.08-0.22	0.0-2.0	8.0-12
	9-18	19-30	1.45-1.55	1.40-14.00	0.10-0.19	0.0-4.0	3.0-6.0
	18-30	25-32	1.45-1.55	1.40-4.00	0.08-0.20	3.0-5.0	1.0-4.0
	30-41	34-40	1.45-1.55	1.40-4.00	0.04-0.19	5.0-7.0	0.5-2.0
	41-50	34-40	1.30-1.45	0.40-1.40	0.04-0.19	5.0-7.0	0.5-2.0
	50-62	34-40	1.40-1.50	0.40-1.40	0.04-0.19	5.0-7.0	0.5-2.0
Aquic Dystroxepts, debris flows-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-2	---	---	42.00-141.00	---	---	65-85
	2-5	25-32	1.40-1.50	1.40-14.00	0.15-0.22	3.0-5.0	14-20
	5-9	25-38	1.40-1.50	1.40-14.00	0.07-0.21	3.0-7.0	0.9-2.3
	9-24	25-38	1.40-1.50	1.40-14.00	0.06-0.18	3.0-7.0	0.0-2.3
	24-30	25-35	1.40-1.50	1.40-14.00	0.05-0.15	3.0-6.0	10-15
	30-48	23-32	1.40-1.50	1.40-14.00	0.04-0.14	2.0-5.0	0.5-1.2
	48-60	23-32	1.40-1.50	1.40-14.00	0.04-0.14	2.0-5.0	0.5-1.2
Typic Dystroxepts-----	0-1	10-18	1.00-1.40	4.00-14.00	0.08-0.13	0.0-0.0	1.0-3.0
	1-4	23-30	1.00-1.40	1.40-14.00	0.06-0.15	2.0-4.0	0.5-1.2
	4-11	23-30	1.00-1.40	1.40-14.00	0.17-0.22	2.0-4.0	0.5-1.2
	11-16	20-24	1.00-1.40	4.00-14.00	0.17-0.19	1.0-2.0	0.0-0.8
	16-20	2-8	1.00-1.40	14.00-42.00	0.02-0.08	0.0-0.0	0.0-0.4
	---	---	---	0.00-0.01	---	---	---
120: Buttelake-----	0-0	---	---	42.00-141.00	---	---	70-90
	0-3	0-2	0.80-1.00	141.00-282.00	0.03-0.15	0.0-0.0	0.5-3.5
	3-11	0-1	0.80-1.00	141.00-282.00	0.01-0.12	0.0-0.0	0.0-0.8
	11-13	0-1	0.80-1.00	141.00-282.00	0.01-0.11	0.0-0.0	0.0-0.8
	13-19	0-10	0.80-1.00	14.00-141.00	0.04-0.12	0.0-0.0	4.0-6.5
	19-31	0-12	0.80-1.00	14.00-42.00	0.01-0.16	0.0-0.0	3.0-5.5
	31-40	0-12	0.80-1.00	14.00-42.00	0.01-0.16	0.0-0.0	3.0-5.5
	40-53	0-7	1.00-1.50	0.10-1.00	0.01-0.07	0.0-0.0	0.0-0.7
	53-63	0-7	1.00-1.50	0.10-1.00	0.00-0.07	0.0-0.0	0.0-0.7
Sunhoff-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-6	0-4	0.80-1.20	42.00-282.00	0.09-0.12	0.0-0.0	0.5-3.5
	6-9	2-5	0.80-1.20	14.00-141.00	0.03-0.12	0.0-0.0	3.0-6.5
	9-29	3-8	0.80-1.20	14.00-141.00	0.00-0.08	0.0-0.0	3.0-5.5
	29-39	1-1	1.20-1.50	0.10-1.00	0.01-0.09	0.0-0.0	0.0-0.7
Talved-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-5	0-2	0.90-1.20	42.34-141.00	0.00-0.07	0.0-0.0	2.0-5.0
	5-13	0-2	0.80-1.20	141.00-282.00	0.00-0.04	0.0-0.0	2.0-5.0
	13-26	2-6	0.80-1.20	14.00-42.00	0.00-0.08	0.0-0.0	1.0-3.0
	26-39	2-6	0.80-1.20	14.11-42.00	0.00-0.08	0.0-0.0	1.0-3.0
	39-60	3-8	0.80-1.20	14.11-42.00	0.00-0.08	0.0-0.0	0.5-2.0
122: Xeric Vitricryands, colluvium	0-3	2-6	0.90-1.20	14.00-42.00	0.04-0.12	0.0-0.0	0.7-3.0
	3-7	2-6	0.90-1.20	14.00-42.00	0.04-0.12	0.0-0.0	0.7-4.0
	7-11	2-6	0.90-1.20	14.00-42.00	0.03-0.12	0.0-0.0	1.2-2.0
	11-24	2-6	0.90-1.20	14.00-42.00	0.03-0.12	0.0-0.0	1.2-2.0
	24-33	2-7	0.90-1.20	14.00-42.00	0.03-0.10	0.0-0.0	0.7-1.5
	33-39	2-7	0.90-1.20	14.00-141.00	0.02-0.10	0.0-0.0	0.7-1.5
	39-42	1-4	0.90-1.20	42.00-141.00	0.02-0.05	0.0-0.0	0.5-1.3
	42-60	1-4	0.90-1.20	42.00-141.00	0.00-0.06	0.0-0.0	0.1-1.0

Soil Survey of Lassen Volcanic National Park, California

Table 26.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensi- bility	Organic matter
	In	Pct	g/cc	um/sec	In/in	Pct	Pct
122: Xeric Vitricryands, ash over cinders-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-2	1-6	0.90-1.20	14.00-42.00	0.05-0.14	0.0-0.0	4.0-5.0
	2-6	1-6	0.90-1.20	14.00-42.00	0.07-0.13	0.0-0.0	1.0-3.0
	6-16	2-11	0.90-1.20	14.00-42.00	0.00-0.11	0.0-0.0	0.9-2.3
	16-24	2-11	0.90-1.20	14.00-42.00	0.00-0.10	0.0-0.0	0.9-2.3
	24-30	1-4	0.90-1.20	14.00-141.00	0.00-0.09	0.0-0.0	0.7-1.5
	30-45	0-1	0.90-1.20	141.00-282.00	0.01-0.04	0.0-0.0	0.1-0.3
	45-60	0-1	0.90-1.20	141.00-282.00	0.01-0.04	0.0-0.0	0.1-0.3
Xeric Vitricryands, bedrock--	0-1	---	---	42.00-141.00	---	---	70-90
	1-4	1-2	0.90-1.20	42.00-141.00	0.04-0.11	0.0-0.0	1.0-4.0
	4-9	1-2	0.90-1.20	42.00-141.00	0.04-0.11	0.0-0.0	1.0-4.0
	9-16	3-8	0.90-1.20	14.00-141.00	0.01-0.10	0.0-0.0	5.7-10
	16-21	4-13	0.90-1.20	4.00-42.00	0.00-0.11	0.0-0.0	4.5-7.5
	---	---	---	0.00-0.01	---	---	---
125: Humic Haploxerands, stream terrace-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-4	4-8	0.80-1.00	14.00-42.00	0.08-0.22	0.0-0.0	2.0-4.0
	4-7	4-8	0.80-1.00	14.00-42.00	0.08-0.22	0.0-0.0	2.0-4.0
	7-17	5-10	0.80-1.00	14.00-42.00	0.03-0.17	0.0-0.0	1.0-3.0
	17-28	5-12	0.80-1.00	14.00-42.00	0.00-0.10	0.0-0.0	1.0-3.0
	28-48	1-12	0.80-1.00	14.00-141.00	0.00-0.11	0.0-0.0	0.5-1.0
	48-68	1-12	1.00-1.20	14.00-141.00	0.00-0.09	0.0-0.0	0.5-1.0
	68-84	1-12	1.00-1.20	14.00-141.00	0.00-0.11	0.0-0.0	0.5-1.0
Aquandic Humaquepts, flood plains-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-4	12-20	1.30-1.55	4.00-14.00	0.13-0.24	0.0-1.0	20-30
	4-7	12-20	1.30-1.55	4.00-14.00	0.12-0.24	0.0-1.0	20-30
	7-16	15-20	1.45-1.55	4.00-14.00	0.06-0.17	0.0-1.0	3.0-10
	16-25	15-20	1.45-1.55	4.00-14.00	0.05-0.15	0.0-1.0	3.0-10
	25-31	22-25	1.45-1.55	4.00-14.00	0.05-0.12	2.0-3.0	1.0-2.0
	31-47	22-25	1.45-1.55	4.00-14.00	0.05-0.12	2.0-3.0	1.0-2.0
	47-60	12-15	1.50-1.60	4.00-14.00	0.02-0.13	0.0-0.0	1.0-3.0
126: Kingsiron-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-3	2-5	0.80-1.00	14.00-141.00	0.01-0.17	0.0-0.0	9.0-18
	3-9	2-5	0.80-1.00	14.00-141.00	0.01-0.16	0.0-0.0	9.0-18
	9-28	5-8	0.80-1.00	14.00-42.00	0.00-0.08	0.0-0.0	5.0-8.0
	28-41	5-8	0.80-1.00	14.00-42.00	0.00-0.08	0.0-0.0	5.0-8.0
	41-63	4-14	0.80-1.00	14.00-42.00	0.00-0.08	0.0-0.0	1.0-4.5
Dittmar-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-2	3-4	0.90-1.20	14.00-42.00	0.04-0.12	0.0-0.0	4.0-12
	2-5	3-4	0.80-1.20	14.00-42.00	0.04-0.12	0.0-0.0	4.0-12
	5-7	3-8	0.80-1.20	14.00-42.00	0.00-0.15	0.0-0.0	3.0-8.0
	7-15	3-8	0.80-1.20	14.00-42.00	0.00-0.15	0.0-0.0	3.0-8.0
	15-19	3-8	0.80-1.20	14.00-42.00	0.00-0.14	0.0-0.0	3.0-8.0
	---	---	---	0.00-0.01	---	---	---
Rock outcrop.							

Soil Survey of Lassen Volcanic National Park, California

Table 26.—Physical Properties of the Soils—Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensi- bility	Organic matter
	In	Pct	g/cc	um/sec	In/in	Pct	Pct
127: Humic Haploxerands, strath terrace-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-4	5-12	0.80-1.20	14.00-42.00	0.07-0.13	0.0-0.0	12-18
	4-9	5-12	0.80-1.20	14.00-42.00	0.07-0.13	0.0-0.0	12-18
	9-16	8-16	0.80-1.20	4.00-14.00	0.07-0.11	0.0-0.0	9.7-16
	16-20	8-13	0.80-1.20	4.00-14.00	0.00-0.12	0.0-0.0	4.5-14
	20-28	8-13	0.80-1.20	14.00-42.00	0.00-0.12	0.0-0.0	4.5-14
	---	---	---	0.00-0.01	---	---	---
Aquepts-----	0-2	---	---	42.00-141.00	---	---	70-90
	2-6	2-4	1.30-1.60	14.00-42.00	0.06-0.14	0.0-0.0	15-30
	6-11	2-4	1.50-1.60	14.00-42.00	0.00-0.15	0.0-0.0	5.0-15
	11-16	2-6	1.50-1.60	14.00-42.00	0.00-0.05	0.0-0.0	3.0-5.0
	16-26	2-5	1.50-1.60	14.00-42.00	0.01-0.10	0.0-0.0	1.0-5.0
	26-45	2-4	1.50-1.60	14.00-42.00	0.00-0.05	0.0-0.0	1.0-3.0
129: Humic Haploxerands, colluvium	0-2	---	---	42.00-141.00	---	---	70-90
	2-2	---	---	42.00-141.00	---	---	65-85
	2-4	3-8	0.80-1.20	14.00-42.00	0.07-0.12	0.0-0.0	12-18
	4-8	3-8	0.80-1.20	14.00-42.00	0.07-0.15	0.0-0.0	12-18
	8-15	3-8	0.80-1.20	14.00-42.00	0.03-0.10	0.0-0.0	9.7-14
	15-22	4-9	0.80-1.20	14.00-42.00	0.03-0.10	0.0-0.0	9.7-14
	22-34	4-10	0.80-1.20	14.00-42.00	0.02-0.07	0.0-0.0	4.5-10
	34-50	4-10	0.80-1.20	14.00-42.00	0.01-0.09	0.0-0.0	4.5-7.5
	50-61	4-10	0.80-1.20	14.00-42.00	0.01-0.09	0.0-0.0	4.5-7.5
130: Histic Humaquepts, lake sediments-----	0-6	----	0.10-0.10	42.00-141.00	---	---	21-30
	6-10	---	0.20-0.20	42.00-141.00	---	---	21-30
	10-14	5-20	0.20-0.20	42.00-141.00	---	---	21-30
	14-16	0-27	0.90-1.20	4.00-282.00	0.02-0.22	0.0-3.0	0.5-17
	16-26	0-27	0.50-0.90	4.00-141.00	0.20-0.22	0.0-3.0	0.5-17
	26-26	10-20	0.20-0.20	42.00-141.00	---	0.0-1.0	0.5-2.0
	26-35	0-12	0.50-0.90	4.00-14.00	0.20-0.22	0.0-0.0	0.2-0.5
	35-39	0-12	0.50-0.90	4.00-42.00	0.04-0.19	0.0-0.0	0.2-0.5
	39-44	0-12	0.90-1.20	42.00-141.00	0.04-0.19	0.0-0.0	0.2-0.5
	44-49	0-12	0.90-1.20	42.00-141.00	0.04-0.19	0.0-0.0	0.2-0.5
	49-59	0-12	0.90-1.20	42.00-141.00	0.04-0.19	0.0-0.0	0.2-0.5
Histic Humaquepts, frequently flooded-----	0-2	---	0.10-0.10	42.00-141.00	---	---	21-30
	2-5	10-20	0.20-0.20	42.00-141.00	---	---	21-30
	5-9	10-20	0.20-0.20	42.00-141.00	---	---	21-30
	9-13	0-1	0.90-1.20	141.00-282.00	0.04-0.06	0.0-0.0	0.5-2.0
	13-17	27-35	0.50-0.90	1.40-4.00	0.18-0.20	3.0-6.0	10-30
	17-28	18-27	0.50-0.90	4.00-14.00	0.12-0.14	0.0-3.0	2.0-10
	28-47	20-35	0.90-1.20	1.40-4.00	0.15-0.17	1.0-6.0	2.0-10
	47-51	0-8	0.90-1.20	14.00-282.00	0.01-0.13	0.0-0.0	0.2-0.5
	51-55	0-8	0.90-1.20	14.00-282.00	0.01-0.13	0.0-0.0	0.2-0.5
Typic Endoaquands-----	0-2	---	0.10-0.10	42.00-141.00	---	---	70-90
	2-3	---	0.20-0.20	42.00-141.00	---	---	60-80
	3-11	6-15	0.90-1.20	14.00-42.00	0.09-0.22	0.0-0.0	4.0-6.0
	11-17	6-15	0.90-1.20	4.00-14.00	0.09-0.19	0.0-0.0	4.0-6.0
	17-29	8-15	0.80-1.20	4.00-14.00	0.01-0.18	0.0-0.0	2.5-4.0
	29-52	1-3	0.80-1.20	12.00-42.00	0.01-0.08	0.0-0.0	0.5-1.5
	52-57	1-3	0.80-1.20	14.00-141.00	0.01-0.08	0.0-0.0	0.5-1.5

Soil Survey of Lassen Volcanic National Park, California

Table 26.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensi- bility	Organic matter
	In	Pct	g/cc	um/sec	In/in	Pct	Pct
132: Vitrandic Cryorthents, debris flows-----	0-4	0-1	1.00-1.30	42.00-141.00	0.01-0.08	0.0-0.0	0.0-0.3
	4-13	0-1	1.00-1.30	42.00-282.00	0.00-0.10	0.0-0.0	0.0-0.2
	13-19	0-1	1.00-1.30	42.00-282.00	0.00-0.09	0.0-0.0	0.0-0.2
	19-32	1-3	0.90-1.20	42.00-141.00	0.00-0.06	0.0-0.0	0.5-1.5
	32-41	1-3	1.20-1.50	0.10-1.00	0.00-0.06	0.0-0.0	0.0-0.3
133: Vitrandic Xerofluvents-----	0-2	---	---	42.00-141.00	---	---	70-90
	2-4	2-3	1.00-1.30	42.00-141.00	0.06-0.11	0.0-0.0	0.2-1.0
	4-6	2-3	1.00-1.30	42.00-141.00	0.06-0.11	0.0-0.0	0.2-1.0
	6-12	3-4	1.00-1.30	42.00-141.00	0.00-0.11	0.0-0.0	0.2-0.5
	12-32	3-4	1.00-1.30	42.00-141.00	0.00-0.10	0.0-0.0	0.2-0.5
	32-34	1-3	1.00-1.30	42.00-282.00	0.00-0.10	0.0-0.0	0.0-0.5
	34-50	1-3	1.00-1.30	42.00-141.00	0.00-0.10	0.0-0.0	0.0-0.5
	50-51	---	0.02-0.05	42.00-141.00	0.45-0.55	---	65-85
	51-56	1-6	1.00-1.20	42.00-141.00	0.02-0.09	0.0-0.0	3.0-5.0
	56-62	0-7	1.00-1.20	14.00-141.00	0.01-0.10	0.0-0.0	0.5-3.0
	62-63	0-7	1.00-1.20	14.00-141.00	0.01-0.10	0.0-0.0	0.5-3.0
Typic Endoaquents-----	0-7	0-1	1.60-1.70	141.00-282.00	0.02-0.08	0.0-0.0	0.1-0.3
	7-14	0-1	1.60-1.70	141.00-282.00	0.02-0.08	0.0-0.0	0.1-0.3
	14-17	0-1	1.60-1.70	141.00-282.00	0.02-0.07	0.0-0.0	0.1-0.3
	17-19	0-1	1.60-1.70	141.00-282.00	0.02-0.07	0.0-0.0	0.1-0.3
	19-26	0-1	1.60-1.70	141.00-282.00	0.01-0.07	0.0-0.0	0.0-0.1
	26-31	0-1	1.60-1.70	141.00-282.00	0.01-0.07	0.0-0.0	0.0-0.1
	31-39	0-1	1.70-1.80	141.00-282.00	0.01-0.07	0.0-0.0	0.0-0.1
134: Chaos-----	0-0	---	---	42.00-141.00	---	---	70-90
	0-4	0-1	1.40-1.70	141.00-282.00	0.01-0.05	0.0-0.0	1.0-4.5
	4-9	0-1	1.40-1.70	42.00-282.00	0.01-0.05	0.0-0.0	0.5-1.5
	9-21	0-4	1.40-1.70	14.00-282.00	0.01-0.12	0.0-0.0	0.0-0.5
	21-23	0-4	1.40-1.70	14.00-282.00	0.01-0.12	0.0-0.0	0.0-0.5
	23-27	0-4	1.40-1.70	14.00-282.00	0.01-0.12	0.0-0.0	0.0-0.5
	27-36	0-4	1.40-1.70	14.00-282.00	0.01-0.12	0.0-0.0	0.0-0.5
	36-56	0-4	1.40-1.70	14.00-282.00	0.01-0.11	0.0-0.0	0.0-0.5
	56-75	0-4	1.40-1.70	14.00-282.00	0.01-0.11	0.0-0.0	0.0-0.5
	75-87	0-4	1.40-1.70	14.00-282.00	0.01-0.11	0.0-0.0	0.0-0.5
136: Terracelake-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-3	2-6	0.80-1.20	14.00-141.00	0.04-0.14	0.0-0.0	5.5-10
	3-7	3-5	0.80-1.20	14.00-42.00	0.05-0.13	0.0-0.0	3.0-5.0
	7-19	2-10	0.80-1.20	14.00-42.00	0.00-0.16	0.0-0.0	2.0-4.0
	19-24	2-10	0.80-1.20	14.00-42.00	0.00-0.16	0.0-0.0	2.0-4.0
	24-37	2-9	0.80-1.20	14.00-141.00	0.00-0.14	0.0-0.0	0.5-1.5
	---	---	---	0.00-0.01	---	---	---
Rock outcrop.							
Xeric Vitricryands, cirque floor-----	0-2	2-6	0.90-1.20	14.11-42.00	0.08-0.13	0.0-0.0	0.0-0.8
	2-5	4-9	0.90-1.20	14.11-42.00	0.06-0.12	0.0-0.0	0.0-0.5
	5-13	4-9	0.90-1.20	14.11-42.00	0.06-0.12	0.0-0.0	0.0-0.5
	13-26	11-15	0.90-1.20	14.11-42.00	0.04-0.13	0.0-0.0	0.0-0.5
	26-36	11-15	0.90-1.20	4.00-42.00	0.04-0.13	0.0-0.0	0.0-0.5
	36-46	0-15	1.20-1.50	0.10-1.00	0.00-0.00	0.0-0.0	0.0-0.5

Soil Survey of Lassen Volcanic National Park, California

Table 26.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensi- bility	Organic matter
	In	Pct	g/cc	um/sec	In/in	Pct	Pct
137:							
Xeric Vitricryands-----	0-3	0-4	0.80-1.20	14.00-141.00	0.03-0.17	0.0-0.0	1.0-4.0
	3-9	0-4	0.80-1.20	14.00-141.00	0.03-0.17	0.0-0.0	1.0-4.0
	9-17	0-4	0.80-1.20	14.00-141.00	0.02-0.16	0.0-0.0	1.0-4.0
	17-23	0-7	0.80-1.20	14.00-141.00	0.02-0.11	0.0-0.0	1.0-3.0
	23-37	0-12	0.90-1.20	14.00-141.00	0.01-0.18	0.0-0.0	0.0-0.8
	37-48	0-12	0.90-1.20	4.00-141.00	0.01-0.18	0.0-0.0	0.0-0.8
	48-59	1-2	1.20-1.50	0.10-1.00	0.04-0.10	0.0-0.0	0.0-0.5
Rock outcrop, rhyodacite.							
138:							
Vitrandid Xerofluvents, debris flows-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-3	---	---	42.00-141.00	---	---	65-85
	3-6	0-8	1.00-1.30	4.00-141.00	0.02-0.21	0.0-0.0	0.5-2.0
	6-9	0-8	1.00-1.30	4.00-141.00	0.02-0.17	0.0-0.0	0.5-2.0
	9-13	0-8	1.00-1.30	4.00-141.00	0.02-0.21	0.0-0.0	0.5-2.0
	13-17	0-8	1.00-1.30	42.00-282.00	0.02-0.18	0.0-0.0	0.5-2.0
	17-35	0-3	1.00-1.30	42.00-282.00	0.01-0.10	0.0-0.0	0.0-0.5
	35-50	0-3	1.00-1.30	42.00-282.00	0.00-0.10	0.0-0.0	0.0-0.5
	50-55	3-12	0.90-1.20	14.00-42.00	0.06-0.14	0.0-0.0	3.0-6.0
	55-67	3-12	0.90-1.20	14.00-42.00	0.06-0.14	0.0-0.0	3.0-6.0
Typic Endoaquents-----	0-7	0-1	1.60-1.70	141.00-282.00	0.02-0.08	0.0-0.0	0.1-0.3
	7-14	0-1	1.60-1.70	141.00-282.00	0.02-0.08	0.0-0.0	0.1-0.3
	14-17	0-1	1.60-1.70	141.00-282.00	0.02-0.07	0.0-0.0	0.1-0.3
	17-19	0-1	1.60-1.70	141.00-282.00	0.02-0.07	0.0-0.0	0.1-0.3
	19-26	0-1	1.60-1.70	141.00-282.00	0.01-0.07	0.0-0.0	0.0-0.1
	26-31	0-1	1.60-1.70	141.00-282.00	0.01-0.07	0.0-0.0	0.0-0.1
	31-39	0-1	1.70-1.80	141.00-282.00	0.01-0.07	0.0-0.0	0.0-0.1
139:							
Duric Vitraquands-----	0-2	---	---	42.00-141.00	---	---	70-90
	2-4	1-5	1.60-1.70	42.00-141.00	0.07-0.10	0.0-0.0	5.0-7.0
	4-7	1-5	1.60-1.70	42.00-141.00	0.07-0.10	0.0-0.0	2.0-4.0
	7-13	1-5	1.60-1.70	42.00-141.00	0.06-0.10	0.0-0.0	2.0-4.0
	13-17	3-6	0.80-1.20	14.00-42.00	0.06-0.13	0.0-0.0	4.5-6.0
	17-23	2-6	0.80-1.20	14.00-42.00	0.04-0.11	0.0-0.0	2.0-4.0
	23-34	2-5	0.80-1.20	42.00-141.00	0.04-0.07	0.0-0.0	0.5-1.5
	34-44	2-5	0.80-1.20	42.00-141.00	0.03-0.07	0.0-0.0	0.5-1.5
	44-49	2-7	0.80-1.20	0.10-1.00	0.02-0.10	0.0-0.0	0.5-1.5
Typic Endoaquands-----	0-2	---	0.10-0.10	42.00-141.00	---	---	70-90
	2-3	---	0.20-0.20	42.00-141.00	---	---	60-80
	3-11	6-15	0.90-1.20	14.00-42.00	0.09-0.22	0.0-0.0	4.0-6.0
	11-17	6-15	0.90-1.20	4.00-14.00	0.09-0.19	0.0-0.0	4.0-6.0
	17-29	8-15	0.80-1.20	4.00-14.00	0.01-0.18	0.0-0.0	2.5-4.0
	29-52	1-3	0.80-1.20	12.00-42.00	0.01-0.08	0.0-0.0	0.5-1.5
	52-57	1-3	0.80-1.20	14.00-141.00	0.01-0.08	0.0-0.0	0.5-1.5
Aquandic Cryaquents-----	0-7	20-35	0.50-0.90	1.00-14.00	0.19-0.23	1.0-6.0	5.0-10
	7-12	20-35	0.50-0.90	1.00-14.00	0.19-0.24	1.0-6.0	5.0-10
	12-14	0-28	0.50-0.90	1.00-14.00	0.10-0.20	0.0-1.0	0.5-5.0
	14-20	0-20	0.90-1.20	4.00-141.00	0.02-0.22	0.0-1.0	0.5-5.0
	20-28	27-40	0.50-0.90	1.00-4.00	0.18-0.20	3.0-7.0	10-20
	28-34	0-20	0.90-1.20	4.00-42.00	0.02-0.22	0.0-1.0	0.5-5.0
	34-47	0-20	0.90-1.20	4.00-141.00	0.01-0.22	0.0-1.0	0.5-5.0

Soil Survey of Lassen Volcanic National Park, California

Table 26.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensi- bility	Organic matter
	In	Pct	g/cc	um/sec	In/in	Pct	Pct
140: Vitrixerands-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-4	1-3	1.00-1.20	14.00-141.00	0.06-0.13	0.0-0.0	4.0-6.0
	4-8	1-3	1.00-1.20	14.00-141.00	0.06-0.13	0.0-0.0	4.0-6.0
	8-12	1-3	1.00-1.20	14.00-141.00	0.06-0.13	0.0-0.0	4.0-6.0
	12-21	1-5	0.90-1.00	14.00-141.00	0.05-0.11	0.0-0.0	5.0-6.0
	21-37	1-3	0.90-1.00	14.00-141.00	0.01-0.08	0.0-0.0	2.5-3.5
	37-46	1-3	---	0.10-1.00	---	---	0.5-1.5
141: Humic Haploxerands-----	0-2	---	---	42.00-141.00	---	---	70-90
	2-3	---	---	42.00-141.00	---	---	60-80
	3-4	4-6	0.80-1.20	14.00-42.00	0.12-0.18	0.0-0.0	12-18
	4-6	4-7	0.80-1.20	14.00-42.00	0.03-0.14	0.0-0.0	9.7-18
	6-15	4-7	0.80-1.20	14.00-42.00	0.03-0.14	0.0-0.0	9.7-18
	15-24	9-12	0.80-1.20	14.00-42.00	0.05-0.13	0.0-0.0	4.5-10
	24-29	9-12	0.80-1.20	14.00-42.00	0.08-0.13	0.0-0.0	4.5-10
	29-42	15-23	0.80-1.20	4.00-14.00	0.03-0.16	0.0-2.0	4.5-10
	42-60	15-23	0.80-1.20	4.00-14.00	0.03-0.16	0.0-2.0	4.5-10
Typic Haploxerands-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-2	1-3	0.80-1.20	14.00-42.00	0.10-0.13	0.0-0.0	12-15
	2-5	2-5	0.80-1.20	14.00-42.00	0.08-0.13	0.0-0.0	9.7-12
	5-12	3-8	0.80-1.20	14.00-42.00	0.02-0.09	0.0-0.0	4.5-7.5
	12-20	3-8	0.80-1.20	14.00-42.00	0.02-0.09	0.0-0.0	4.5-7.5
	20-30	3-8	0.90-1.20	14.00-42.00	0.02-0.09	0.0-0.0	4.5-7.5
	30-37	8-14	0.90-1.20	4.00-42.00	0.00-0.10	0.0-0.0	1.0-4.5
	37-44	8-14	0.90-1.20	4.00-42.00	0.00-0.13	0.0-0.0	1.0-4.5
	44-50	8-14	0.90-1.20	4.00-14.00	0.01-0.17	0.0-0.0	1.0-4.5
	50-61	10-14	0.90-1.20	4.00-42.00	0.11-0.19	0.0-0.0	0.1-2.0
Bearrubble-----	0-3	---	---	42.00-141.00	---	---	70-90
	3-6	0-5	0.80-1.20	14.00-141.00	0.00-0.18	0.0-0.0	13-35
	6-13	0-4	0.80-1.20	42.00-141.00	0.00-0.07	0.0-0.0	2.0-8.0
	13-19	1-7	0.80-1.20	4.00-42.00	0.00-0.11	0.0-0.0	1.2-4.0
	19-35	1-7	0.80-1.20	4.00-42.00	0.00-0.11	0.0-0.0	1.2-4.0
	35-49	2-8	0.80-1.20	4.00-42.00	0.00-0.14	0.0-0.0	1.0-2.5
	49-60	2-8	0.80-1.20	4.00-42.00	0.00-0.14	0.0-0.0	1.0-2.5
Rubble land.							
142: Cragwash-----	0-2	---	---	42.00-141.00	---	---	70-90
	2-3	2-6	0.75-1.20	14.00-282.00	0.03-0.14	0.0-0.0	3.0-12
	3-5	2-6	0.80-1.20	14.00-282.00	0.03-0.14	0.0-0.0	3.0-12
	5-11	1-8	0.80-1.20	14.00-141.00	0.01-0.18	0.0-0.0	0.9-1.8
	11-17	2-7	0.80-1.20	14.00-141.00	0.02-0.10	0.0-0.0	3.0-5.0
	17-27	2-6	0.80-1.20	14.00-141.00	0.01-0.13	0.0-0.0	1.0-3.0
	27-38	2-6	0.80-1.20	14.00-141.00	0.01-0.13	0.0-0.0	1.0-3.0
	38-57	1-3	0.80-1.20	42.00-282.00	0.01-0.07	0.0-0.0	0.3-0.9
	57-82	1-3	1.00-1.40	0.10-1.00	0.01-0.10	0.0-0.0	0.1-0.5
143: Andic Durixerpts-----	0-1	---	---	42.00-141.00	---	---	50-70
	1-3	1-3	0.90-1.20	42.00-141.00	0.07-0.13	0.0-0.0	3.0-5.0
	3-12	1-5	0.90-1.00	14.00-42.00	0.02-0.11	0.0-0.0	1.7-3.5
	12-19	1-5	0.90-1.00	14.00-42.00	0.02-0.11	0.0-0.0	1.7-3.5
	19-24	1-4	0.90-1.20	42.00-141.00	0.01-0.06	0.0-0.0	0.5-2.0
	24-31	1-2	1.20-1.60	0.10-1.00	0.02-0.08	0.0-0.0	0.2-0.5

Soil Survey of Lassen Volcanic National Park, California

Table 26.—Physical Properties of the Soils—Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensi- bility	Organic matter
	In	Pct	g/cc	um/sec	In/in	Pct	Pct
144: Xeric Vitricryands, cirque floor-----	0-2	2-6	0.90-1.20	14.11-42.00	0.08-0.13	0.0-0.0	0.0-0.8
	2-5	4-9	0.90-1.20	14.11-42.00	0.06-0.12	0.0-0.0	0.0-0.5
	5-13	4-9	0.90-1.20	14.11-42.00	0.06-0.12	0.0-0.0	0.0-0.5
	13-26	11-15	0.90-1.20	14.11-42.00	0.04-0.13	0.0-0.0	0.0-0.5
	26-36	11-15	0.90-1.20	4.00-42.00	0.04-0.13	0.0-0.0	0.0-0.5
	36-46	0-15	1.20-1.50	0.10-1.00	0.00-0.00	0.0-0.0	0.0-0.5
Humic Xeric Vitricryands----	0-1	---	---	42.00-141.00	---	---	70-90
	1-4	2-4	0.80-1.20	14.00-42.00	0.10-0.13	0.0-0.0	13-35
	4-6	3-6	0.80-1.20	14.00-42.00	0.08-0.13	0.0-0.0	2.0-3.0
	6-12	5-6	0.80-1.20	14.00-42.00	0.06-0.13	0.0-0.0	1.0-5.0
	12-18	5-6	0.80-1.20	14.00-42.00	0.05-0.12	0.0-0.0	1.0-5.0
	18-24	5-7	0.80-1.20	14.00-42.00	0.05-0.12	0.0-0.0	1.0-5.0
	24-30	4-6	1.20-1.50	0.10-1.00	0.00-0.01	0.0-0.0	1.0-2.0
145: Sueredo-----	0-2	---	---	42.00-141.00	---	---	70-90
	2-5	---	---	42.00-141.00	---	---	65-85
	5-9	1-6	1.00-1.20	42.00-141.00	0.04-0.14	0.0-0.0	2.0-4.0
	9-13	1-6	1.00-1.20	42.00-141.00	0.04-0.14	0.0-0.0	2.0-4.0
	13-16	0-7	1.00-1.20	42.00-282.00	0.00-0.19	0.0-0.0	0.5-3.0
	16-18	0-7	1.00-1.20	42.00-282.00	0.00-0.19	0.0-0.0	0.5-3.0
	18-26	1-9	0.90-1.20	42.00-141.00	0.00-0.15	0.0-0.0	3.0-4.0
	26-50	0-8	0.90-1.20	42.00-282.00	0.00-0.08	0.0-0.0	2.0-3.0
	50-76	0-3	0.90-1.20	42.00-282.00	0.00-0.09	0.0-0.0	0.5-1.5
	76-83	1-3	1.00-1.50	0.10-1.00	0.00-0.07	0.0-0.0	0.0-0.3
146: Sueredo-----	0-2	---	---	42.00-141.00	---	---	70-90
	2-5	---	---	42.00-141.00	---	---	65-85
	5-9	1-6	1.00-1.20	42.00-141.00	0.04-0.14	0.0-0.0	2.0-4.0
	9-13	1-6	1.00-1.20	42.00-141.00	0.04-0.14	0.0-0.0	2.0-4.0
	13-16	0-7	1.00-1.20	42.00-282.00	0.00-0.19	0.0-0.0	0.5-3.0
	16-18	0-7	1.00-1.20	42.00-282.00	0.00-0.19	0.0-0.0	0.5-3.0
	18-26	1-9	0.90-1.20	42.00-141.00	0.00-0.15	0.0-0.0	3.0-4.0
	26-50	0-8	0.90-1.20	42.00-282.00	0.00-0.08	0.0-0.0	2.0-3.0
	50-76	0-3	0.90-1.20	42.00-282.00	0.00-0.09	0.0-0.0	0.5-1.5
	76-83	1-3	1.00-1.50	0.10-1.00	0.00-0.07	0.0-0.0	0.0-0.3
147: Summertown-----	0-2	---	---	42.00-141.00	---	---	70-90
	2-4	---	---	42.00-141.00	---	---	60-80
	4-6	2-4	1.00-1.20	14.00-141.00	0.04-0.17	0.0-2.0	4.0-5.5
	6-15	2-4	1.00-1.20	14.00-141.00	0.05-0.16	0.0-2.0	2.0-3.0
	15-22	2-6	1.00-1.20	14.00-141.00	0.00-0.14	0.0-2.0	2.5-4.0
	22-31	2-6	1.00-1.20	14.00-141.00	0.00-0.15	0.0-2.0	2.5-4.0
	31-43	2-5	1.00-1.20	0.10-1.00	0.00-0.07	0.0-2.0	0.0-1.5
148: Humic Haploxerands, lake terrace-----	0-0	---	---	42.00-141.00	---	---	70-90
	0-3	3-12	0.80-1.20	14.00-42.00	0.00-0.21	0.0-1.0	12-18
	3-11	3-12	0.80-1.20	14.00-42.00	0.00-0.21	0.0-1.0	12-18
	11-18	3-12	0.80-1.20	14.00-42.00	0.00-0.18	0.0-1.0	12-18
	18-26	4-9	0.80-1.20	14.00-42.00	0.03-0.13	0.0-1.0	4.5-14
	26-35	3-7	1.20-1.40	0.10-1.00	---	---	1.0-2.5

Soil Survey of Lassen Volcanic National Park, California

Table 26.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensi- bility	Organic matter
	In	Pct	g/cc	um/sec	In/in	Pct	Pct
148:							
Typic Endoaquands-----	0-2	---	0.10-0.10	42.00-141.00	---	---	70-90
	2-3	---	0.20-0.20	42.00-141.00	---	---	60-80
	3-11	6-15	0.90-1.20	14.00-42.00	0.09-0.22	0.0-0.0	4.0-6.0
	11-17	6-15	0.90-1.20	4.00-14.00	0.09-0.19	0.0-0.0	4.0-6.0
	17-29	8-15	0.80-1.20	4.00-14.00	0.01-0.18	0.0-0.0	2.5-4.0
	29-52	1-3	0.80-1.20	12.00-42.00	0.01-0.08	0.0-0.0	0.5-1.5
	52-57	1-3	0.80-1.20	14.00-141.00	0.01-0.08	0.0-0.0	0.5-1.5
149:							
Rubble land.							
Rock outcrop, cliffs.							
Emeraldlake-----	0-1	1-4	0.80-1.20	14.00-141.00	0.04-0.13	0.0-0.0	4.5-8.0
	1-5	1-4	0.80-1.20	42.00-141.00	0.02-0.06	0.0-0.0	4.0-7.0
	5-14	1-4	0.80-1.20	42.00-141.00	0.02-0.06	0.0-0.0	4.0-7.0
	14-25	2-4	0.80-1.20	42.00-141.00	0.01-0.09	0.0-0.0	3.0-5.0
	25-35	2-4	0.80-1.20	42.00-141.00	0.01-0.09	0.0-0.0	3.0-5.0
	35-51	1-4	0.80-1.20	42.00-282.00	0.00-0.03	0.0-0.0	1.5-4.0
	51-60	1-4	0.80-1.20	42.00-282.00	0.00-0.03	0.0-0.0	1.5-4.0
150:							
Shadowlake-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-2	1-6	0.90-1.20	14.00-42.00	0.09-0.12	0.0-0.0	4.0-12
	2-6	3-8	0.80-1.20	14.00-42.00	0.01-0.13	0.0-0.0	3.5-8.6
	6-13	3-8	0.80-1.20	14.00-42.00	0.01-0.13	0.0-0.0	3.5-8.6
	13-23	3-8	0.80-1.20	14.00-42.00	0.01-0.12	0.0-0.0	3.5-8.6
	23-41	1-5	0.80-1.20	14.00-141.00	0.00-0.05	0.0-0.0	0.5-1.5
	41-51	1-12	1.20-1.50	0.10-1.00	0.01-0.17	0.0-0.0	0.0-0.3
Terracelake-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-3	2-6	0.80-1.20	14.00-141.00	0.04-0.14	0.0-0.0	5.5-10
	3-7	3-5	0.80-1.20	14.00-42.00	0.05-0.13	0.0-0.0	3.0-5.0
	7-19	2-10	0.80-1.20	14.00-42.00	0.00-0.16	0.0-0.0	2.0-4.0
	19-24	2-10	0.80-1.20	14.00-42.00	0.00-0.16	0.0-0.0	2.0-4.0
	24-37	2-9	0.80-1.20	14.00-141.00	0.00-0.14	0.0-0.0	0.5-1.5
	---	---	---	0.00-0.01	---	---	---
Acroph-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-2	1-3	0.80-1.20	42.00-141.00	0.03-0.15	0.0-2.0	13-35
	2-5	1-3	0.80-1.20	42.00-141.00	0.03-0.15	0.0-2.0	13-35
	5-11	2-5	0.80-1.20	42.00-141.00	0.03-0.12	0.0-2.0	1.2-2.5
	11-15	2-5	0.80-1.20	42.00-141.00	0.02-0.11	0.0-2.0	1.2-2.5
	---	---	---	0.00-0.07	---	---	---
Rock outcrop.							
151:							
Terracelake-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-3	2-6	0.80-1.20	14.00-141.00	0.04-0.14	0.0-0.0	5.5-10
	3-7	3-5	0.80-1.20	14.00-42.00	0.05-0.13	0.0-0.0	3.0-5.0
	7-19	2-10	0.80-1.20	14.00-42.00	0.00-0.16	0.0-0.0	2.0-4.0
	19-24	2-10	0.80-1.20	14.00-42.00	0.00-0.16	0.0-0.0	2.0-4.0
	24-37	2-9	0.80-1.20	14.00-141.00	0.00-0.14	0.0-0.0	0.5-1.5
	---	---	---	0.00-0.01	---	---	---

Soil Survey of Lassen Volcanic National Park, California

Table 26.—Physical Properties of the Soils—Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensi- bility	Organic matter
	In	Pct	g/cc	um/sec	In/in	Pct	Pct
151: Acroph-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-2	1-3	0.80-1.20	42.00-141.00	0.03-0.15	0.0-2.0	13-35
	2-5	1-3	0.80-1.20	42.00-141.00	0.03-0.15	0.0-2.0	13-35
	5-11	2-5	0.80-1.20	42.00-141.00	0.03-0.12	0.0-2.0	1.2-2.5
	11-15	2-5	0.80-1.20	42.00-141.00	0.02-0.11	0.0-2.0	1.2-2.5
	---	---	---	0.00-0.07	---	---	---
Rock outcrop.							
Shadowlake-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-2	1-6	0.90-1.20	14.00-42.00	0.09-0.12	0.0-0.0	4.0-12
	2-6	3-8	0.80-1.20	14.00-42.00	0.01-0.13	0.0-0.0	3.5-8.6
	6-13	3-8	0.80-1.20	14.00-42.00	0.01-0.13	0.0-0.0	3.5-8.6
	13-23	3-8	0.80-1.20	14.00-42.00	0.01-0.12	0.0-0.0	3.5-8.6
	23-41	1-5	0.80-1.20	14.00-141.00	0.00-0.05	0.0-0.0	0.5-1.5
	41-51	1-12	1.20-1.50	0.10-1.00	0.01-0.17	0.0-0.0	0.0-0.3
152: Terracelake-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-3	2-6	0.80-1.20	14.00-141.00	0.04-0.14	0.0-0.0	5.5-10
	3-7	3-5	0.80-1.20	14.00-42.00	0.05-0.13	0.0-0.0	3.0-5.0
	7-19	2-10	0.80-1.20	14.00-42.00	0.00-0.16	0.0-0.0	2.0-4.0
	19-24	2-10	0.80-1.20	14.00-42.00	0.00-0.16	0.0-0.0	2.0-4.0
	24-37	2-9	0.80-1.20	14.00-141.00	0.00-0.14	0.0-0.0	0.5-1.5
	---	---	---	0.00-0.01	---	---	---
Shadowlake-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-2	1-6	0.90-1.20	14.00-42.00	0.09-0.12	0.0-0.0	4.0-12
	2-6	3-8	0.80-1.20	14.00-42.00	0.01-0.13	0.0-0.0	3.5-8.6
	6-13	3-8	0.80-1.20	14.00-42.00	0.01-0.13	0.0-0.0	3.5-8.6
	13-23	3-8	0.80-1.20	14.00-42.00	0.01-0.12	0.0-0.0	3.5-8.6
	23-41	1-5	0.80-1.20	14.00-141.00	0.00-0.05	0.0-0.0	0.5-1.5
	41-51	1-12	1.20-1.50	0.10-1.00	0.01-0.17	0.0-0.0	0.0-0.3
Acroph-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-2	1-3	0.80-1.20	42.00-141.00	0.03-0.15	0.0-2.0	13-35
	2-5	1-3	0.80-1.20	42.00-141.00	0.03-0.15	0.0-2.0	13-35
	5-11	2-5	0.80-1.20	42.00-141.00	0.03-0.12	0.0-2.0	1.2-2.5
	11-15	2-5	0.80-1.20	42.00-141.00	0.02-0.11	0.0-2.0	1.2-2.5
	---	---	---	0.00-0.07	---	---	---
Rock outcrop.							
153: Typic Vitrixerands-----	0-2	1-3	1.00-1.20	42.00-141.00	0.04-0.10	0.0-0.0	0.1-0.3
	2-4	1-3	1.00-1.20	42.00-141.00	0.04-0.10	0.0-0.0	0.1-0.3
	4-8	0-5	0.90-1.20	42.00-141.00	0.04-0.10	0.0-0.0	0.5-3.0
	8-18	0-5	0.90-1.20	42.00-141.00	0.03-0.09	0.0-0.0	0.5-3.0
	18-31	0-5	0.90-1.20	42.00-141.00	0.03-0.09	0.0-0.0	0.5-3.0
	31-52	1-5	1.20-1.50	0.10-1.00	0.03-0.07	0.0-0.0	0.0-0.3
Vitrandid Xerorthents, moraine-----	0-3	1-3	1.00-1.30	14.00-42.00	0.06-0.12	0.0-0.0	0.1-0.3
	3-9	1-3	1.00-1.30	14.00-42.00	0.06-0.12	0.0-0.0	0.1-0.3
	9-16	1-3	1.00-1.30	14.00-42.00	0.05-0.11	0.0-0.0	0.0-0.2
	16-23	0-5	0.90-1.20	14.00-42.00	0.05-0.11	0.0-0.0	0.5-1.5
	23-37	1-5	1.20-1.50	0.10-1.00	0.02-0.06	0.0-0.0	0.0-0.3

Soil Survey of Lassen Volcanic National Park, California

Table 26.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensi- bility	Organic matter
	In	Pct	g/cc	um/sec	In/in	Pct	Pct
154: Typic Vitrixerands-----	0-2	1-3	1.00-1.20	42.00-141.00	0.04-0.10	0.0-0.0	0.1-0.3
	2-4	1-3	1.00-1.20	42.00-141.00	0.04-0.10	0.0-0.0	0.1-0.3
	4-8	0-5	0.90-1.20	42.00-141.00	0.04-0.10	0.0-0.0	0.5-3.0
	8-18	0-5	0.90-1.20	42.00-141.00	0.03-0.09	0.0-0.0	0.5-3.0
	18-31	0-5	0.90-1.20	42.00-141.00	0.03-0.09	0.0-0.0	0.5-3.0
	31-52	1-5	1.20-1.50	0.10-1.00	0.03-0.07	0.0-0.0	0.0-0.3
Vitrandic Xerorthents, moraine-----	0-3	1-3	1.00-1.30	14.00-42.00	0.06-0.12	0.0-0.0	0.1-0.3
	3-9	1-3	1.00-1.30	14.00-42.00	0.06-0.12	0.0-0.0	0.1-0.3
	9-16	1-3	1.00-1.30	14.00-42.00	0.05-0.11	0.0-0.0	0.0-0.2
	16-23	0-5	0.90-1.20	14.00-42.00	0.05-0.11	0.0-0.0	0.5-1.5
	23-37	1-5	1.20-1.50	0.10-1.00	0.02-0.06	0.0-0.0	0.0-0.3
155: Xeric Vitricryands, pyroclastic surge-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-3	---	---	42.00-141.00	---	---	65-85
	3-6	1-3	1.00-1.30	4.00-141.00	0.03-0.21	0.0-0.0	0.1-0.3
	6-10	2-3	0.90-1.20	42.00-141.00	0.05-0.09	0.0-0.0	0.5-4.0
	10-15	3-5	0.90-1.20	14.00-42.00	0.02-0.09	0.0-0.0	2.0-3.0
	15-27	3-5	0.90-1.20	14.00-42.00	0.02-0.09	0.0-0.0	2.0-3.0
	27-39	1-3	0.90-1.20	14.00-282.00	0.00-0.08	0.0-0.0	0.5-3.0
	39-48	1-3	0.90-1.20	14.00-282.00	0.00-0.07	0.0-0.0	0.5-3.0
	48-60	1-2	1.20-1.50	0.10-1.00	0.00-0.08	0.0-0.0	0.0-0.3
156: Xeric Vitricryands, pyroclastic surge-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-3	---	---	42.00-141.00	---	---	65-85
	3-6	1-3	1.00-1.30	4.00-141.00	0.03-0.21	0.0-0.0	0.1-0.3
	6-10	2-3	0.90-1.20	42.00-141.00	0.05-0.09	0.0-0.0	0.5-4.0
	10-15	3-5	0.90-1.20	14.00-42.00	0.02-0.09	0.0-0.0	2.0-3.0
	15-27	3-5	0.90-1.20	14.00-42.00	0.02-0.09	0.0-0.0	2.0-3.0
	27-39	1-3	0.90-1.20	14.00-282.00	0.00-0.08	0.0-0.0	0.5-3.0
	39-48	1-3	0.90-1.20	14.00-282.00	0.00-0.07	0.0-0.0	0.5-3.0
	48-60	1-2	1.20-1.50	0.10-1.00	0.00-0.08	0.0-0.0	0.0-0.3
157: Typic Vitrixerands, very deep	0-2	---	---	42.00-141.00	---	---	70-90
	2-4	---	---	42.00-141.00	---	---	65-85
	4-6	1-5	0.90-1.20	14.00-141.00	0.07-0.13	0.0-0.0	4.0-5.5
	6-10	1-5	0.90-1.20	14.00-141.00	0.07-0.13	0.0-0.0	4.0-5.5
	10-22	2-5	0.90-1.20	14.00-141.00	0.01-0.12	0.0-0.0	2.0-3.0
	22-31	2-5	0.90-1.20	14.00-141.00	0.01-0.12	0.0-0.0	2.0-3.0
	31-39	2-5	0.90-1.20	42.00-141.00	0.00-0.07	0.0-0.0	2.0-3.0
	39-60	1-3	0.90-1.20	42.00-141.00	0.00-0.07	0.0-0.0	0.5-3.0
158: Typic Vitrixerands, unglaciaded-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-3	1-4	0.95-1.20	14.00-141.00	0.08-0.17	0.0-0.0	2.0-5.5
	3-8	1-5	0.95-1.20	14.00-141.00	0.04-0.14	0.0-0.0	2.0-4.0
	8-15	1-5	0.95-1.20	14.00-141.00	0.04-0.14	0.0-0.0	2.0-4.0
	15-25	1-5	0.95-1.20	42.00-141.00	0.03-0.10	0.0-0.0	2.0-4.0
	25-39	1-4	0.95-1.20	42.00-141.00	0.00-0.07	0.0-0.0	0.0-1.5
	---	---	---	0.10-1.00	---	---	---
Rock outcrop, rhyodacite.							

Soil Survey of Lassen Volcanic National Park, California

Table 26.—Physical Properties of the Soils—Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensi- bility	Organic matter
	In	Pct	g/cc	um/sec	In/in	Pct	Pct
159:							
Typic Vitrixerands, bouldery-	0-2	---	---	42.00-141.00	---	---	70-90
	2-5	1-3	0.90-1.20	141.00-282.00	0.00-0.06	0.0-0.0	2.0-4.0
	5-11	1-4	0.90-1.20	42.00-141.00	0.00-0.08	0.0-0.0	1.0-3.0
	11-34	0-3	0.90-1.20	141.00-282.00	0.00-0.05	0.0-0.0	0.5-3.0
	34-56	0-3	0.90-1.20	141.00-282.00	0.00-0.03	0.0-0.0	0.5-3.0
	56-60	2-10	0.90-1.20	141.00-282.00	0.00-0.02	0.0-0.0	1.0-2.0
Typic Vitrixerands, tephra over colluvium-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-2	1-5	0.90-1.20	14.00-141.00	0.08-0.14	0.0-0.0	2.0-12
	2-4	1-5	0.90-1.20	14.00-141.00	0.08-0.14	0.0-0.0	2.0-12
	4-7	0-8	0.90-1.20	14.00-282.00	0.01-0.18	0.0-0.0	0.5-3.0
	7-14	0-8	0.90-1.20	14.00-282.00	0.01-0.18	0.0-0.0	0.5-3.0
	14-20	2-6	0.90-1.20	14.00-42.00	0.04-0.10	0.0-0.0	2.0-4.0
	20-28	2-6	0.90-1.20	14.00-42.00	0.04-0.10	0.0-0.0	1.0-3.0
	28-41	2-6	0.90-1.20	14.00-42.00	0.04-0.10	0.0-0.0	1.0-3.0
	41-51	1-3	0.90-1.20	14.00-141.00	0.00-0.06	0.0-0.0	0.5-1.5
	51-61	1-3	0.90-1.20	42.00-141.00	0.00-0.06	0.0-0.0	0.5-1.5
Rubble land.							
160:							
Aeric Endoaquents-----	0-2	---	---	42.00-141.00	---	---	70-90
	2-3	---	---	42.00-141.00	---	---	65-85
	3-5	0-3	1.55-1.60	14.00-282.00	0.03-0.12	0.0-0.0	0.5-3.0
	5-7	0-3	1.60-1.70	14.00-282.00	0.03-0.12	0.0-0.0	0.5-3.0
	7-13	0-3	1.70-1.80	14.00-282.00	0.02-0.09	0.0-0.0	0.5-3.0
	13-24	0-1	1.60-1.70	42.00-282.00	0.00-0.05	0.0-0.0	0.0-0.5
	24-30	0-1	1.60-1.70	42.00-282.00	0.01-0.07	0.0-0.0	0.0-0.5
	30-33	0-1	1.60-1.70	42.00-282.00	0.01-0.07	0.0-0.0	0.0-0.5
	33-38	0-1	1.70-1.80	42.00-282.00	0.00-0.07	0.0-0.0	0.0-0.5
	38-63	0-1	1.70-1.80	42.00-282.00	0.00-0.06	0.0-0.0	0.0-0.5
Humic Haploxerands, stream terrace-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-4	4-8	0.80-1.00	14.00-42.00	0.08-0.22	0.0-0.0	2.0-4.0
	4-7	4-8	0.80-1.00	14.00-42.00	0.08-0.22	0.0-0.0	2.0-4.0
	7-17	5-10	0.80-1.00	14.00-42.00	0.03-0.17	0.0-0.0	1.0-3.0
	17-28	5-12	0.80-1.00	14.00-42.00	0.00-0.10	0.0-0.0	1.0-3.0
	28-48	1-12	0.80-1.00	14.00-141.00	0.00-0.11	0.0-0.0	0.5-1.0
	48-68	1-12	1.00-1.20	14.00-141.00	0.00-0.09	0.0-0.0	0.5-1.0
	68-84	1-12	1.00-1.20	14.00-141.00	0.00-0.11	0.0-0.0	0.5-1.0
Riverwash.							
161:							
Typic Psammaquents-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-4	0-1	1.60-1.70	141.00-282.00	0.06-0.09	0.0-0.0	0.1-0.3
	4-5	0-1	1.60-1.70	42.00-141.00	0.06-0.10	0.0-0.0	0.3-0.5
	5-9	0-1	1.70-1.80	141.00-282.00	0.03-0.09	0.0-0.0	0.0-0.1
	9-17	0-1	1.60-1.70	141.00-282.00	0.02-0.08	0.0-0.0	0.0-0.1
	17-26	0-1	1.70-1.80	141.00-282.00	0.02-0.08	0.0-0.0	0.0-0.1
	26-33	0-1	1.70-1.80	141.00-282.00	0.02-0.08	0.0-0.0	0.0-0.1
	33-39	0-1	1.60-1.70	141.00-282.00	0.01-0.07	0.0-0.0	0.0-0.1
	39-48	0-1	1.60-1.70	141.00-282.00	0.01-0.07	0.0-0.0	0.0-0.1
	48-55	0-1	1.55-1.65	141.00-282.00	0.01-0.07	0.0-0.0	0.0-0.1
	55-63	0-1	1.60-1.70	141.00-282.00	0.01-0.07	0.0-0.0	0.0-0.1

Soil Survey of Lassen Volcanic National Park, California

Table 26.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensi- bility	Organic matter
	In	Pct	g/cc	um/sec	In/in	Pct	Pct
162: Humic Haploxerands, outwash--	0-2	---	---	42.00-141.00	---	---	70-90
	2-8	2-6	0.80-1.20	14.00-141.00	0.03-0.14	0.0-0.0	12-18
	8-15	2-6	0.80-1.20	14.00-141.00	0.03-0.11	0.0-0.0	12-18
	15-28	2-6	0.80-1.20	14.00-141.00	0.01-0.12	0.0-0.0	12-18
	28-41	3-5	0.80-1.20	141.00-282.00	0.01-0.07	0.0-0.0	6.5-12
	41-59	2-4	0.80-1.20	141.00-282.00	0.00-0.05	0.0-0.0	3.0-7.5
163: Vitrandic Cryofluvents-----	0-3	---	0.10-0.10	42.00-141.00	---	---	65-90
	3-8	10-15	0.50-0.90	14.00-42.00	0.10-0.14	0.0-0.0	5.0-10
	8-11	1-3	0.50-0.90	141.00-282.00	0.02-0.06	0.0-0.0	1.0-2.0
	11-13	20-45	0.20-0.50	1.40-14.00	0.10-0.17	1.0-9.0	10-30
	13-16	20-45	0.50-0.90	0.40-1.40	0.10-0.22	1.0-9.0	10-30
	16-23	10-35	0.50-0.90	1.40-14.00	0.08-0.21	0.0-6.0	3.0-10
	23-28	10-35	0.50-0.90	1.41-42.00	0.08-0.21	0.0-6.0	3.0-10
	28-36	10-35	0.50-0.90	1.40-14.00	0.08-0.21	0.0-6.0	3.0-10
	36-55	20-45	0.50-0.90	1.40-14.00	0.09-0.22	1.0-9.0	10-30
	55-61	0-2	0.90-1.20	141.00-282.00	0.01-0.02	0.0-0.0	0.0-0.5
Aquandic Cryaquepts-----	0-7	20-35	0.50-0.90	1.00-14.00	0.19-0.23	1.0-6.0	5.0-10
	7-12	20-35	0.50-0.90	1.00-14.00	0.19-0.24	1.0-6.0	5.0-10
	12-14	0-28	0.50-0.90	1.00-14.00	0.10-0.20	0.0-1.0	0.5-5.0
	14-20	0-20	0.90-1.20	4.00-141.00	0.02-0.22	0.0-1.0	0.5-5.0
	20-28	27-40	0.50-0.90	1.00-4.00	0.18-0.20	3.0-7.0	10-20
	28-34	0-20	0.90-1.20	4.00-42.00	0.02-0.22	0.0-1.0	0.5-5.0
	34-47	0-20	0.90-1.20	4.00-141.00	0.01-0.22	0.0-1.0	0.5-5.0
164: Aquepts-----	0-2	---	---	42.00-141.00	---	---	70-90
	2-6	2-4	1.30-1.60	14.00-42.00	0.06-0.14	0.0-0.0	15-30
	6-11	2-4	1.50-1.60	14.00-42.00	0.00-0.15	0.0-0.0	5.0-15
	11-16	2-6	1.50-1.60	14.00-42.00	0.00-0.05	0.0-0.0	3.0-5.0
	16-26	2-5	1.50-1.60	14.00-42.00	0.01-0.10	0.0-0.0	1.0-5.0
	26-45	2-4	1.50-1.60	14.00-42.00	0.00-0.05	0.0-0.0	1.0-3.0
Typic Petraquepts, bedrock---	0-2	---	0.10-0.10	42.00-141.00	0.55-0.65	---	70-90
	2-7	---	0.10-0.10	42.00-141.00	0.35-0.45	---	70-90
	7-13	1-3	1.55-1.65	14.00-141.00	0.00-0.04	0.0-0.0	5.0-20
	13-28	1-3	1.55-1.60	14.00-141.00	0.00-0.05	0.0-0.0	5.0-20
	28-35	1-3	1.60-1.70	42.00-141.00	0.00-0.02	0.0-0.0	1.0-3.0
	---	---	---	0.00-0.01	---	---	---
Aquic Haploxerands-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-2	5-6	0.80-1.00	14.00-42.00	0.07-0.16	0.0-0.0	5.0-14
	2-4	5-6	0.80-1.00	14.00-42.00	0.07-0.16	0.0-0.0	5.0-14
	4-9	5-6	0.80-1.00	14.00-42.00	0.07-0.16	0.0-0.0	5.0-14
	9-16	7-9	0.80-1.00	14.00-42.00	0.07-0.14	0.0-0.0	4.3-8.5
	16-24	7-9	0.80-1.00	14.00-42.00	0.07-0.14	0.0-0.0	4.3-8.5
	24-39	5-6	0.90-1.20	14.00-42.00	0.04-0.08	0.0-0.0	0.1-1.2
	39-60	6-7	1.20-1.50	0.10-1.00	0.03-0.06	0.0-0.0	0.0-0.9
Typic Petraquepts-----	0-2	10-12	1.00-1.55	4.00-14.00	0.22-0.24	0.0-0.0	11-30
	2-7	10-12	1.00-1.55	4.00-14.00	0.22-0.24	0.0-0.0	11-30
	7-12	15-17	1.45-1.55	4.00-14.00	0.15-0.19	0.0-0.0	3.0-5.0
	12-19	15-24	1.45-1.55	4.00-14.00	0.12-0.18	0.0-2.0	1.0-5.0
	19-25	20-24	1.45-1.55	4.00-14.00	0.12-0.18	1.0-2.0	1.0-5.0
	25-33	16-20	---	0.10-1.00	---	---	1.0-3.0

Soil Survey of Lassen Volcanic National Park, California

Table 26.—Physical Properties of the Soils—Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensi- bility	Organic matter
	In	Pct	g/cc	um/sec	In/in	Pct	Pct
165:							
Aquandic Humaquepts-----	0-4	5-10	0.02-0.02	42.00-141.00	---	---	30-50
	4-11	5-10	1.45-1.55	4.00-14.00	0.10-0.16	0.0-0.0	5.0-10
	11-22	10-15	1.45-1.55	4.00-14.00	0.09-0.15	0.0-0.0	5.0-10
	22-28	10-15	1.50-1.60	14.00-42.00	0.02-0.06	0.0-0.0	3.0-5.0
	28-38	10-15	1.50-1.60	14.00-43.00	0.02-0.06	0.0-0.0	3.0-5.0
	38-52	10-20	1.50-1.60	14.00-42.00	0.06-0.10	0.0-1.0	1.0-3.0
Histic Humaquepts-----	0-2	---	0.10-0.10	42.00-141.00	0.55-0.65	---	20-45
	2-6	20-35	0.02-0.02	42.00-141.00	0.45-0.55	---	20-40
	6-9	20-35	0.20-0.20	42.00-141.00	0.35-0.45	---	20-30
	9-12	20-27	1.45-1.55	4.00-14.00	0.19-0.22	1.0-3.0	5.0-10
	12-21	20-27	1.45-1.55	4.00-14.00	0.16-0.19	1.0-3.0	3.0-5.0
	21-30	20-27	1.45-1.55	4.00-14.00	0.15-0.19	1.0-3.0	1.0-2.0
	30-51	10-25	1.45-1.55	4.00-14.00	0.01-0.09	0.0-3.0	1.0-3.0
	51-62	10-25	1.55-1.60	4.00-42.00	0.01-0.09	0.0-3.0	1.0-3.0
Aquandic Endoaquepts-----	0-4	4-8	1.50-1.60	4.00-14.00	0.16-0.21	0.0-0.0	2.0-8.0
	4-12	4-8	1.45-1.55	4.00-14.00	0.16-0.21	0.0-0.0	2.0-8.0
	12-22	5-12	1.45-1.55	4.00-14.00	0.10-0.16	0.0-0.0	1.0-2.0
	22-35	5-12	1.45-1.55	4.00-14.00	0.10-0.16	0.0-0.0	1.0-2.0
	35-41	5-15	1.45-1.55	4.00-42.00	0.05-0.18	0.0-0.0	1.0-3.0
	41-49	5-15	1.55-1.65	4.00-141.00	0.05-0.18	0.0-0.0	1.0-3.0
	49-59	0-3	1.60-1.70	42.00-141.00	0.01-0.05	0.0-0.0	0.5-2.0
Terric Haplohemists-----	0-5	---	0.02-0.02	42.00-141.00	---	---	60-80
	5-20	---	0.02-0.02	42.00-141.00	---	---	50-70
	20-30	22-27	1.45-1.55	1.40-4.00	0.18-0.20	2.0-3.0	5.0-10
	30-35	22-27	1.45-1.55	1.40-4.00	0.18-0.20	2.0-3.0	5.0-10
	35-43	10-20	1.45-1.55	4.00-14.00	0.20-0.22	0.0-1.0	3.0-5.0
166:							
Aquic Haploxerands-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-2	5-6	0.80-1.00	14.00-42.00	0.07-0.16	0.0-0.0	5.0-14
	2-4	5-6	0.80-1.00	14.00-42.00	0.07-0.16	0.0-0.0	5.0-14
	4-9	5-6	0.80-1.00	14.00-42.00	0.07-0.16	0.0-0.0	5.0-14
	9-16	7-9	0.80-1.00	14.00-42.00	0.07-0.14	0.0-0.0	4.3-8.5
	16-24	7-9	0.80-1.00	14.00-42.00	0.07-0.14	0.0-0.0	4.3-8.5
	24-39	5-6	0.90-1.20	14.00-42.00	0.04-0.08	0.0-0.0	0.1-1.2
	39-60	6-7	1.20-1.50	0.10-1.00	0.03-0.06	0.0-0.0	0.0-0.9
Humic Haploxerands, outwash terrace-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-2	---	---	42.00-141.00	---	---	65-85
	2-5	2-6	0.80-1.20	42.00-141.00	0.06-0.14	0.0-0.0	12-18
	5-8	2-6	0.80-1.20	42.00-141.00	0.04-0.14	0.0-0.0	12-18
	8-15	2-6	0.80-1.20	42.00-141.00	0.04-0.14	0.0-0.0	12-18
	15-24	2-6	0.80-1.20	42.00-141.00	0.02-0.12	0.0-0.0	9.7-14
	24-31	3-8	0.80-1.20	42.00-141.00	0.01-0.05	0.0-0.0	4.5-7.5
	31-39	2-8	1.00-1.60	0.00-0.07	0.00-0.03	0.0-0.0	1.0-2.5
167:							
Emeraldlake-----	0-1	1-4	0.80-1.20	14.00-141.00	0.04-0.13	0.0-0.0	4.5-8.0
	1-5	1-4	0.80-1.20	42.00-141.00	0.02-0.06	0.0-0.0	4.0-7.0
	5-14	1-4	0.80-1.20	42.00-141.00	0.02-0.06	0.0-0.0	4.0-7.0
	14-25	2-4	0.80-1.20	42.00-141.00	0.01-0.09	0.0-0.0	3.0-5.0
	25-35	2-4	0.80-1.20	42.00-141.00	0.01-0.09	0.0-0.0	3.0-5.0
	35-51	1-4	0.80-1.20	42.00-282.00	0.00-0.03	0.0-0.0	1.5-4.0
	51-60	1-4	0.80-1.20	42.00-282.00	0.00-0.03	0.0-0.0	1.5-4.0

Soil Survey of Lassen Volcanic National Park, California

Table 26.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensi- bility	Organic matter
	In	Pct	g/cc	um/sec	In/in	Pct	Pct
167:							
Readingpeak-----	0-2	2-4	0.90-1.20	14.00-42.00	0.03-0.09	0.0-0.0	4.0-5.5
	2-7	2-4	0.90-1.20	14.00-42.00	0.03-0.09	0.0-0.0	4.0-5.5
	7-14	2-4	0.90-1.20	42.00-141.00	0.00-0.04	0.0-0.0	3.0-5.0
	14-26	2-4	0.90-1.20	42.00-141.00	0.00-0.04	0.0-0.0	3.0-5.0
	26-35	2-3	0.90-1.20	14.00-141.00	0.00-0.05	0.0-0.0	2.0-4.0
	35-50	2-3	0.90-1.20	42.00-141.00	0.00-0.05	0.0-0.0	2.0-4.0
	---	---	---	0.00-0.01	---	---	---
Terracelake-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-3	2-6	0.80-1.20	14.00-141.00	0.04-0.14	0.0-0.0	5.5-10
	3-7	3-5	0.80-1.20	14.00-42.00	0.05-0.13	0.0-0.0	3.0-5.0
	7-19	2-10	0.80-1.20	14.00-42.00	0.00-0.16	0.0-0.0	2.0-4.0
	19-24	2-10	0.80-1.20	14.00-42.00	0.00-0.16	0.0-0.0	2.0-4.0
	24-37	2-9	0.80-1.20	14.00-141.00	0.00-0.14	0.0-0.0	0.5-1.5
	---	---	---	0.00-0.01	---	---	---
Rock outcrop, dacite.							
168:							
Vitrikerands, low elevation--	0-1	---	---	42.00-141.00	---	---	70-90
	1-4	1-3	1.00-1.20	14.00-141.00	0.06-0.13	0.0-0.0	4.0-6.0
	4-8	1-3	1.00-1.20	14.00-141.00	0.06-0.13	0.0-0.0	4.0-6.0
	8-12	1-3	1.00-1.20	14.00-141.00	0.06-0.13	0.0-0.0	4.0-6.0
	12-21	1-5	0.90-1.00	14.00-141.00	0.05-0.11	0.0-0.0	5.0-6.0
	21-37	1-3	0.90-1.00	14.00-141.00	0.01-0.08	0.0-0.0	2.5-3.5
	37-46	1-3	---	0.10-1.00	---	---	0.5-1.5
169:							
Sueredo-----	0-2	---	---	42.00-141.00	---	---	70-90
	2-5	---	---	42.00-141.00	---	---	65-85
	5-9	1-6	1.00-1.20	42.00-141.00	0.04-0.14	0.0-0.0	2.0-4.0
	9-13	1-6	1.00-1.20	42.00-141.00	0.04-0.14	0.0-0.0	2.0-4.0
	13-16	0-7	1.00-1.20	42.00-282.00	0.00-0.19	0.0-0.0	0.5-3.0
	16-18	0-7	1.00-1.20	42.00-282.00	0.00-0.19	0.0-0.0	0.5-3.0
	18-26	1-9	0.90-1.20	42.00-141.00	0.00-0.15	0.0-0.0	3.0-4.0
	26-50	0-8	0.90-1.20	42.00-282.00	0.00-0.08	0.0-0.0	2.0-3.0
	50-76	0-3	0.90-1.20	42.00-282.00	0.00-0.09	0.0-0.0	0.5-1.5
	76-83	1-3	1.00-1.50	0.10-1.00	0.00-0.07	0.0-0.0	0.0-0.3
Rock outcrop, cliffs.							
Scoured-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-4	1-3	0.70-1.00	42.00-141.00	0.00-0.12	0.0-0.0	14-18
	4-10	1-5	0.80-1.00	14.00-42.00	0.00-0.10	0.0-0.0	12-16
	10-17	1-8	0.80-1.00	4.00-42.00	0.00-0.18	0.0-0.0	12-16
	17-30	1-3	0.80-1.00	14.00-42.00	0.00-0.02	0.0-0.0	1.0-4.0
	30-39	---	---	0.00-0.01	---	---	---
170:							
Rock outcrop, rhyodacite.							
Emeraldlake-----	0-1	1-4	0.80-1.20	14.00-141.00	0.04-0.13	0.0-0.0	4.5-8.0
	1-5	1-4	0.80-1.20	42.00-141.00	0.02-0.06	0.0-0.0	4.0-7.0
	5-14	1-4	0.80-1.20	42.00-141.00	0.02-0.06	0.0-0.0	4.0-7.0
	14-25	2-4	0.80-1.20	42.00-141.00	0.01-0.09	0.0-0.0	3.0-5.0
	25-35	2-4	0.80-1.20	42.00-141.00	0.01-0.09	0.0-0.0	3.0-5.0
	35-51	1-4	0.80-1.20	42.00-282.00	0.00-0.03	0.0-0.0	1.5-4.0
	51-60	1-4	0.80-1.20	42.00-282.00	0.00-0.03	0.0-0.0	1.5-4.0

Soil Survey of Lassen Volcanic National Park, California

Table 26.—Physical Properties of the Soils—Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensi- bility	Organic matter
	In	Pct	g/cc	um/sec	In/in	Pct	Pct
170: Rubble land.							
Readingpeak-----	0-2	2-4	0.90-1.20	14.00-42.00	0.03-0.09	0.0-0.0	4.0-5.5
	2-7	2-4	0.90-1.20	14.00-42.00	0.03-0.09	0.0-0.0	4.0-5.5
	7-14	2-4	0.90-1.20	42.00-141.00	0.00-0.04	0.0-0.0	3.0-5.0
	14-26	2-4	0.90-1.20	42.00-141.00	0.00-0.04	0.0-0.0	3.0-5.0
	26-35	2-3	0.90-1.20	14.00-141.00	0.00-0.05	0.0-0.0	2.0-4.0
	35-50	2-3	0.90-1.20	42.00-141.00	0.00-0.05	0.0-0.0	2.0-4.0
	---	---	---	0.00-0.01	---	---	---
171: Aquepts-----	0-2	---	---	42.00-141.00	---	---	70-90
	2-6	2-4	1.30-1.60	14.00-42.00	0.06-0.14	0.0-0.0	15-30
	6-11	2-4	1.50-1.60	14.00-42.00	0.00-0.15	0.0-0.0	5.0-15
	11-16	2-6	1.50-1.60	14.00-42.00	0.00-0.05	0.0-0.0	3.0-5.0
	16-26	2-5	1.50-1.60	14.00-42.00	0.01-0.10	0.0-0.0	1.0-5.0
	26-45	2-4	1.50-1.60	14.00-42.00	0.00-0.05	0.0-0.0	1.0-3.0
Typic Petraquepts, bedrock---	0-2	---	0.10-0.10	42.00-141.00	0.55-0.65	---	70-90
	2-7	---	0.10-0.10	42.00-141.00	0.35-0.45	---	70-90
	7-13	1-3	1.55-1.65	14.00-141.00	0.00-0.04	0.0-0.0	5.0-20
	13-28	1-3	1.55-1.60	14.00-141.00	0.00-0.05	0.0-0.0	5.0-20
	28-35	1-3	1.60-1.70	42.00-141.00	0.00-0.02	0.0-0.0	1.0-3.0
	---	---	---	0.00-0.01	---	---	---
172: Badgerflat-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-4	1-5	0.80-1.20	14.00-42.00	0.06-0.11	0.0-0.0	4.0-6.5
	4-7	1-5	0.80-1.20	14.00-42.00	0.06-0.11	0.0-0.0	4.0-6.5
	7-11	1-4	0.80-1.20	42.00-141.00	0.02-0.06	0.0-0.0	3.0-5.5
	11-23	1-4	0.80-1.20	42.00-141.00	0.02-0.06	0.0-0.0	3.0-5.5
	23-33	1-3	0.80-1.20	42.00-141.00	0.02-0.04	0.0-0.0	0.5-4.0
	33-43	0-3	1.20-1.40	0.10-1.00	0.02-0.05	0.0-0.0	0.0-0.7
173: Badgerwash-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-4	1-3	0.80-1.20	14.00-141.00	0.02-0.12	0.0-0.0	4.0-6.5
	4-9	1-3	0.80-1.20	14.00-141.00	0.02-0.12	0.0-0.0	4.0-6.5
	9-13	1-2	0.80-1.20	141.00-282.00	0.01-0.03	0.0-0.0	3.8-6.0
	13-20	2-3	0.80-1.20	14.00-42.00	0.01-0.08	0.0-0.0	3.8-6.0
	20-35	3-4	0.80-1.20	14.00-42.00	0.01-0.11	0.0-0.0	4.3-8.5
	35-45	2-3	---	0.10-1.00	---	0.0-0.0	0.0-1.2
174: Vitrandic Cryorthents-----	0-4	0-1	1.10-1.20	42.00-141.00	0.04-0.08	0.0-0.0	0.1-0.3
	4-9	0-1	1.10-1.20	42.00-141.00	0.04-0.07	0.0-0.0	0.0-0.2
	9-17	0-1	1.10-1.20	42.00-282.00	0.01-0.08	0.0-0.0	0.0-0.2
	17-19	0-1	1.10-1.20	42.00-282.00	0.01-0.08	0.0-0.0	0.0-0.2
	19-27	0-1	1.10-1.20	42.00-282.00	0.01-0.08	0.0-0.0	0.0-0.2
	27-30	0-1	1.10-1.20	42.00-282.00	0.01-0.08	0.0-0.0	0.0-0.2
	30-35	0-1	1.10-1.20	141.00-282.00	0.00-0.04	0.0-0.0	0.0-0.2
	35-38	0-1	1.10-1.20	141.00-282.00	0.00-0.03	0.0-0.0	0.0-0.2
	38-60	0-1	1.10-1.20	141.00-282.00	0.00-0.03	0.0-0.0	0.0-0.2

Soil Survey of Lassen Volcanic National Park, California

Table 26.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensi- bility	Organic matter
	In	Pct	g/cc	um/sec	In/in	Pct	Pct
174: Readingpeak-----	0-2	2-4	0.90-1.20	14.00-42.00	0.03-0.09	0.0-0.0	4.0-5.5
	2-7	2-4	0.90-1.20	14.00-42.00	0.03-0.09	0.0-0.0	4.0-5.5
	7-14	2-4	0.90-1.20	42.00-141.00	0.00-0.04	0.0-0.0	3.0-5.0
	14-26	2-4	0.90-1.20	42.00-141.00	0.00-0.04	0.0-0.0	3.0-5.0
	26-35	2-3	0.90-1.20	14.00-141.00	0.00-0.05	0.0-0.0	2.0-4.0
	35-50	2-3	0.90-1.20	42.00-141.00	0.00-0.05	0.0-0.0	2.0-4.0
	---	---	---	0.00-0.01	---	---	---
Rock outcrop.							
175: Shadowlake-----	0-1	---	---	42.00-141.00	---	---	70-90
	1-2	1-6	0.90-1.20	14.00-42.00	0.09-0.12	0.0-0.0	4.0-12
	2-6	3-8	0.80-1.20	14.00-42.00	0.01-0.13	0.0-0.0	3.5-8.6
	6-13	3-8	0.80-1.20	14.00-42.00	0.01-0.13	0.0-0.0	3.5-8.6
	13-23	3-8	0.80-1.20	14.00-42.00	0.01-0.12	0.0-0.0	3.5-8.6
	23-41	1-5	0.80-1.20	14.00-141.00	0.00-0.05	0.0-0.0	0.5-1.5
	41-51	1-12	1.20-1.50	0.10-1.00	0.01-0.17	0.0-0.0	0.0-0.3
Vitrandic Cryofluvents-----	0-3	---	0.10-0.10	42.00-141.00	---	---	65-90
	3-8	10-15	0.50-0.90	14.00-42.00	0.10-0.14	0.0-0.0	5.0-10
	8-11	1-3	0.50-0.90	141.00-282.00	0.02-0.06	0.0-0.0	1.0-2.0
	11-13	20-45	0.20-0.50	1.40-14.00	0.10-0.17	1.0-9.0	10-30
	13-16	20-45	0.50-0.90	0.40-1.40	0.10-0.22	1.0-9.0	10-30
	16-23	10-35	0.50-0.90	1.40-14.00	0.08-0.21	0.0-6.0	3.0-10
	23-28	10-35	0.50-0.90	1.41-42.00	0.08-0.21	0.0-6.0	3.0-10
	28-36	10-35	0.50-0.90	1.40-14.00	0.08-0.21	0.0-6.0	3.0-10
	36-55	20-45	0.50-0.90	1.40-14.00	0.09-0.22	1.0-9.0	10-30
	55-61	0-2	0.90-1.20	141.00-282.00	0.01-0.02	0.0-0.0	0.0-0.5
176: Juniperlake, bouldery-----	0-1	---	---	42.00-141.00	---	---	50-90
	1-4	2-6	0.65-0.90	14.00-141.00	0.02-0.16	0.0-0.0	12-18
	4-10	2-6	0.65-0.90	14.00-141.00	0.02-0.16	0.0-0.0	12-18
	10-21	2-4	0.65-0.90	14.00-42.00	0.03-0.11	0.0-0.0	9.7-14
	21-30	2-5	0.70-0.90	14.00-42.00	0.00-0.11	0.0-0.0	4.5-10
	30-47	2-5	0.70-0.90	14.00-42.00	0.00-0.10	0.0-0.0	4.5-7.5
	47-56	3-6	1.20-1.50	0.10-1.00	0.00-0.07	0.0-0.0	1.0-2.5
177: Vitrandic Cryorthents, debris flows, high elevation-----	0-4	0-1	1.00-1.30	42.00-141.00	0.01-0.08	0.0-0.0	0.0-0.3
	4-13	0-1	1.00-1.30	42.00-282.00	0.00-0.10	0.0-0.0	0.0-0.2
	13-60	0-1	1.00-1.30	42.00-282.00	0.00-0.09	0.0-0.0	0.0-0.2
200. Cinder land							
201. Lava flows							
202: Typic Xerorthents, tephra----	0-5	0-1	0.80-1.20	42.00-282.00	0.00-0.10	0.0-0.0	0.0-0.8
	5-8	0-1	0.80-1.20	42.00-282.00	0.01-0.12	0.0-0.0	0.0-0.8
	8-12	0-1	0.80-1.20	42.00-282.00	0.01-0.12	0.0-0.0	0.0-0.8
	12-14	0-1	0.80-1.20	42.00-282.00	0.01-0.11	0.0-0.0	0.0-0.8
	14-25	0-1	0.80-1.20	42.00-282.00	0.01-0.08	0.0-0.0	0.0-0.8
	25-35	0-1	0.80-1.20	42.00-282.00	0.01-0.08	0.0-0.0	0.0-0.8
	35-49	0-1	0.80-1.20	42.00-282.00	0.00-0.11	0.0-0.0	0.0-0.8
	49-60	0-1	0.80-1.20	42.00-282.00	0.01-0.10	0.0-0.0	0.0-0.8

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Table 26.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensi- bility	Organic matter
	In	Pct	g/cc	um/sec	In/in	Pct	Pct
202: Typic Xerorthents, welded----	0-1	0-1	1.60-1.80	141.00-282.00	0.00-0.03	0.0-0.0	0.0-0.1
	1-3	0-1	1.60-1.80	141.00-282.00	0.00-0.03	0.0-0.0	0.0-0.1
	3-7	0-1	1.60-1.80	141.00-282.00	0.00-0.03	0.0-0.0	0.0-0.1
	7-9	0-1	1.50-1.80	141.00-282.00	0.00-0.03	0.0-0.0	0.0-0.1
	9-12	0-1	1.60-1.80	141.00-282.00	0.00-0.03	0.0-0.0	0.0-0.1
	12-15	0-1	1.50-1.80	42.00-141.00	0.00-0.03	0.0-0.0	0.0-0.1
	15-25	0-1	1.60-1.80	141.00-282.00	0.00-0.03	0.0-0.0	0.0-0.1
	25-26	0-1	1.60-1.80	141.00-282.00	0.00-0.03	0.0-0.0	0.0-0.1
	26-34	0-1	1.60-1.80	141.00-282.00	0.00-0.03	0.0-0.0	0.0-0.1
	34-37	0-1	1.60-1.80	141.00-282.00	0.00-0.03	0.0-0.0	0.0-0.1
	37-39	0-1	1.60-1.80	141.00-282.00	0.00-0.03	0.0-0.0	0.0-0.1
	39-43	0-1	1.60-1.80	141.00-282.00	0.00-0.03	0.0-0.0	0.0-0.1
	43-59	0-1	1.60-1.80	141.00-282.00	0.00-0.03	0.0-0.5	0.0-0.1
203: Typic Xerorthents, tephra----	0-5	0-1	0.80-1.20	42.00-282.00	0.00-0.10	0.0-0.0	0.0-0.8
	5-8	0-1	0.80-1.20	42.00-282.00	0.01-0.12	0.0-0.0	0.0-0.8
	8-12	0-1	0.80-1.20	42.00-282.00	0.01-0.12	0.0-0.0	0.0-0.8
	12-14	0-1	0.80-1.20	42.00-282.00	0.01-0.11	0.0-0.0	0.0-0.8
	14-25	0-1	0.80-1.20	42.00-282.00	0.01-0.08	0.0-0.0	0.0-0.8
	25-35	0-1	0.80-1.20	42.00-282.00	0.01-0.08	0.0-0.0	0.0-0.8
	35-49	0-1	0.80-1.20	42.00-282.00	0.00-0.11	0.0-0.0	0.0-0.8
	49-60	0-1	0.80-1.20	42.00-282.00	0.01-0.10	0.0-0.0	0.0-0.8
205. Beaches							
W. Water							

Soil Survey of Lassen Volcanic National Park, California

Table 27.—Erosion Properties of the Soils

(Entries under "Erosion factors" apply to the entire profile. Entries under "Wind erodibility group" and "Wind erodibility index" apply only to the surface layer)

Map symbol and soil name	Depth (inches)	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
		Kw	Kf	T		
100: Buttelake-----	0-0	---	---	3	1	220
	0-3	.10	.10			
	3-11	.10	.10			
	11-13	.05	.10			
	13-19	.10	.20			
	19-31	.10	.28			
	31-40	.10	.37			
	40-53	.05	.43			
	53-63	.02	.55			
101: Buttewash-----	0-1	---	---	4	1	180
	1-2	.10	.10			
	2-7	.10	.10			
	7-12	.05	.05			
	12-20	.15	.20			
	20-27	.32	.32			
	27-45	.20	.37			
	45-57	.02	.32			
	57-66	.02	.24			
	66-74	.02	.24			
102: Ashbutte-----	0-2	---	---	2	2	134
	2-6	.02	.10			
	6-11	.05	.10			
	11-15	.10	.15			
	15-24	.05	.15			
	24-36	.05	.28			
	36-60	.02	.10			
Vitrandic Xerorthents-----	0-1	---	---	2	2	134
	1-5	.05	.17			
	5-10	.02	.20			
	10-26	.02	.24			
	26-34	.02	.10			
	34-46	.02	.10			
	46-61	.02	.10			
103: Scoured-----	0-1	---	---	1	7	38
	1-4	.05	.24			
	4-10	.05	.28			
	10-17	.10	.37			
	17-30	.02	.32			
	30-39	---	---			
104: Scoured-----	0-1	---	---	1	7	38
	1-4	.05	.24			
	4-10	.05	.28			
	10-17	.10	.37			
	17-30	.02	.32			
	30-39	---	---			

Soil Survey of Lassen Volcanic National Park, California

Table 27.—Erosion Properties of the Soils—Continued

Map symbol and soil name	Depth (inches)	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
		Kw	Kf	T		
104: Juniperlake-----	0-1	---	---	4	7	38
	1-4	.15	.24			
	4-10	.10	.24			
	10-21	.10	.28			
	21-30	.10	.28			
	30-47	.10	.37			
	47-56	.05	.37			
Rock outcrop.						
105: Juniperlake-----	0-1	---	---	4	7	38
	1-4	.15	.24			
	4-10	.10	.24			
	10-21	.10	.28			
	21-30	.10	.28			
	30-47	.10	.37			
	47-56	.05	.37			
106: Cenplat-----	0-0	---	---	2	2	134
	0-2	.20	.20			
	2-5	.10	.10			
	5-8	.02	.10			
	8-17	.02	.24			
	17-24	.05	.43			
	24-31	.10	.43			
	---	---	---			
107: Badgerflat-----	0-1	---	---	3	6	48
	1-4	.10	.24			
	4-7	.10	.24			
	7-11	.05	.17			
	11-23	.02	.20			
	23-33	.05	.32			
	33-43	.05	.32			
Cenplat-----	0-2	.10	.20	2	3	86
	2-6	.10	.20			
	6-12	.10	.20			
	12-21	.05	.28			
	21-39	.05	.32			
	---	---	---			
108: Typic Xerorthents-----	0-1	---	---	5	2	134
	1-4	.02	.05			
	4-33	.02	.05			
	33-46	.02	.10			
	46-50	.05	.10			
	50-55	.05	.10			
	55-59	.10	.32			

Soil Survey of Lassen Volcanic National Park, California

Table 27.—Erosion Properties of the Soils—Continued

Map symbol and soil name	Depth (inches)	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
		Kw	Kf	T		
109: Prospectpeak-----	0-1	---	---	3	1	180
	1-3	.10	.10			
	3-7	.05	.10			
	7-9	.02	.10			
	9-14	.02	.15			
	14-22	.02	.24			
	22-50	.02	.24			
	---	---	---			
110: Bearrubble-----	0-3	---	---	5	2	134
	3-6	.10	.10			
	6-13	.02	.15			
	13-19	.05	.28			
	19-35	.05	.32			
	35-49	.15	.37			
	49-60	.15	.37			
Rubble land.						
111: Vitrandic Xerorthents, debris fan-----	0-4	.05	.24	5	7	38
	4-14	.02	.20			
	14-31	.05	.20			
	31-42	.05	.20			
	42-60	.02	.17			
112: Cascadesprings-----	0-0	---	---	3	2	134
	0-2	.10	.17			
	2-9	.10	.17			
	9-17	.10	.32			
	17-27	.05	.28			
	27-33	.15	.49			
113: Terracelake-----	0-1	---	---	2	5	56
	1-3	.15	.24			
	3-7	.10	.24			
	7-19	.10	.32			
	19-24	.10	.43			
	24-37	.02	.43			
	---	---	---			
Emeraldlake-----	0-1	.05	.32	5	7	38
	1-5	.05	.20			
	5-14	.02	.15			
	14-25	.02	.15			
	25-35	.02	.15			
	35-51	.02	.15			
	51-60	.02	.20			
Readingpeak-----	0-2	.10	.24	3	6	48
	2-7	.05	.24			
	7-14	.02	.20			
	14-26	.02	.20			
	26-35	.05	.24			
	35-50	.02	.37			
	---	---	---			
Rock outcrop.						

Soil Survey of Lassen Volcanic National Park, California

Table 27.—Erosion Properties of the Soils—Continued

Map symbol and soil name	Depth (inches)	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
		Kw	Kf	T		
114:						
Emeraldlake-----	0-1	.05	.32	5	7	38
	1-5	.05	.20			
	5-14	.02	.15			
	14-25	.02	.15			
	25-35	.02	.15			
	35-51	.02	.15			
	51-60	.02	.20			
Terracelake-----	0-1	---	---	2	5	56
	1-3	.15	.24			
	3-7	.10	.24			
	7-19	.10	.32			
	19-24	.10	.43			
	24-37	.02	.43			
	---	---	---			
Readingpeak-----	0-2	.10	.24	3	6	48
	2-7	.05	.24			
	7-14	.02	.20			
	14-26	.02	.20			
	26-35	.05	.24			
	35-50	.02	.37			
	---	---	---			
Rock outcrop.						
Rubble land.						
115:						
Shadowlake-----	0-1	---	---	4	5	56
	1-2	.10	.24			
	2-6	.15	.24			
	6-13	.10	.24			
	13-23	.10	.24			
	23-41	.10	.37			
	41-51	.64	.64			
116:						
Xeric Vitricryands, tephra over till---	0-0	---	---	4	2	134
	0-2	---	---			
	2-3	.10	.20			
	3-4	.05	.10			
	4-5	.05	.10			
	5-8	.02	.10			
	8-10	.10	.17			
	10-16	.05	.15			
	16-19	.05	.15			
	19-39	.10	.24			
	39-60	.02	.10			
Terracelake-----	0-1	---	---			
	1-3	.15	.24			
	3-7	.10	.24			
	7-19	.10	.32			
	19-24	.10	.43			
	24-37	.02	.43			
	---	---	---			
Rock outcrop.						

Soil Survey of Lassen Volcanic National Park, California

Table 27.—Erosion Properties of the Soils—Continued

Map symbol and soil name	Depth (inches)	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
		Kw	Kf	T		
116: Xeric Vitricryands, cirque floor-----	0-2	.17	.37	2	3	86
	2-5	.10	.28			
	5-13	.15	.28			
	13-26	.15	.28			
	26-36	.17	.32			
	36-46	.17	.32			
117: Humic Haploxerands, moist lake terrace-	0-0	---	---	3	1	180
	0-2	.10	.10			
	2-5	.10	.10			
	5-7	.05	.10			
	7-19	.10	.20			
	19-30	.10	.32			
	30-35	---	---			
118: Typic Dystroxerepts, landslides-----	0-2	---	---	5	3	86
	2-5	.20	.20			
	5-15	.10	.24			
	15-23	.05	.24			
	23-41	.05	.20			
	41-60	.10	.20			
119: Diamondpeak-----	0-1	---	---	3	6	48
	1-3	.28	.28			
	3-10	.24	.24			
	10-31	.24	.24			
	31-49	.32	.32			
	49-60	.43	.43			
Brokeoff-----	0-2	.17	.32			
	2-4	.15	.32			
	4-7	.10	.28			
	7-15	.05	.32			
	15-37	---	---			
	---	---	---			
Endoaquepts-----	0-2	---	---	5	5	56
	2-4	.20	.28			
	4-6	.15	.24			
	6-9	.10	.24			
	9-18	.32	.32			
	18-30	.24	.37			
	30-41	.17	.37			
	41-50	.10	.28			
	50-62	.20	.28			
Aquic Dystroxerepts, debris flows-----	0-1	---	---	5	6	48
	1-2	---	---			
	2-5	.28	.28			
	5-9	.28	.28			
	9-24	.10	.32			
	24-30	.05	.24			
	30-48	.05	.37			
	48-60	.10	.32			

Soil Survey of Lassen Volcanic National Park, California

Table 27.—Erosion Properties of the Soils—Continued

Map symbol and soil name	Depth (inches)	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
		Kw	Kf	T		
119: Typic Dystroxerepts-----	0-1	.15	.24	2	5	56
	1-4	.15	.43			
	4-11	.37	.37			
	11-16	.43	.43			
	16-20	.37	.37			
	---	---	---			
120: Buttelake-----	0-0	---	---	4	1	220
	0-3	.10	.10			
	3-11	.10	.10			
	11-13	.05	.10			
	13-19	.10	.20			
	19-31	.10	.28			
	31-40	.10	.37			
	40-53	.05	.43			
	53-63	.02	.55			
Sunhoff-----	0-1	---	---	4	2	134
	1-6	.20	.20			
	6-9	.05	.15			
	11-29	.05	.28			
	29-39	.10	.43			
Talved-----	0-1	---	---	5	6	48
	1-5	.02	.20			
	5-13	.02	.10			
	13-26	.02	.28			
	26-39	.02	.28			
	39-60	.02	.28			
122: Xeric Vitricryands, colluvium-----	0-3	.10	.32	3	6	48
	3-7	.10	.32			
	7-11	.15	.32			
	11-24	.15	.37			
	24-33	.05	.32			
	33-39	.05	.24			
	39-42	.05	.20			
	42-60	.02	.20			
Xeric Vitricryands, ash over cinders---	0-1	---	---	5	3	86
	1-2	.24	.24			
	2-6	.17	.28			
	6-16	.05	.24			
	16-24	.10	.32			
	24-30	.05	.24			
	30-45	.02	.05			
	45-60	.02	.05			
Xeric Vitricryands, bedrock-----	0-1	---	---	1	2	134
	1-4	.15	.24			
	4-9	.17	.37			
	9-16	.05	.32			
	16-21	.15	.43			
	---	---	---			

Soil Survey of Lassen Volcanic National Park, California

Table 27.—Erosion Properties of the Soils—Continued

Map symbol and soil name	Depth (inches)	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
		Kw	Kf	T		
125: Humic Haploxerands, stream terrace-----	0-1	---	---	2	7	38
	1-4	.15	.24			
	4-7	.15	.28			
	7-17	.10	.20			
	17-28	.02	.20			
	28-48	.02	.20			
	48-68	.02	.15			
	68-84	.02	.15			
Aquandic Humaquepts, flood plains-----	0-1	---	---	5	6	48
	1-4	.20	.28			
	4-7	.20	.32			
	7-16	.15	.28			
	16-25	.10	.28			
	25-31	.15	.32			
	31-47	.15	.32			
	47-60	.05	.24			
126: Kingsiron-----	0-1	---	---	5	8	0
	1-3	.05	.28			
	3-9	.02	.28			
	9-28	.02	.24			
	28-41	.02	.24			
	41-63	.02	.28			
Dittmar-----	0-1	---	---	1	6	48
	1-2	.10	.37			
	2-5	.10	.37			
	5-7	.17	.37			
	7-15	.05	.37			
	15-19	.05	.37			
	---	---	---			
Rock outcrop.						
127: Humic Haploxerands, strath terrace-----	0-1	---	---	2	5	56
	1-4	.05	.15			
	4-9	.10	.17			
	9-16	.15	.28			
	16-20	.15	.28			
	20-28	.02	.28			
	---	---	---			
Aquepts-----	0-2	---	---	4	6	48
	2-6	.10	.24			
	6-11	.05	.24			
	11-16	.02	.24			
	16-26	.05	.28			
	26-45	.05	.32			

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Table 27.—Erosion Properties of the Soils—Continued

Map symbol and soil name	Depth (inches)	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
		Kw	Kf	T		
129: Humic Haploxerands, colluvium-----	0-2	---	---	3	7	38
	2-2	---	---			
	2-4	.10	.24			
	4-8	.10	.24			
	8-15	.10	.24			
	15-22	.05	.20			
	22-34	.05	.20			
	34-50	.05	.24			
	50-61	.05	.20			
130: Histic Humaquepts, lake sediments-----	0-6	---	---	1	1	180
	6-10	---	---			
	10-14	---	---			
	14-16	.10	.10			
	16-26	.37	.37			
	26-26	---	---			
	26-35	.55	.55			
	35-39	.64	.64			
	39-44	.05	.15			
	44-49	.10	.20			
	49-59	.28	.28			
Histic Humaquepts, frequently flooded--	0-2	---	---	1	8	0
	2-5	---	---			
	5-9	---	---			
	9-13	.17	.17			
	13-17	.32	.32			
	17-28	.37	.37			
	28-47	.10	.17			
	47-51	.24	.24			
	51-55	.05	.10			
Typic Endoaquands-----	0-2	---	---	4	3	86
	2-3	---	---			
	3-11	.10	.20			
	11-17	.10	.20			
	17-29	.10	.20			
	29-52	.05	.32			
	52-57	.05	.20			
132: Vitrandic Cryorthents, debris flows----	0-4	.10	.24	3	2	134
	4-13	.10	.24			
	13-19	.02	.24			
	19-32	.05	.32			
	32-41	.10	.37			
133: Vitrandic Xerofluvents-----	0-2	---	---	5	1	220
	2-4	.15	.24			
	4-6	.17	.24			
	6-12	.10	.24			
	12-32	.10	.20			
	32-34	.05	.05			
	34-50	.10	.24			
	50-51	---	---			
	51-56	.10	.20			
	56-62	.10	.24			
	62-63	.10	.28			

Soil Survey of Lassen Volcanic National Park, California

Table 27.—Erosion Properties of the Soils—Continued

Map symbol and soil name	Depth (inches)	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
		Kw	Kf	T		
133: Typic Endoaquents-----	0-7	.02	.05	5	5	56
	7-14	.02	.05			
	14-17	.05	.05			
	17-19	.02	.05			
	19-26	.02	.05			
	26-31	.02	.05			
	31-39	.02	.05			
134: Chaos-----	0-0	---	---	1	8	0
	0-4	.02	.10			
	4-9	.02	.17			
	9-21	.02	.20			
	21-23	.20	.37			
	23-27	.10	.28			
	27-36	.15	.28			
	36-56	.05	.20			
	56-75	.05	.20			
	75-87	.15	.28			
136: Terracelake-----	0-1	---	---	2	5	56
	1-3	.15	.24			
	3-7	.10	.24			
	7-19	.10	.32			
	19-24	.10	.43			
	24-37	.02	.43			
	---	---	---			
Rock outcrop.						
Xeric Vitricryands, cirque floor-----	0-2	.17	.37	2	3	86
	2-5	.10	.28			
	5-13	.15	.28			
	13-26	.15	.28			
	26-36	.17	.32			
	36-46	.17	.32			
137: Xeric Vitricryands-----	0-3	.10	.20	4	2	134
	3-9	.10	.24			
	9-17	.15	.37			
	17-23	.10	.24			
	23-37	.24	.24			
	37-48	.37	.37			
	48-59	.20	.37			
Rock outcrop, rhyodacite.						
138: Vitrandic Xerofluvents, debris flows---	0-1	---	---	3	2	134
	1-3	---	---			
	3-6	.55	.55			
	6-9	.32	.32			
	9-13	.37	.37			
	13-17	.20	.20			
	17-35	.05	.20			
	35-50	.05	.24			
	50-55	.10	.24			
	55-67	.10	.24			

Soil Survey of Lassen Volcanic National Park, California

Table 27.—Erosion Properties of the Soils—Continued

Map symbol and soil name	Depth (inches)	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
		Kw	Kf	T		
138: Typic Endoaquents-----	0-7	.02	.05	5	5	56
	7-14	.02	.05			
	14-17	.05	.05			
	17-19	.02	.05			
	19-26	.02	.05			
	26-31	.02	.05			
	31-39	.02	.05			
139: Duric Vitraquands-----	0-2	---	---	4	2	134
	2-4	.10	.15			
	4-7	.10	.17			
	7-13	.10	.17			
	13-17	.15	.24			
	17-23	.10	.28			
	23-34	.10	.24			
	34-44	.10	.32			
	44-49	.10	.43			
Typic Endoaquands-----	0-2	---	---	4	3	86
	2-3	---	---			
	3-11	.10	.20			
	11-17	.10	.20			
	17-29	.10	.20			
	29-52	.05	.32			
	52-57	.05	.20			
Aquandic Cryaquents-----	0-7	.32	.32	5	6	48
	7-12	.32	.32			
	12-14	.43	.43			
	14-20	.05	.15			
	20-28	.37	.37			
	28-34	.05	.17			
	34-47	.02	.05			
140: Vitrixerands-----	0-1	---	---	2	2	134
	1-4	.05	.15			
	4-8	.10	.15			
	8-12	.10	.17			
	12-21	.10	.20			
	21-37	.10	.32			
	37-46	.43	.43			
141: Humic Haploxerands-----	0-2	---	---	5	2	134
	2-3	---	---			
	3-4	.28	.28			
	4-6	.24	.24			
	6-15	.05	.24			
	15-24	.10	.24			
	24-29	.10	.20			
	29-42	.05	.17			
	42-60	.10	.37			

Soil Survey of Lassen Volcanic National Park, California

Table 27.—Erosion Properties of the Soils—Continued

Map symbol and soil name	Depth (inches)	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
		Kw	Kf	T		
141: Typic Haploxerands-----	0-1	---	---	5	7	38
	1-2	.17	.28			
	2-5	.15	.24			
	5-12	.10	.24			
	12-20	.05	.24			
	20-30	.05	.20			
	30-37	.05	.24			
	37-44	.02	.20			
	44-50	.15	.24			
	50-61	.24	.24			
Bearrubble-----	0-3	---	---	5	2	134
	3-6	.10	.10			
	6-13	.02	.15			
	13-19	.05	.28			
	19-35	.05	.32			
	35-49	.15	.37			
	49-60	.15	.37			
Rubble land.						
142: Cragwash-----	0-2	---	---	4	2	134
	2-3	.15	.15			
	3-5	.05	.10			
	5-11	.10	.24			
	11-17	.05	.17			
	17-27	.05	.17			
	27-38	.02	.15			
	38-57	.02	.20			
	57-82	.05	.37			
143: Andic Durixerpts-----	0-1	---	---	2	2	134
	1-3	.10	.20			
	3-12	.05	.28			
	12-19	.05	.32			
	19-24	.05	.32			
	24-31	.10	.49			
144: Xeric Vitricryands, cirque floor-----	0-2	.17	.37	2	3	86
	2-5	.10	.28			
	5-13	.15	.28			
	13-26	.15	.28			
	26-36	.17	.32			
	36-46	.17	.32			
Humic Xeric Vitricryands-----	0-1	---	---	3	3	86
	1-4	.10	.20			
	4-6	.15	.28			
	6-12	.10	.32			
	12-18	.10	.37			
	18-24	.20	.37			
	24-30	.15	.37			

Soil Survey of Lassen Volcanic National Park, California

Table 27.—Erosion Properties of the Soils—Continued

Map symbol and soil name	Depth (inches)	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
		Kw	Kf	T		
145: Sueredo-----	0-2	---	---	3	2	134
	2-5	---	---			
	5-9	.05	.15			
	9-13	.10	.20			
	13-16	.10	.17			
	16-18	.02	.05			
	18-26	.05	.15			
	26-50	.02	.17			
	50-76	.02	.15			
	76-83	.05	.37			
146: Sueredo-----	0-2	---	---	3	2	134
	2-5	---	---			
	5-9	.05	.15			
	9-13	.10	.20			
	13-16	.10	.17			
	16-18	.02	.05			
	18-26	.05	.15			
	26-50	.02	.17			
	50-76	.02	.15			
	76-83	.05	.37			
147: Summertown-----	0-2	---	---	4	2	134
	2-4	---	---			
	4-6	.10	.17			
	6-15	.10	.20			
	15-22	.10	.32			
	22-31	.05	.28			
	31-43	.02	.28			
148: Humic Haploxerands, lake terrace-----	0-0	---	---	3	6	48
	0-3	.24	.24			
	3-11	.10	.28			
	11-18	.05	.37			
	18-26	.10	.37			
	26-35	---	---			
Typic Endoaquands-----	0-2	---	---	4	3	86
	2-3	---	---			
	3-11	.10	.20			
	11-17	.10	.20			
	17-29	.10	.20			
	29-52	.05	.32			
	52-57	.05	.20			
149: Rubble land. Rock outcrop, cliffs. Emeraldlake-----	0-1	.05	.32	5	7	38
	1-5	.05	.20			
	5-14	.02	.15			
	14-25	.02	.15			
	25-35	.02	.15			
	35-51	.02	.15			
	51-60	.02	.20			

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Table 27.—Erosion Properties of the Soils—Continued

Map symbol and soil name	Depth (inches)	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
		Kw	Kf	T		
150: Shadowlake-----	0-1	---	---	4	5	56
	1-2	.10	.24			
	2-6	.15	.24			
	6-13	.10	.24			
	13-23	.10	.24			
	23-41	.10	.37			
	41-51	.64	.64			
Terracelake-----	0-1	---	---	2	5	56
	1-3	.15	.24			
	3-7	.10	.24			
	7-19	.10	.32			
	19-24	.10	.43			
	24-37	.02	.43			
	---	---	---			
Acroph-----	0-1	---	---	1	2	134
	1-2	.10	.10			
	2-5	.10	.10			
	5-11	.15	.32			
	11-15	.10	.37			
	---	---	---			
Rock outcrop.						
151: Terracelake-----	0-1	---	---	2	5	56
	1-3	.15	.24			
	3-7	.10	.24			
	7-19	.10	.32			
	19-24	.10	.43			
	24-37	.02	.43			
	---	---	---			
Acroph-----	0-1	---	---	1	2	134
	1-2	.10	.10			
	2-5	.10	.10			
	5-11	.15	.32			
	11-15	.10	.37			
	---	---	---			
Rock outcrop.						
Shadowlake-----	0-1	---	---	4	5	56
	1-2	.10	.24			
	2-6	.15	.24			
	6-13	.10	.24			
	13-23	.10	.24			
	23-41	.10	.37			
	41-51	.64	.64			
152: Terracelake-----	0-1	---	---	2	5	56
	1-3	.15	.24			
	3-7	.10	.24			
	7-19	.10	.32			
	19-24	.10	.43			
	24-37	.02	.43			
	---	---	---			

Soil Survey of Lassen Volcanic National Park, California

Table 27.—Erosion Properties of the Soils—Continued

Map symbol and soil name	Depth (inches)	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
		Kw	Kf	T		
152: Shadowlake-----	0-1	---	---	4	5	56
	1-2	.10	.24			
	2-6	.15	.24			
	6-13	.10	.24			
	13-23	.10	.24			
	23-41	.10	.37			
	41-51	.64	.64			
Acroph-----	0-1	---	---	1	2	134
	1-2	.10	.10			
	2-5	.10	.10			
	5-11	.15	.32			
	11-15	.10	.37			
	---	---	---			
Rock outcrop.						
153: Typic Vitrixerands-----	0-2	.10	.24	3	3	86
	2-4	.17	.37			
	4-8	.10	.24			
	8-18	.10	.20			
	18-31	.15	.32			
	31-52	.10	.37			
Vitrandic Xerorthents, moraine-----	0-3	.17	.37	4	4	86
	3-9	.20	.37			
	9-16	.24	.43			
	16-23	.17	.43			
	23-37	.05	.32			
154: Typic Vitrixerands-----	0-2	.10	.24	3	3	86
	2-4	.17	.37			
	4-8	.10	.24			
	8-18	.10	.20			
	18-31	.15	.32			
	31-52	.10	.37			
Vitrandic Xerorthents, moraine-----	0-3	.17	.37	4	4	86
	3-9	.20	.37			
	9-16	.24	.43			
	16-23	.17	.43			
	23-37	.05	.32			
155: Xeric Vitricryands, pyroclastic surge--	0-1	---	---	4	3	86
	1-3	---	---			
	3-6	.05	.24			
	6-10	.10	.20			
	10-15	.10	.28			
	15-27	.10	.32			
	27-39	.05	.32			
	39-48	.10	.37			
	48-60	.10	.32			

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Table 27.—Erosion Properties of the Soils—Continued

Map symbol and soil name	Depth (inches)	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
		Kw	Kf	T		
156: Xeric Vitricryands, pyroclastic surge--	0-1	---	---	4	3	86
	1-3	---	---			
	3-6	.05	.24			
	6-10	.10	.20			
	10-15	.10	.28			
	15-27	.10	.32			
	27-39	.05	.32			
	39-48	.10	.37			
	48-60	.10	.32			
157: Typic Vitriixerands, very deep-----	0-2	---	---	3	3	86
	2-4	---	---			
	4-6	.15	.24			
	6-10	.15	.24			
	10-22	.10	.28			
	22-31	.10	.20			
	31-39	.05	.20			
	39-60	.02	.24			
158: Typic Vitriixerands, unglaciated-----	0-1	---	---	2	3	86
	1-3	.28	.28			
	3-8	.24	.24			
	8-15	.15	.28			
	15-25	.05	.17			
	25-39	.10	.32			
	---	---	---			
Rock outcrop, rhyodacite.						
159: Typic Vitriixerands, bouldery-----	0-2	---	---	5	3	86
	2-5	.02	.05			
	5-11	.05	.17			
	11-34	.02	.05			
	34-56	.02	.05			
	56-60	.02	.05			
Typic Vitriixerands, tephra over colluvium-----	0-1	---	---	5	3	86
	1-2	.24	.24			
	2-4	.24	.24			
	4-7	.28	.28			
	7-14	.02	.10			
	14-20	.10	.24			
	20-28	.10	.28			
	28-41	.10	.32			
	41-51	.05	.32			
	51-61	.02	.20			
Rubble land.						

Soil Survey of Lassen Volcanic National Park, California

Table 27.—Erosion Properties of the Soils—Continued

Map symbol and soil name	Depth (inches)	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
		Kw	Kf	T		
160: Aeric Endoaquents-----	0-2	---	---	2	2	134
	2-3	---	---			
	3-5	.55	.55			
	5-7	.05	.05			
	7-13	.02	.10			
	13-24	.02	.05			
	24-30	.05	.10			
	30-33	.02	.10			
	33-38	.02	.10			
	38-63	.02	.10			
Humic Haploxerands, stream terrace----	0-1	---	---	2	7	38
	1-4	.15	.24			
	4-7	.15	.28			
	7-17	.10	.20			
	17-28	.02	.20			
	28-48	.02	.20			
	48-68	.02	.15			
	68-84	.02	.15			
Riverwash.						
161: Typic Psammaquents-----	0-1	---	---	5	1	250
	1-4	.10	.10			
	4-5	.10	.20			
	5-9	.05	.10			
	9-17	.05	.05			
	17-26	.05	.10			
	26-33	.05	.10			
	33-39	.05	.05			
	39-48	.10	.10			
	48-55	.64	.64			
	55-63	.05	.05			
162: Humic Haploxerands, outwash-----	0-2	---	---	2	6	48
	2-8	.24	.24			
	8-15	.10	.20			
	15-28	.02	.17			
	28-41	.02	.05			
	41-59	.02	.05			
163: Vitrandic Cryofluvents-----	0-3	---	---	5	4	86
	3-8	.20	.28			
	8-11	.05	.20			
	11-13	.20	.24			
	13-16	.28	.28			
	16-23	.32	.32			
	23-28	.10	.17			
	28-36	.37	.37			
	36-55	.32	.32			
	55-61	.02	.05			

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Table 27.—Erosion Properties of the Soils—Continued

Map symbol and soil name	Depth (inches)	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
		Kw	Kf	T		
163: Aquandic Cryaquepts-----	0-7	.32	.32	5	6	48
	7-12	.32	.32			
	12-14	.43	.43			
	14-20	.05	.15			
	20-28	.37	.37			
	28-34	.05	.17			
	34-47	.02	.05			
164: Aquepts-----	0-2	---	---	4	6	48
	2-6	.10	.24			
	6-11	.05	.24			
	11-16	.02	.24			
	16-26	.05	.28			
	26-45	.05	.32			
Typic Petraquepts, bedrock-----	0-2	---	---	3	3	86
	2-7	---	---			
	7-13	.05	.20			
	13-28	.05	.24			
	28-35	.02	.32			
	---	---	---			
Aquic Haploxerands-----	0-1	---	---	2	7	38
	1-2	.10	.24			
	2-4	.10	.24			
	4-9	.15	.28			
	9-16	.10	.24			
	16-24	.10	.24			
	24-39	.10	.37			
	39-60	.10	.37			
Typic Petraquepts-----	0-2	.43	.43	3	5	56
	2-7	.37	.37			
	7-12	.24	.37			
	12-19	.32	.32			
	19-25	.20	.32			
	25-33	---	---			
165: Aquandic Humaquepts-----	0-4	---	---	4	3	86
	4-11	.20	.20			
	11-22	.10	.24			
	22-28	.02	.20			
	28-38	.02	.20			
	38-52	.10	.24			
Histic Humaquepts-----	0-2	---	---	1	8	0
	2-6	---	---			
	6-9	---	---			
	9-12	.20	.20			
	12-21	.24	.24			
	21-30	.32	.32			
	30-51	.05	.20			
	51-62	.02	.15			

Soil Survey of Lassen Volcanic National Park, California

Table 27.—Erosion Properties of the Soils—Continued

Map symbol and soil name	Depth (inches)	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
		Kw	Kf	T		
165:						
Aquandic Endoaquepts-----	0-4	.28	.43	4	5	56
	4-12	.43	.43			
	12-22	.24	.49			
	22-35	.28	.49			
	35-41	.28	.43			
	41-49	.20	.20			
	49-59	.02	.20			
Terric Haplohemists-----	0-5	---	---	1	2	134
	5-20	---	---			
	20-30	.37	.37			
	30-35	.37	.37			
	35-43	.37	.37			
166:						
Aquic Haploxerands-----	0-1	---	---	2	7	38
	1-2	.10	.24			
	2-4	.10	.24			
	4-9	.15	.28			
	9-16	.10	.24			
	16-24	.10	.24			
	24-39	.10	.37			
	39-60	.10	.37			
Humic Haploxerands, outwash terrace----	0-1	---	---	3	7	38
	1-2	---	---			
	2-5	.15	.24			
	5-8	.28	.28			
	8-15	.15	.24			
	15-24	.24	.37			
	24-31	.15	.37			
	31-39	.10	.37			
167:						
Emeraldlake-----	0-1	.05	.32	5	7	38
	1-5	.05	.20			
	5-14	.02	.15			
	14-25	.02	.15			
	25-35	.02	.15			
	35-51	.02	.15			
	51-60	.02	.20			
Readingpeak-----	0-2	.10	.24	3	6	48
	2-7	.05	.24			
	7-14	.02	.20			
	14-26	.02	.20			
	26-35	.05	.24			
	35-50	.02	.37			
	---	---	---			
Terracelake-----	0-1	---	---	2	5	56
	1-3	.15	.24			
	3-7	.10	.24			
	7-19	.10	.32			
	19-24	.10	.43			
	24-37	.02	.43			
	---	---	---			
Rock outcrop, dacite.						

Soil Survey of Lassen Volcanic National Park, California

Table 27.—Erosion Properties of the Soils—Continued

Map symbol and soil name	Depth (inches)	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
		Kw	Kf	T		
168: Vitrixerands, low elevation-----	0-1	---	---	2	2	134
	1-4	.05	.15			
	4-8	.10	.15			
	8-12	.10	.17			
	12-21	.10	.20			
	21-37	.10	.32			
	37-46	.43	.43			
169: Sueredo-----	0-2	---	---	3	2	134
	2-5	---	---			
	5-9	.05	.15			
	9-13	.10	.20			
	13-16	.10	.17			
	16-18	.02	.05			
	18-26	.05	.15			
	26-50	.02	.17			
	50-76	.02	.15			
	76-83	.05	.37			
Rock outcrop, cliffs.						
Scoured-----	0-1	---	---	1	7	38
	1-4	.05	.24			
	4-10	.05	.28			
	10-17	.10	.37			
	17-30	.02	.32			
	30-39	---	---			
170: Rock outcrop, rhyodacite-----	---	---	---	-	---	---
Emeraldlake-----	0-1	.05	.32	5	7	38
	1-5	.05	.20			
	5-14	.02	.15			
	14-25	.02	.15			
	25-35	.02	.15			
	35-51	.02	.15			
	51-60	.02	.20			
Rubble land.						
Readingpeak-----	0-2	.10	.24	3	6	48
	2-7	.05	.24			
	7-14	.02	.20			
	14-26	.02	.20			
	26-35	.05	.24			
	35-50	.02	.37			
	---	---	---			
171: Aquepts-----	0-2	---	---	4	6	48
	2-6	.10	.24			
	6-11	.05	.24			
	11-16	.02	.24			
	16-26	.05	.28			
	26-45	.05	.32			

Soil Survey of Lassen Volcanic National Park, California

Table 27.—Erosion Properties of the Soils—Continued

Map symbol and soil name	Depth (inches)	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
		Kw	Kf	T		
171: Typic Petraquepts, bedrock-----	0-2	---	---	3	3	86
	2-7	---	---			
	7-13	.05	.20			
	13-28	.05	.24			
	28-35	.02	.32			
	---	---	---			
172: Badgerflat-----	0-1	---	---	3	6	48
	1-4	.10	.24			
	4-7	.10	.24			
	7-11	.05	.17			
	11-23	.02	.20			
	23-33	.05	.32			
	33-43	.05	.32			
173: Badgerwash-----	0-1	---	---	2	3	86
	1-4	.05	.17			
	4-9	.05	.17			
	9-13	.02	.10			
	13-20	.05	.24			
	20-35	.10	.32			
	35-45	---	---			
174: Vitrandic Cryorthents-----	0-4	.05	.24	5	7	38
	4-9	.05	.24			
	9-17	.02	.10			
	17-19	.10	.24			
	19-27	.02	.10			
	27-30	.02	.10			
	30-35	.05	.10			
	35-38	.05	.10			
	38-60	.02	.10			
Readingpeak-----	0-2	.10	.24	3	6	48
	2-7	.05	.24			
	7-14	.02	.20			
	14-26	.02	.20			
	26-35	.05	.24			
	35-50	.02	.37			
	---	---	---			
Rock outcrop.						
175: Shadowlake-----	0-1	---	---	4	5	56
	1-2	.10	.24			
	2-6	.15	.24			
	6-13	.10	.24			
	13-23	.10	.24			
	23-41	.10	.37			
	41-51	.64	.64			

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Table 27.—Erosion Properties of the Soils—Continued

Map symbol and soil name	Depth (inches)	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
		Kw	Kf	T		
175: Vitrandic Cryofluvents-----	0-3	---	---	5	4	86
	3-8	.20	.28			
	8-11	.05	.20			
	11-13	.20	.24			
	13-16	.28	.28			
	16-23	.32	.32			
	23-28	.10	.17			
	28-36	.37	.37			
	36-55	.32	.32			
	55-61	.02	.05			
176: Juniperlake, bouldery-----	0-1	---	---	4	7	38
	1-4	.15	.24			
	4-10	.10	.24			
	10-21	.10	.28			
	21-30	.10	.28			
	30-47	.10	.37			
	47-56	.05	.37			
177: Vitrandic Cryorthents, debris flows, high elevation-----	0-4	.10	.24	5	2	134
	4-13	.10	.24			
	13-60	.02	.24			
200. Cinder land						
201. Lava flows						
202: Typic Xerorthents, tephra-----	0-5	.28	.28	5	2	134
	5-8	.05	.05			
	8-12	.05	.05			
	12-14	.28	.28			
	14-25	.28	.28			
	25-35	.28	.28			
	35-49	.28	.28			
	49-60	.28	.28			
Typic Xerorthents, welded-----	0-1	.02	.02	1	1	160
	1-3	.02	.02			
	3-7	.02	.02			
	7-9	.02	.02			
	9-12	.02	.02			
	12-15	.02	.02			
	15-25	.02	.02			
	25-26	.05	.15			
	26-34	.02	.02			
	34-37	.02	.02			
	37-39	.02	.02			
	39-43	.02	.02			
	43-59	.02	.05			

Soil Survey of Lassen Volcanic National Park, California

Table 27.—Erosion Properties of the Soils—Continued

Map symbol and soil name	Depth (inches)	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
		Kw	Kf	T		
203: Typic Xerorthents, tephra-----	0-5	.28	.28	5	2	134
	5-8	.05	.05			
	8-12	.05	.05			
	12-14	.28	.28			
	14-25	.28	.28			
	25-35	.28	.28			
	35-49	.28	.28			
	49-60	.28	.28			
205. Beaches						
W. Water						

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Table 28.—Chemical Properties of the Soils

(Soil properties are measured or inferred from direct observations in the field or laboratory. Laboratory data for selected pedons are included in "Selected Chemical Laboratory Data" report. Absence of an entry indicates that data were not estimated)

Map symbol and soil name	Depth	Cation- exchange capacity	Effective cation- exchange capacity	Soil reaction
	In	meq/100g	meq/100g	pH
100: Buttelake-----	0-0	---	---	---
	0-3	1.0-8.5	---	5.9-7.0
	3-11	0.1-2.3	---	6.5-7.0
	11-13	0.1-2.3	---	6.5-7.0
	13-19	7.8-20	---	6.4-7.5
	19-31	5.9-20	---	6.5-8.0
	31-40	5.9-20	---	6.5-8.0
	40-53	0.1-5.8	---	6.4-7.8
	53-63	0.1-5.8	---	6.4-7.8
101: Buttewash-----	0-1	---	---	---
	1-2	1.2-18	---	5.6-7.3
	2-7	1.2-18	---	5.6-7.3
	7-12	0.0-2.1	---	6.1-7.3
	12-20	7.6-20	---	6.1-7.3
	20-27	12-29	---	6.1-7.6
	27-45	12-29	---	6.1-7.6
	45-57	0.5-4.6	---	6.1-7.6
	57-66	1.5-10	---	6.1-7.6
	66-74	0.5-4.6	---	6.1-7.6
102: Ashbutte-----	0-2	---	---	---
	2-6	4.7-11	---	6.6-7.0
	6-11	2.9-10	---	6.6-7.0
	11-15	3.5-9.1	---	6.6-7.5
	15-24	2.7-8.1	---	6.6-7.5
	24-36	1.0-6.7	---	6.6-7.0
	36-60	2.0-8.1	---	6.6-7.0
Vitrandic Xerorthents-----	0-1	---	---	---
	1-5	8.1-14	---	6.1-6.5
	5-10	6.6-12	---	6.1-7.3
	10-26	6.6-13	---	6.1-7.3
	26-34	3.0-10	---	6.1-7.3
	34-46	0.2-6.9	---	6.1-7.3
	46-61	0.2-6.9	---	6.1-7.3
103: Scoured-----	0-1	---	---	---
	1-4	25-36	---	5.6-6.5
	4-10	23-34	---	5.6-6.5
	10-17	29-36	---	5.6-6.5
	17-30	3.5-13	---	5.6-6.5
	30-39	---	---	---

Soil Survey of Lassen Volcanic National Park, California

Table 28.—Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Effective cation- exchange capacity	Soil reaction
	In	meq/100g	meq/100g	pH
104:				
Scoured-----	0-1	---	---	---
	1-4	25-36	---	5.6-6.5
	4-10	23-34	---	5.6-6.5
	10-17	29-36	---	5.6-6.5
	17-30	3.5-13	---	5.6-6.5
	30-39	---	---	---
Juniperlake-----	0-1	---	---	---
	1-4	29-36	---	4.5-6.5
	4-10	21-36	---	5.2-6.5
	10-21	19-28	---	6.1-6.5
	21-30	8.8-23	---	5.5-6.5
	30-47	9.4-24	---	5.5-6.5
	47-56	3.6-14	---	6.1-7.0
Rock outcrop.				
105:				
Juniperlake-----	0-1	---	---	---
	1-4	29-36	---	4.5-6.5
	4-10	21-36	---	5.2-6.5
	10-21	19-28	---	6.1-6.5
	21-30	8.8-23	---	5.5-6.5
	30-47	9.4-24	---	5.5-6.5
	47-56	3.6-14	---	6.1-7.0
106:				
Cenplat-----	0-0	---	---	---
	0-2	6.6-36	---	6.1-7.3
	2-5	2.4-7.3	---	6.1-7.3
	5-8	2.4-7.3	---	6.1-7.3
	8-17	5.0-14	---	6.1-7.3
	17-24	2.8-8.5	---	6.1-7.3
	24-31	2.8-8.5	---	6.1-7.3
	---	---	---	---
107:				
Badgerflat-----	0-1	---	---	---
	1-4	8.6-15	---	6.1-6.5
	4-7	8.6-15	---	6.1-6.5
	7-11	7.3-14	---	6.1-7.3
	11-23	7.3-14	---	6.1-7.3
	23-33	2.2-10	---	6.6-7.3
	33-43	0.8-3.4	---	6.6-7.3
Cenplat-----	0-2	7.0-32	---	5.1-6.5
	2-6	7.0-32	---	5.1-6.5
	6-12	4.9-12	---	6.1-7.3
	12-21	5.8-16	---	6.1-7.3
	21-39	5.8-16	---	6.1-7.3
	---	---	---	---

Soil Survey of Lassen Volcanic National Park, California

Table 28.—Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Effective cation- exchange capacity	Soil reaction
	In	meq/100g	meq/100g	pH
108: Typic Xerorthents-----	0-1	---	---	---
	1-4	0.0-2.1	---	5.6-7.3
	4-33	0.0-1.0	---	6.1-7.8
	33-46	0.0-1.0	---	6.1-7.8
	46-50	0.0-1.0	---	6.1-7.8
	50-55	0.0-1.0	---	6.1-7.8
	55-59	2.6-8.6	---	6.1-7.3
109: Prospectpeak-----	0-1	---	---	---
	1-3	1.3-11	---	5.6-7.3
	3-7	0.2-3.7	---	6.1-7.3
	7-9	0.2-3.7	---	6.1-7.3
	9-14	2.3-6.4	---	6.1-7.3
	14-22	4.2-13	---	6.1-7.3
	22-50	3.7-13	---	6.1-7.3
	---	---	---	---
110: Bearthrubble-----	0-3	---	---	---
	3-6	29-55	---	6.1-6.6
	6-13	4.0-18	---	6.5-6.6
	13-19	2.9-14	---	6.2-7.0
	19-35	2.9-14	---	6.2-7.0
	35-49	2.5-10	---	6.2-7.5
	49-60	2.5-10	---	6.2-7.5
Rubble land.				
111: Vitrandic Xerorthents, debris fan-----	0-4	0.2-3.3	---	5.6-7.3
	4-14	0.2-3.3	---	5.6-7.3
	14-31	0.2-3.3	---	5.6-7.3
	31-42	0.9-2.8	---	6.6-7.3
	42-60	0.9-2.8	---	6.6-7.3
112: Cascadesprings-----	0-0	---	---	---
	0-2	---	---	4.5-6.5
	2-9	6.4-26	---	4.5-6.5
	9-17	6.2-22	---	5.6-7.0
	17-27	6.2-22	---	5.6-7.0
	27-33	1.4-6.7	---	5.6-7.0
113: Terracelake-----	0-1	---	---	---
	1-3	10-25	---	5.5-6.4
	3-7	6.0-12	---	5.5-6.4
	7-19	3.5-13	---	6.2-7.0
	19-24	3.5-13	---	6.2-7.0
	24-37	1.2-7.1	---	6.2-7.0
	---	---	---	---

Soil Survey of Lassen Volcanic National Park, California

Table 28.—Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Effective cation- exchange capacity	Soil reaction
	In	meq/100g	meq/100g	pH
113:				
Emeraldlake-----	0-1	8.8-18	---	5.5-6.5
	1-5	7.9-18	---	5.6-6.5
	5-14	7.2-14	---	5.6-6.5
	14-25	6.9-15	---	6.1-7.0
	25-35	5.0-13	---	6.1-7.0
	35-51	3.4-11	---	6.1-7.0
	51-60	2.5-11	---	6.1-7.0
Readingpeak-----	0-2	8.1-12	---	5.6-6.0
	2-7	8.1-12	---	5.6-6.0
	7-14	6.8-12	---	6.1-6.5
	14-26	6.8-12	---	6.1-6.5
	26-35	4.9-10	---	6.1-7.0
	35-50	4.9-10	---	6.1-7.0
	---	---	---	---
Rock outcrop.				
114:				
Emeraldlake-----	0-1	8.8-18	---	5.5-6.5
	1-5	7.9-18	---	5.6-6.5
	5-14	7.2-14	---	5.6-6.5
	14-25	6.9-15	---	6.1-7.0
	25-35	5.0-13	---	6.1-7.0
	35-51	3.4-11	---	6.1-7.0
	51-60	2.5-11	---	6.1-7.0
Terracelake-----	0-1	---	---	---
	1-3	10-25	---	5.5-6.4
	3-7	6.0-12	---	5.5-6.4
	7-19	3.5-13	---	6.2-7.0
	19-24	3.5-13	---	6.2-7.0
	24-37	1.2-7.1	---	6.2-7.0
	---	---	---	---
Readingpeak-----	0-2	8.1-12	---	5.6-6.0
	2-7	8.1-12	---	5.6-6.0
	7-14	6.8-12	---	6.1-6.5
	14-26	6.8-12	---	6.1-6.5
	26-35	4.9-10	---	6.1-7.0
	35-50	4.9-10	---	6.1-7.0
	---	---	---	---
Rock outcrop.				
Rubble land.				
115:				
Shadowlake-----	0-1	---	---	---
	1-2	8.0-31	---	5.6-7.0
	2-6	7.0-21	---	5.6-7.3
	6-13	7.0-21	---	5.6-7.3
	13-23	7.0-21	---	5.6-7.3
	23-41	1.7-4.5	---	6.6-7.3
	41-51	3.0-6.0	---	5.6-6.5

Soil Survey of Lassen Volcanic National Park, California

Table 28.—Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Effective cation- exchange capacity	Soil reaction
	In	meq/100g	meq/100g	pH
116: Xeric Vitricryands, tephra over till-----	0-0	---	---	---
	0-2	---	---	---
	2-3	---	---	3.5-5.5
	3-4	---	---	3.5-5.5
	4-5	---	---	4.5-5.5
	5-8	---	---	4.5-5.5
	8-10	---	---	4.5-5.5
	10-16	5.6-13	---	5.1-6.0
	16-19	5.6-13	---	5.1-6.0
	19-39	2.2-6.4	---	5.6-6.5
	39-60	1.4-5.4	---	5.6-7.0
116: Terracelake-----	0-1	---	---	---
	1-3	10-25	---	5.5-6.4
	3-7	6.0-12	---	5.5-6.4
	7-19	3.5-13	---	6.2-7.0
	19-24	3.5-13	---	6.2-7.0
	24-37	1.2-7.1	---	6.2-7.0
	---	---	---	---
Rock outcrop.				
Xeric Vitricryands, cirque floor-----	0-2	0.5-3.8	---	6.0-7.0
	2-5	1.1-4.9	---	6.0-7.0
	5-13	1.1-4.9	---	6.0-7.0
	13-26	3.8-8.5	---	6.0-7.0
	26-36	3.8-8.5	---	6.0-7.0
	36-46	0.1-9.4	---	6.0-7.0
117: Humic Haploxerands, moist lake terrace-----	0-0	---	---	---
	0-2	2.7-19	---	5.6-7.3
	2-5	2.7-19	---	5.6-7.3
	5-7	0.1-3.0	---	6.6-7.3
	7-19	11-19	---	6.6-7.3
	19-30	14-25	---	6.6-7.3
	30-35	---	---	6.6-7.3
118: Typic Dystroxerepts, landslides-----	0-2	---	---	---
	2-5	---	10-34	4.5-6.5
	5-15	---	1-16	3.5-6.5
	15-23	---	1-16	3.5-6.5
	23-41	---	1-16	3.5-6.5
	41-60	---	2-14	4.5-7.3
119: Diamondpeak-----	0-1	---	---	---
	1-3	---	10-26	4.5-6.0
	3-10	---	13-35	4.5-6.0
	10-31	---	13-40	4.5-6.0
	31-49	---	10-48	4.3-5.5
	49-60	---	10-48	4.3-5.5

Soil Survey of Lassen Volcanic National Park, California

Table 28.—Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Effective cation- exchange capacity	Soil reaction
	In	meq/100g	meq/100g	pH
119:				
Brokeoff-----	0-2	---	12-38	4.8-6.7
	2-4	13-22	---	4.8-6.7
	4-7	---	6-21	5.0-6.6
	7-15	---	6-21	5.0-6.6
	15-37	---	0-17	5.0-6.7
	---	---	---	---
Endoaquepts-----	0-2	---	---	---
	2-4	33-48	---	4.8-6.7
	4-6	33-48	---	4.8-6.7
	6-9	6.9-20	---	4.8-6.7
	9-18	16-26	---	4.6-6.7
	18-30	20-26	---	4.6-6.9
	30-41	27-32	---	5.8-7.5
	41-50	27-32	---	5.8-7.5
	50-62	27-32	---	5.8-7.5
Aquic Dystroxepts, debris flows-----	0-1	---	---	---
	1-2	---	---	---
	2-5	40-49	---	5.6-6.5
	5-9	---	13-20	3.5-5.0
	9-24	---	11-20	3.5-5.0
	24-30	---	14-20	3.5-5.0
	30-48	---	12-17	3.5-5.0
	48-60	---	12-17	3.5-5.0
Typic Dystroxepts-----	0-1	---	6-11	3.5-4.4
	1-4	---	12-16	3.5-4.4
	4-11	---	12-16	3.5-4.4
	11-16	---	9-13	3.5-4.4
	16-20	---	1-4	3.5-4.4
	---	---	---	---
120:				
Buttelake-----	0-0	---	---	---
	0-3	1.0-8.5	---	5.9-7.0
	3-11	0.1-2.3	---	6.5-7.0
	11-13	0.1-2.3	---	6.5-7.0
	13-19	7.8-20	---	6.4-7.5
	19-31	5.9-20	---	6.5-8.0
	31-40	5.9-20	---	6.5-8.0
	40-53	0.1-5.8	---	6.4-7.8
	53-63	0.1-5.8	---	6.4-7.8
Sunhoff-----	0-1	---	---	---
	1-6	1.0-24	---	6.1-7.0
	6-9	5.3-25	---	6.6-7.0
	9-29	1.9-16	---	6.1-7.0
	29-39	0.3-3.0	---	6.1-7.0
Talved-----	0-1	---	---	---
	1-5	4.0-12	---	6.5-7.3
	5-13	4.0-12	---	6.5-7.3
	13-26	3.8-11	---	6.5-7.3
	26-39	3.8-11	---	6.5-7.3
	39-60	3.2-10	---	6.5-7.6

Soil Survey of Lassen Volcanic National Park, California

Table 28.—Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Effective cation- exchange capacity	Soil reaction
	In	meq/100g	meq/100g	pH
122:				
Xeric Vitricryands, colluvium-----	0-3	2.4-10	---	6.1-7.3
	3-7	2.4-12	---	6.1-7.3
	7-11	3.6-8.0	---	6.6-7.3
	11-24	3.6-8.0	---	6.6-7.3
	24-33	2.6-7.5	---	6.6-7.3
	33-39	2.6-7.5	---	6.6-7.3
	39-42	1.6-5.3	---	6.6-7.3
	42-60	0.7-4.6	---	6.6-7.3
Xeric Vitricryands, ash over cinders-----	0-1	---	---	---
	1-2	2.3-13	---	5.6-6.5
	2-6	2.3-6.1	---	5.6-6.5
	6-16	2.5-12	---	5.1-7.3
	16-24	2.5-12	---	5.1-7.3
	24-30	1.9-5.7	---	6.1-7.3
	30-45	0.2-1.3	---	6.1-7.3
	45-60	0.2-1.3	---	6.1-7.3
Xeric Vitricryands, bedrock-----	0-1	---	---	---
	1-4	0.4-8.1	---	6.1-7.3
	4-9	0.4-8.1	---	6.1-7.3
	9-16	12-27	---	6.1-7.3
	16-21	11-22	---	6.1-6.5
	---	---	---	---
125:				
Humic Haploxerands, stream terrace-----	0-1	---	---	---
	1-4	4.8-14	---	4.5-7.3
	4-7	4.8-14	---	4.5-7.3
	7-17	4.6-13	---	6.1-7.3
	17-28	4.6-14	---	6.1-7.3
	28-48	1.5-8.9	---	6.1-7.3
	48-68	1.4-8.9	---	5.6-7.3
	68-84	1.5-8.9	---	6.1-7.3
Aquandic Humaquepts, flood plains-----	0-1	---	---	---
	1-4	42-55	---	4.5-6.5
	4-7	42-55	---	4.5-6.5
	7-16	13-18	---	6.1-6.5
	16-25	13-18	---	6.1-6.5
	25-31	18-21	---	6.1-6.5
	31-47	18-21	---	6.1-6.5
	47-60	10-13	---	6.1-7.3
126:				
Kingsiron-----	0-1	---	---	---
	1-3	26-36	---	6.1-7.3
	3-9	18-40	---	6.1-7.3
	9-28	13-22	---	6.6-7.3
	28-41	13-22	---	6.6-7.3
	41-63	4.1-17	---	6.1-7.3
Dittmar-----	0-1	---	---	---
	1-2	8.0-26	---	5.1-6.5
	2-5	8.0-26	---	5.1-6.5
	5-7	7.3-22	---	6.1-7.3
	7-15	7.3-22	---	6.1-7.3
	15-19	7.3-22	---	6.1-7.3
	---	---	---	---

Soil Survey of Lassen Volcanic National Park, California

Table 28.—Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Effective cation- exchange capacity	Soil reaction
	In	meq/100g	meq/100g	pH
126: Rock outcrop.				
127: Humic Haploxerands, strath terrace-----	0-1	---	---	---
	1-4	30-39	---	5.6-6.5
	4-9	30-39	---	5.6-6.5
	9-16	22-42	---	6.1-7.3
	16-20	13-36	---	6.1-7.3
	20-28	13-36	---	6.1-7.3
	---	---	---	---
Aquepts-----	0-2	---	---	---
	2-6	---	10-37	4.5-6.0
	6-11	13-33	---	6.1-6.5
	11-16	11-17	---	6.1-7.3
	16-26	6.2-17	---	6.1-7.3
	26-45	5.0-11	---	6.1-7.3
129: Humic Haploxerands, colluviums-----	0-2	---	---	---
	2-2	---	---	---
	2-4	30-37	---	6.1-7.3
	4-8	30-37	---	6.1-7.3
	8-15	20-33	---	6.1-7.3
	15-22	20-34	---	6.1-7.3
	22-34	11-27	---	6.1-7.3
	34-50	10-22	---	5.6-7.3
	50-61	10-22	---	5.6-7.3
130: Histic Humaquepts, lake sediments-----	0-6	---	---	5.6-7.3
	6-10	---	---	5.6-7.3
	10-14	---	---	6.1-7.3
	14-16	1.6-46	---	5.6-6.5
	16-26	1.6-46	---	5.6-6.5
	26-26	6.8-18	---	5.6-7.3
	26-35	0.8-9.5	---	5.6-7.3
	35-39	0.8-9.5	---	5.6-7.3
	39-44	0.8-9.5	---	5.6-7.3
	44-49	0.8-9.5	---	5.6-7.3
	49-59	0.8-9.5	---	5.6-7.3
Histic Humaquepts, frequently flooded-----	0-2	---	---	5.6-7.3
	2-5	---	---	5.6-7.3
	5-9	---	---	5.6-7.3
	9-13	1.7-6.9	---	6.1-7.3
	13-17	37-61	---	6.1-7.3
	17-28	15-38	---	6.1-7.3
	28-47	16-42	---	6.1-7.3
	47-51	0.9-7.4	---	6.1-7.3
	51-55	0.9-7.4	---	6.1-7.3
Typic Endoaquands-----	0-2	---	---	---
	2-3	---	---	---
	3-11	9.5-20	---	5.1-6.5
	11-17	9.5-20	---	5.1-6.5
	17-29	8.5-16	---	5.6-6.5
	29-52	1.5-4.7	---	6.1-6.5
	52-57	1.5-4.7	---	6.1-6.5

Soil Survey of Lassen Volcanic National Park, California

Table 28.—Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Effective cation- exchange capacity	Soil reaction
	In	meq/100g	meq/100g	pH
132:				
Vitrandid Cryorthents, debris flows-----	0-4	0.0-0.5	---	5.6-7.3
	4-13	0.0-0.4	---	6.1-7.3
	13-19	0.0-0.4	---	6.1-7.3
	19-32	0.8-3.3	---	6.1-7.3
	32-41	0.2-1.4	---	6.1-7.3
133:				
Vitrandid Xerofluvents-----	0-2	---	---	---
	2-4	4.4-17	---	6.1-7.3
	4-6	4.4-17	---	6.1-7.3
	6-12	3.8-9.1	---	6.1-7.3
	12-32	3.8-9.1	---	6.1-7.3
	32-34	0.8-4.4	---	6.1-7.3
	34-50	0.8-4.4	---	6.1-7.3
	50-51	---	---	6.1-7.3
	51-56	8.7-18	---	6.1-7.3
	56-62	4.4-16	---	6.1-7.3
	62-63	4.4-16	---	6.1-7.3
Typic Endoaquents-----	0-7	0.0-0.5	---	6.1-7.3
	7-14	0.0-0.5	---	6.1-7.3
	14-17	0.0-0.5	---	6.1-7.3
	17-19	0.0-0.5	---	6.1-7.3
	19-26	0.0-0.5	---	6.6-7.3
	26-31	0.0-0.5	---	6.6-7.3
	31-39	0.0-0.5	---	6.6-7.3
134:				
Chaos-----	0-0	---	---	---
	0-4	1.7-5.1	---	5.1-6.5
	4-9	1.7-5.1	---	6.1-6.5
	9-21	0.2-5.0	---	6.0-7.0
	21-23	0.2-5.0	---	6.0-7.0
	23-27	0.2-5.0	---	6.0-7.0
	27-36	0.2-5.0	---	6.0-7.0
	36-56	0.2-5.0	---	6.0-7.0
	56-75	0.2-5.0	---	6.0-7.0
	75-87	0.2-5.0	---	6.0-7.0
136:				
Terracelake-----	0-1	---	---	---
	1-3	10-25	---	5.5-6.4
	3-7	6.0-12	---	5.5-6.4
	7-19	3.5-13	---	6.2-7.0
	19-24	3.5-13	---	6.2-7.0
	24-37	1.2-7.1	---	6.2-7.0
	---	---	---	---
Rock outcrop.				
Xeric Vitricryands, cirque floor-----	0-2	0.5-3.8	---	6.0-7.0
	2-5	1.1-4.9	---	6.0-7.0
	5-13	1.1-4.9	---	6.0-7.0
	13-26	3.8-8.5	---	6.0-7.0
	26-36	3.8-8.5	---	6.0-7.0
	36-46	0.1-9.4	---	6.0-7.0

Soil Survey of Lassen Volcanic National Park, California

Table 28.—Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Effective cation- exchange capacity	Soil reaction
	In	meq/100g	meq/100g	pH
137:				
Xeric Vitricryands-----	0-3	1.0-8.7	---	6.1-7.3
	3-9	1.0-8.7	---	6.1-7.3
	9-17	1.0-8.7	---	6.1-7.3
	17-23	1.0-8.8	---	6.1-7.3
	23-37	0.0-7.5	---	6.1-7.8
	37-48	0.0-7.5	---	6.1-7.8
	48-59	0.2-1.2	---	6.1-7.8
Rock outcrop, rhyodacite.				
138:				
Vitrandic Xerofluvents, debris flows-----	0-1	---	---	---
	1-3	---	---	---
	3-6	1.6-12	---	5.6-7.3
	6-9	1.6-12	---	5.6-7.3
	9-13	1.6-12	---	5.6-7.3
	13-17	1.6-12	---	5.6-7.3
	17-35	0.2-4.4	---	6.1-7.3
	35-50	0.2-4.4	---	6.1-7.3
	50-55	9.3-23	---	6.1-7.3
	55-67	9.3-23	---	6.1-7.3
Typic Endoaquents-----	0-7	0.0-0.5	---	6.1-7.3
	7-14	0.0-0.5	---	6.1-7.3
	14-17	0.0-0.5	---	6.1-7.3
	17-19	0.0-0.5	---	6.1-7.3
	19-26	0.0-0.5	---	6.6-7.3
	26-31	0.0-0.5	---	6.6-7.3
	31-39	0.0-0.5	---	6.6-7.3
139:				
Duric Vitraquands-----	0-2	---	---	---
	2-4	---	1-3	5.1-6.0
	4-7	---	1-3	4.5-6.5
	7-13	---	1-3	4.5-6.5
	13-17	---	1-3	5.1-6.5
	17-23	4.2-10	---	5.6-6.5
	23-34	1.7-6.2	---	5.1-7.3
	34-44	1.7-6.2	---	5.1-7.3
	44-49	2.0-6.7	---	6.1-6.5
Typic Endoaquands-----	0-2	---	---	---
	2-3	---	---	---
	3-11	9.5-20	---	5.1-6.5
	11-17	9.5-20	---	5.1-6.5
	17-29	8.5-16	---	5.6-6.5
	29-52	1.5-4.7	---	6.1-6.5
	52-57	1.5-4.7	---	6.1-6.5
Aquandic Cryaquents-----	0-7	24-53	---	5.1-6.5
	7-12	24-53	---	5.1-6.5
	12-14	0.4-24	---	5.6-7.3
	14-20	0.4-24	---	5.6-7.3
	20-28	37-63	---	5.6-7.3
	28-34	0.4-24	---	5.6-7.3
	34-47	0.4-24	---	5.6-7.3

Soil Survey of Lassen Volcanic National Park, California

Table 28.—Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Effective cation- exchange capacity	Soil reaction
	In	meq/100g	meq/100g	pH
140: Vitrixerands-----	0-1	---	---	---
	1-4	6.6-13	---	5.1-6.5
	4-8	6.6-12	---	5.1-6.5
	8-12	6.6-12	---	5.1-6.5
	12-21	8.6-14	---	5.6-6.5
	21-37	3.8-7.0	---	5.6-7.3
	37-46	0.8-3.3	---	5.6-7.3
141: Humic Haploxerands-----	0-2	---	---	---
	2-3	---	---	---
	3-4	30-36	---	6.1-7.3
	4-6	20-41	---	6.1-7.3
	6-15	20-41	---	6.1-7.3
	15-24	13-29	---	6.1-7.3
	24-29	13-29	---	6.1-7.3
	29-42	14-32	---	5.1-6.5
	42-60	14-32	---	5.1-6.5
Typic Haploxerands-----	0-1	---	---	---
	1-2	29-33	---	6.1-7.3
	2-5	19-30	---	6.1-7.3
	5-12	10-21	---	6.1-7.3
	12-20	10-21	---	6.1-7.3
	20-30	10-21	---	6.1-7.3
	30-37	6.3-18	---	6.6-7.3
	37-44	6.3-18	---	6.6-7.3
	44-50	6.3-18	---	6.6-7.3
	50-61	3.6-13	---	6.6-7.3
Bearrubble-----	0-3	---	---	---
	3-6	29-55	---	6.1-6.6
	6-13	4.0-18	---	6.5-6.6
	13-19	2.9-14	---	6.2-7.0
	19-35	2.9-14	---	6.2-7.0
	35-49	2.5-10	---	6.2-7.5
	49-60	2.5-10	---	6.2-7.5
Rubble land.		---	---	---
142: Cragwash-----	0-2	---	---	---
	2-3	5.3-31	---	5.5-7.0
	3-5	5.3-31	---	5.5-7.0
	5-11	1.3-7.0	---	6.1-7.0
	11-17	5.3-13	---	6.1-7.0
	17-27	1.9-8.1	---	6.1-7.0
	27-38	1.9-8.1	---	6.1-7.0
	38-57	0.5-2.3	---	6.1-7.0
	57-82	0.3-1.7	---	6.1-7.0
143: Andic Durixerpts-----	0-1	---	---	---
	1-3	5.8-12	---	5.6-6.5
	3-12	3.5-10	---	5.6-6.5
	12-19	3.5-10	---	5.6-6.5
	19-24	1.5-10	---	6.1-6.5
	24-31	0.9-4.0	---	6.1-7.3

Soil Survey of Lassen Volcanic National Park, California

Table 28.—Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Effective cation- exchange capacity	Soil reaction
	In	meq/100g	meq/100g	pH
144:				
Xeric Vitricryands, cirque floor-----	0-2	0.5-3.8	---	6.0-7.0
	2-5	1.1-4.9	---	6.0-7.0
	5-13	1.1-4.9	---	6.0-7.0
	13-26	3.8-8.5	---	6.0-7.0
	26-36	3.8-8.5	---	6.0-7.0
	36-46	0.1-9.4	---	6.0-7.0
Humic Xeric Vitricryands-----	0-1	---	---	---
	1-4	---	9-32	4.5-5.5
	4-6	4.1-8.1	---	5.6-6.5
	6-12	3.6-12	---	5.6-7.3
	12-18	3.6-12	---	5.6-7.3
	18-24	3.6-13	---	5.6-7.3
	24-30	3.0-6.1	---	6.1-7.3
145:				
Sueredo-----	0-2	---	---	---
	2-5	---	---	---
	5-9	2.9-10	---	5.5-7.0
	9-13	2.9-10	---	5.5-7.0
	13-16	0.4-8.8	---	5.6-7.0
	16-18	0.4-8.8	---	5.6-7.0
	18-26	4.7-13	---	6.1-7.0
	26-50	2.4-9.6	---	6.1-7.0
	50-76	0.4-3.3	---	6.1-7.0
	76-83	0.2-1.4	---	6.1-7.0
146:				
Sueredo-----	0-2	---	---	---
	2-5	---	---	---
	5-9	2.9-10	---	5.5-7.0
	9-13	2.9-10	---	5.5-7.0
	13-16	0.4-8.8	---	5.6-7.0
	16-18	0.4-8.8	---	5.6-7.0
	18-26	4.7-13	---	6.1-7.0
	26-50	2.4-9.6	---	6.1-7.0
	50-76	0.4-3.3	---	6.1-7.0
	76-83	0.2-1.4	---	6.1-7.0
147:				
Summertown-----	0-2	---	---	---
	2-4	---	---	---
	4-6	7.3-12	---	5.6-6.5
	6-15	3.5-6.7	---	6.1-7.3
	15-22	4.4-10	---	6.1-6.5
	22-31	4.4-10	---	6.1-6.5
	31-43	0.5-4.5	---	6.1-6.5
148:				
Humic Haploxerands, lake terrace-----	0-0	---	---	---
	0-3	30-39	---	5.6-7.3
	3-11	30-39	---	5.6-7.3
	11-18	22-44	---	5.6-7.3
	18-26	11-34	---	6.1-7.3
	26-35	---	---	5.6-7.3

Soil Survey of Lassen Volcanic National Park, California

Table 28.—Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Effective cation- exchange capacity	Soil reaction
	In	meq/100g	meq/100g	pH
148:				
Typic Endoaquands-----	0-2	---	---	---
	2-3	---	---	---
	3-11	9.5-20	---	5.1-6.5
	11-17	9.5-20	---	5.1-6.5
	17-29	8.5-16	---	5.6-6.5
	29-52	1.5-4.7	---	6.1-6.5
	52-57	1.5-4.7	---	6.1-6.5
149:				
Rubble land.				
Rock outcrop, cliffs.				
Emeraldlake-----	0-1	8.8-18	---	5.5-6.5
	1-5	7.9-18	---	5.6-6.5
	5-14	7.2-14	---	5.6-6.5
	14-25	6.9-15	---	6.1-7.0
	25-35	5.0-13	---	6.1-7.0
	35-51	3.4-11	---	6.1-7.0
	51-60	2.5-11	---	6.1-7.0
150:				
Shadowlake-----	0-1	---	---	---
	1-2	8.0-31	---	5.6-7.0
	2-6	7.0-21	---	5.6-7.3
	6-13	7.0-21	---	5.6-7.3
	13-23	7.0-21	---	5.6-7.3
	23-41	1.7-4.5	---	6.6-7.3
	41-51	3.0-6.0	---	5.6-6.5
Terracelake-----	0-1	---	---	---
	1-3	10-25	---	5.5-6.4
	3-7	6.0-12	---	5.5-6.4
	7-19	3.5-13	---	6.2-7.0
	19-24	3.5-13	---	6.2-7.0
	24-37	1.2-7.1	---	6.2-7.0
	---	---	---	---
Acroph-----	0-1	---	---	---
	1-2	30-75	---	5.6-6.7
	2-5	29-75	---	5.6-6.7
	5-11	2.2-6.4	---	5.6-7.0
	11-15	2.2-6.4	---	5.6-7.0
	---	---	---	---
Rock outcrop.				
151:				
Terracelake-----	0-1	---	---	---
	1-3	10-25	---	5.5-6.4
	3-7	6.0-12	---	5.5-6.4
	7-19	3.5-13	---	6.2-7.0
	19-24	3.5-13	---	6.2-7.0
	24-37	1.2-7.1	---	6.2-7.0
	---	---	---	---

Soil Survey of Lassen Volcanic National Park, California

Table 28.—Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Effective cation- exchange capacity	Soil reaction
	In	meq/100g	meq/100g	pH
151:				
Acroph-----	0-1	---	---	---
	1-2	30-75	---	5.6-6.7
	2-5	29-75	---	5.6-6.7
	5-11	2.2-6.4	---	5.6-7.0
	11-15	2.2-6.4	---	5.6-7.0
	---	---	---	---
Rock outcrop.				
Shadowlake-----	0-1	---	---	---
	1-2	8.0-31	---	5.6-7.0
	2-6	7.0-21	---	5.6-7.3
	6-13	7.0-21	---	5.6-7.3
	13-23	7.0-21	---	5.6-7.3
	23-41	1.7-4.5	---	6.6-7.3
	41-51	3.0-6.0	---	5.6-6.5
152:				
Terracelake-----	0-1	---	---	---
	1-3	10-25	---	5.5-6.4
	3-7	6.0-12	---	5.5-6.4
	7-19	3.5-13	---	6.2-7.0
	19-24	3.5-13	---	6.2-7.0
	24-37	1.2-7.1	---	6.2-7.0
	---	---	---	---
Shadowlake-----	0-1	---	---	---
	1-2	8.0-31	---	5.6-7.0
	2-6	7.0-21	---	5.6-7.3
	6-13	7.0-21	---	5.6-7.3
	13-23	7.0-21	---	5.6-7.3
	23-41	1.7-4.5	---	6.6-7.3
	41-51	3.0-6.0	---	5.6-6.5
Acroph-----	0-1	---	---	---
	1-2	30-75	---	5.6-6.7
	2-5	29-75	---	5.6-6.7
	5-11	2.2-6.4	---	5.6-7.0
	11-15	2.2-6.4	---	5.6-7.0
	---	---	---	---
Rock outcrop.				
153:				
Typic Vitrixerands-----	0-2	0.3-1.4	---	5.6-6.5
	2-4	0.3-1.4	---	5.6-6.5
	4-8	0.4-7.4	---	6.1-7.3
	8-18	0.4-7.4	---	6.1-7.3
	18-31	0.4-7.4	---	6.1-7.3
	31-52	0.2-2.3	---	6.1-7.3
Vitrandidic Xerorthents, moraine-----	0-3	0.3-1.4	---	5.6-6.0
	3-9	0.3-1.4	---	5.6-6.0
	9-16	0.2-1.2	---	6.1-6.5
	16-23	0.4-4.5	---	6.1-7.3
	23-37	0.2-2.3	---	6.1-7.3

Soil Survey of Lassen Volcanic National Park, California

Table 28.—Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Effective cation- exchange capacity	Soil reaction
	In	meq/100g	meq/100g	pH
154:				
Typic Vitrixerands-----	0-2	0.3-1.4	---	5.6-6.5
	2-4	0.3-1.4	---	5.6-6.5
	4-8	0.4-7.4	---	6.1-7.3
	8-18	0.4-7.4	---	6.1-7.3
	18-31	0.4-7.4	---	6.1-7.3
	31-52	0.2-2.3	---	6.1-7.3
Vitrandid Xerorthents, moraine-----	0-3	0.3-1.4	---	5.6-6.0
	3-9	0.3-1.4	---	5.6-6.0
	9-16	0.2-1.2	---	6.1-6.5
	16-23	0.4-4.5	---	6.1-7.3
	23-37	0.2-2.3	---	6.1-7.3
155:				
Xeric Vitricryands, pyroclastic surge-----	0-1	---	---	---
	1-3	---	---	---
	3-6	0.7-2.2	---	5.6-6.5
	6-10	1.9-10	---	5.6-7.3
	10-15	5.4-9.6	---	6.1-7.3
	15-27	1.5-8.3	---	6.1-7.3
	27-39	1.5-8.3	---	6.1-7.3
	39-48	5.4-9.6	---	6.1-7.3
	48-60	0.4-1.8	---	6.1-7.3
156:				
Xeric Vitricryands, pyroclastic surge-----	0-1	---	---	---
	1-3	---	---	---
	3-6	0.7-2.2	---	5.6-6.5
	6-10	1.9-10	---	5.6-7.3
	10-15	5.4-9.6	---	6.1-7.3
	15-27	1.5-8.3	---	6.1-7.3
	27-39	1.5-8.3	---	6.1-7.3
	39-48	5.4-9.6	---	6.1-7.3
	48-60	0.4-1.8	---	6.1-7.3
157:				
Typic Vitrixerands, very deep-----	0-2	---	---	---
	2-4	---	---	---
	4-6	6.6-13	---	5.1-7.3
	6-10	6.6-13	---	5.1-7.3
	10-22	3.5-7.4	---	6.1-7.3
	22-31	3.5-7.4	---	6.1-7.3
	31-39	3.5-7.4	---	6.1-7.3
	39-60	0.8-6.0	---	6.1-7.3
158:				
Typic Vitrixerands, unglaciated-----	0-1	---	---	---
	1-3	2.9-12	---	5.6-6.5
	3-8	2.9-9.5	---	6.1-7.3
	8-15	2.9-9.5	---	6.1-7.3
	15-25	2.9-9.5	---	6.1-7.3
	25-39	0.2-3.9	---	6.6-7.3
	---	---	---	---
Rock outcrop rhyodacite.				

Soil Survey of Lassen Volcanic National Park, California

Table 28.—Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Effective cation- exchange capacity	Soil reaction
	In	meq/100g	meq/100g	pH
159:				
Typic Vitrixerands, bouldery-----	0-2	---	---	---
	2-5	2.9-8.0	---	6.1-6.5
	5-11	1.4-6.7	---	6.6-7.3
	11-34	0.4-6.0	---	6.6-7.3
	34-56	0.4-6.0	---	6.6-7.3
	56-60	1.9-8.8	---	6.6-7.3
Typic Vitrixerands, tephra over colluvium---	0-1	---	---	---
	1-2	2.9-30	---	5.1-6.0
	2-4	2.9-30	---	5.1-6.0
	4-7	0.4-9.6	---	5.6-6.5
	7-14	0.4-9.6	---	5.6-6.5
	14-20	3.5-10	---	6.1-6.5
	20-28	1.9-8.1	---	6.1-6.5
	28-41	1.9-8.1	---	6.1-6.5
	41-51	0.8-3.3	---	6.6-7.3
	51-61	0.8-3.3	---	6.6-7.3
Rubble land.				
160:				
Aeric Endoaquents-----	0-2	---	---	---
	2-3	---	---	---
	3-5	0.0-3.0	---	6.1-7.0
	5-7	0.0-3.0	---	6.1-7.0
	7-13	0.0-3.0	---	6.1-7.0
	13-24	0.0-2.6	---	6.1-7.0
	24-30	0.0-2.6	---	6.1-7.0
	30-33	0.0-2.6	---	6.1-7.0
	33-38	0.0-2.6	---	6.1-7.0
	38-63	0.0-2.6	---	6.1-7.0
Humic Haploxerands, stream terrace-----	0-1	---	---	---
	1-4	4.8-14	---	4.5-7.3
	4-7	4.8-14	---	4.5-7.3
	7-17	4.6-13	---	6.1-7.3
	17-28	4.6-14	---	6.1-7.3
	28-48	1.5-8.9	---	6.1-7.3
	48-68	1.4-8.9	---	5.6-7.3
	68-84	1.5-8.9	---	6.1-7.3
Riverwash.				
161:				
Typic Psammaquents-----	0-1	---	---	---
	1-4	0.1-0.5	---	5.6-6.5
	4-5	0.2-0.8	---	6.1-6.5
	5-9	0.0-0.3	---	6.1-6.5
	9-17	0.0-0.3	---	6.1-6.5
	17-26	0.0-0.3	---	6.1-6.5
	26-33	0.0-0.3	---	6.1-6.5
	33-39	0.0-0.3	---	6.1-6.5
	39-48	0.0-0.3	---	6.1-6.5
	48-55	0.0-0.3	---	6.1-6.5
	55-63	0.0-0.3	---	6.1-6.5

Soil Survey of Lassen Volcanic National Park, California

Table 28.—Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Effective cation- exchange capacity	Soil reaction
	In	meq/100g	meq/100g	pH
162: Humic Haploxerands, outwash-----	0-2	---	---	---
	2-8	1.1-5.7	---	6.1-7.3
	8-15	29-36	---	6.1-7.3
	15-28	23-41	---	6.1-7.3
	28-41	14-28	---	6.1-7.3
	41-59	6.8-17	---	6.1-6.5
163: Vitrandic Cryofluvents-----	0-3	---	---	4.0-6.5
	3-8	---	7-13	5.1-5.5
	8-11	1.4-4.1	---	5.6-6.5
	11-13	34-65	---	5.6-6.5
	13-16	28-65	---	5.6-6.5
	16-23	11-53	---	5.6-6.5
	23-28	11-53	---	5.6-6.5
	28-36	11-53	---	5.6-6.5
	36-55	30-65	---	5.6-6.5
	55-61	0.1-4.0	---	6.1-7.3
Aquandic Cryaquepts-----	0-7	24-53	---	5.1-6.5
	7-12	24-53	---	5.1-6.5
	12-14	0.4-24	---	5.6-7.3
	14-20	0.4-24	---	5.6-7.3
	20-28	37-63	---	5.6-7.3
	28-34	0.4-24	---	5.6-7.3
	34-47	0.4-24	---	5.6-7.3
164: Aquepts-----	0-2	---	---	---
	2-6	---	10-37	4.5-6.0
	6-11	13-33	---	6.1-6.5
	11-16	11-17	---	6.1-7.3
	16-26	6.2-17	---	6.1-7.3
	26-45	5.0-11	---	6.1-7.3
Typic Petraquepts, bedrock-----	0-2	---	---	---
	2-7	---	---	---
	7-13	11-44	---	5.6-7.3
	13-28	11-44	---	5.6-7.3
	28-35	3.7-11	---	6.1-7.3
	---	---	---	---
Aquic Haploxerands-----	0-1	---	---	---
	1-2	---	---	5.1-6.5
	2-4	11-31	---	5.1-6.5
	4-9	11-31	---	5.1-6.5
	9-16	12-24	---	6.1-7.3
	16-24	12-24	---	6.1-7.3
	24-39	2.2-6.2	---	6.6-7.3
	39-60	1.9-6.1	---	6.6-7.3
Typic Petraquepts-----	0-2	25-52	---	6.1-7.3
	2-7	17-65	---	6.1-7.3
	7-12	16-26	---	6.1-8.4
	12-19	11-30	---	6.1-8.4
	19-25	13-30	---	6.1-8.4
	25-33	---	---	7.9-8.4

Soil Survey of Lassen Volcanic National Park, California

Table 28.—Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Effective cation- exchange capacity	Soil reaction
	In	meq/100g	meq/100g	pH
165:				
Aquandic Humaquepts-----	0-4	---	---	---
	4-11	13-27	---	5.6-6.5
	11-22	16-29	---	5.6-6.5
	22-28	12-22	---	5.6-7.3
	28-38	12-22	---	5.6-7.3
	38-52	8.8-21	---	6.1-7.3
Histic Humaquepts-----	0-2	---	---	---
	2-6	42-58	---	5.1-6.0
	6-9	---	9-17	5.1-6.0
	9-12	---	9-17	5.1-6.0
	12-21	---	8-14	5.1-6.0
	21-30	---	6-11	5.1-6.0
	30-51	---	3-10	4.5-5.5
	51-62	---	3-10	4.5-5.5
Aquandic Endoaquepts-----	0-4	7.3-25	---	5.6-7.3
	4-12	7.3-25	---	5.6-7.3
	12-22	6.2-14	---	6.1-7.3
	22-35	6.2-14	---	6.1-7.3
	35-41	6.2-18	---	6.1-7.3
	41-49	6.2-18	---	6.1-7.3
	49-59	1.7-8.4	---	6.1-7.3
Terric Haplohemists-----	0-5	---	---	6.1-7.3
	5-20	---	---	6.1-7.3
	20-30	19-32	---	5.1-6.0
	30-35	---	12-20	5.1-6.0
	35-43	---	8-16	4.5-5.0
166:				
Aquic Haploxerands-----	0-1	---	---	---
	1-2	---	---	5.1-6.5
	2-4	11-31	---	5.1-6.5
	4-9	11-31	---	5.1-6.5
	9-16	12-24	---	6.1-7.3
	16-24	12-24	---	6.1-7.3
	24-39	2.2-6.2	---	6.6-7.3
	39-60	1.9-6.1	---	6.6-7.3
Humic Haploxerands, outwash terrace-----	0-1	---	---	---
	1-2	---	---	---
	2-5	29-36	---	5.6-6.5
	5-8	29-36	---	5.6-6.5
	8-15	29-36	---	5.6-6.5
	15-24	15-26	---	5.6-6.5
	24-31	9.0-17	---	6.1-6.5
	31-39	2.9-9.0	---	6.1-6.5
167:				
Emeraldlake-----	0-1	8.8-18	---	5.5-6.5
	1-5	7.9-18	---	5.6-6.5
	5-14	7.2-14	---	5.6-6.5
	14-25	6.9-15	---	6.1-7.0
	25-35	5.0-13	---	6.1-7.0
	35-51	3.4-11	---	6.1-7.0
	51-60	2.5-11	---	6.1-7.0

Soil Survey of Lassen Volcanic National Park, California

Table 28.—Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Effective cation- exchange capacity	Soil reaction
	In	meq/100g	meq/100g	pH
167:				
Readingpeak-----	0-2	8.1-12	---	5.6-6.0
	2-7	8.1-12	---	5.6-6.0
	7-14	6.8-12	---	6.1-6.5
	14-26	6.8-12	---	6.1-6.5
	26-35	4.9-10	---	6.1-7.0
	35-50	4.9-10	---	6.1-7.0
	---	---	---	---
Terracelake-----	0-1	---	---	---
	1-3	10-25	---	5.5-6.4
	3-7	6.0-12	---	5.5-6.4
	7-19	3.5-13	---	6.2-7.0
	19-24	3.5-13	---	6.2-7.0
	24-37	1.2-7.1	---	6.2-7.0
	---	---	---	---
Rock outcrop, dacite.				
168:				
Vitrikerands, low elevation-----	0-1	---	---	---
	1-4	6.6-13	---	5.1-6.5
	4-8	6.6-12	---	5.1-6.5
	8-12	6.6-12	---	5.1-6.5
	12-21	8.6-14	---	5.6-6.5
	21-37	3.8-7.0	---	5.6-7.3
	37-46	0.8-3.3	---	5.6-7.3
169:				
Sueredo-----	0-2	---	---	---
	2-5	---	---	---
	5-9	2.9-10	---	5.5-7.0
	9-13	2.9-10	---	5.5-7.0
	13-16	0.4-8.8	---	5.6-7.0
	16-18	0.4-8.8	---	5.6-7.0
	18-26	4.7-13	---	6.1-7.0
	26-50	2.4-9.6	---	6.1-7.0
	50-76	0.4-3.3	---	6.1-7.0
	76-83	0.2-1.4	---	6.1-7.0
Rock outcrop, cliffs.				
Scoured-----	0-1	---	---	---
	1-4	25-36	---	5.6-6.5
	4-10	23-34	---	5.6-6.5
	10-17	29-36	---	5.6-6.5
	17-30	3.5-13	---	5.6-6.5
	30-39	---	---	---
170:				
Rock outcrop, rhyodacite.				
Emeraldlake-----	0-1	8.8-18	---	5.5-6.5
	1-5	7.9-18	---	5.6-6.5
	5-14	7.2-14	---	5.6-6.5
	14-25	6.9-15	---	6.1-7.0
	25-35	5.0-13	---	6.1-7.0
	35-51	3.4-11	---	6.1-7.0
	51-60	2.5-11	---	6.1-7.0

Soil Survey of Lassen Volcanic National Park, California

Table 28.—Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Effective cation- exchange capacity	Soil reaction
	<u>In</u>	<u>meq/100g</u>	<u>meq/100g</u>	<u>pH</u>
170: Rubble land.				
Readingpeak-----	0-2	8.1-12	---	5.6-6.0
	2-7	8.1-12	---	5.6-6.0
	7-14	6.8-12	---	6.1-6.5
	14-26	6.8-12	---	6.1-6.5
	26-35	4.9-10	---	6.1-7.0
	35-50	4.9-10	---	6.1-7.0
	---	---	---	---
171: Aquepts-----	0-2	---	---	---
	2-6	---	10-37	4.5-6.0
	6-11	13-33	---	6.1-6.5
	11-16	11-17	---	6.1-7.3
	16-26	6.2-17	---	6.1-7.3
	26-45	5.0-11	---	6.1-7.3
Typic Petraquepts, bedrock-----	0-2	---	---	---
	2-7	---	---	---
	7-13	11-44	---	5.6-7.3
	13-28	11-44	---	5.6-7.3
	28-35	3.7-11	---	6.1-7.3
	---	---	---	---
172: Badgerflat-----	0-1	---	---	---
	1-4	8.6-15	---	6.1-6.5
	4-7	8.6-15	---	6.1-6.5
	7-11	7.3-14	---	6.1-7.3
	11-23	7.3-14	---	6.1-7.3
	23-33	2.2-10	---	6.6-7.3
	33-43	0.8-3.4	---	6.6-7.3
173: Badgerwash-----	0-1	---	---	---
	1-4	7.0-14	---	5.5-6.5
	4-9	7.0-14	---	5.5-6.5
	9-13	7.7-13	---	6.1-6.5
	13-20	8.2-15	---	6.1-7.0
	20-35	10-21	---	6.6-7.0
	35-45	---	---	6.6-7.0
174: Vitrandic Cryorthents-----	0-4	0.1-0.5	---	6.1-6.5
	4-9	0.0-0.4	---	6.1-7.3
	9-17	0.0-0.4	---	6.6-7.3
	17-19	0.0-0.4	---	6.6-7.3
	19-27	0.0-0.4	---	6.6-7.3
	27-30	0.0-0.4	---	6.6-7.3
	30-35	0.0-0.4	---	6.6-7.3
	35-38	0.0-0.4	---	6.6-7.3
	38-60	0.0-0.4	---	6.0-7.3

Soil Survey of Lassen Volcanic National Park, California

Table 28.—Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Effective cation- exchange capacity	Soil reaction
	In	meq/100g	meq/100g	pH
174:				
Readingpeak-----	0-2	8.1-12	---	5.6-6.0
	2-7	8.1-12	---	5.6-6.0
	7-14	6.8-12	---	6.1-6.5
	14-26	6.8-12	---	6.1-6.5
	26-35	4.9-10	---	6.1-7.0
	35-50	4.9-10	---	6.1-7.0
	---	---	---	---
Rock outcrop.				
175:				
Shadowlake-----	0-1	---	---	---
	1-2	8.0-31	---	5.6-7.0
	2-6	7.0-21	---	5.6-7.3
	6-13	7.0-21	---	5.6-7.3
	13-23	7.0-21	---	5.6-7.3
	23-41	1.7-4.5	---	6.6-7.3
	41-51	3.0-6.0	---	5.6-6.5
Vitrandic Cryofluvents-----	0-3	---	---	4.0-6.5
	3-8	---	7-13	5.1-5.5
	8-11	1.4-4.1	---	5.6-6.5
	11-13	34-65	---	5.6-6.5
	13-16	28-65	---	5.6-6.5
	16-23	11-53	---	5.6-6.5
	23-28	11-53	---	5.6-6.5
	28-36	11-53	---	5.6-6.5
	36-55	30-65	---	5.6-6.5
	55-61	0.1-4.0	---	6.1-7.3
176:				
Juniperlake, bouldery-----	0-1	---	---	---
	1-4	29-36	---	4.5-6.5
	4-10	21-36	---	5.2-6.5
	10-21	19-28	---	6.1-6.5
	21-30	8.8-23	---	5.5-6.5
	30-47	9.4-24	---	5.5-6.5
	47-56	3.6-14	---	6.1-7.0
177:				
Vitrandic Cryorthents, debris flows, high elevation-----	0-4	0.0-0.5	---	5.6-7.3
	4-13	0.0-0.4	---	6.1-7.3
	13-60	0.0-0.4	---	6.1-7.3
200:				
Cinder land.				
201:				
Lava flows.				

Soil Survey of Lassen Volcanic National Park, California

Table 28.—Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Effective cation- exchange capacity	Soil reaction
	In	meq/100g	meq/100g	pH
202:				
Typic Xerorthents, tephra-----	0-5	0.0-1.0	---	6.1-7.0
	5-8	0.0-1.0	---	6.1-7.0
	8-12	0.0-1.0	---	6.1-7.0
	12-14	0.0-1.0	---	6.1-7.0
	14-25	0.0-1.0	---	6.1-7.0
	25-35	0.0-1.0	---	6.1-7.0
	35-49	0.0-1.0	---	6.1-7.0
	49-60	0.0-1.0	---	6.1-7.0
Typic Xerorthents, welded-----	0-1	0.0-4.0	---	6.6-8.4
	1-3	0.0-4.0	---	6.6-8.4
	3-7	0.0-4.0	---	6.6-8.4
	7-9	0.0-2.0	---	6.6-7.8
	9-12	0.0-4.0	---	6.6-7.8
	12-15	0.0-2.0	---	6.6-7.8
	15-25	0.0-0.8	---	6.6-7.3
	25-26	0.0-0.8	---	6.6-7.3
	26-34	0.0-0.8	---	6.6-7.3
	34-37	0.0-0.8	---	6.6-7.3
	37-39	0.0-0.8	---	6.6-7.3
	39-43	0.0-0.8	---	6.6-7.3
	43-59	0.0-0.8	---	6.6-7.3
203:				
Typic Xerorthents, tephra-----	0-5	0.0-1.0	---	6.1-7.0
	5-8	0.0-1.0	---	6.1-7.0
	8-12	0.0-1.0	---	6.1-7.0
	12-14	0.0-1.0	---	6.1-7.0
	14-25	0.0-1.0	---	6.1-7.0
	25-35	0.0-1.0	---	6.1-7.0
	35-49	0.0-1.0	---	6.1-7.0
	49-60	0.0-1.0	---	6.1-7.0
205.				
Beaches				
W.				
Water				

Table 29.—Water Features

(Depths of layers are in feet. See text for definitions of terms used in this table. Estimates of the frequency of ponding and flooding apply to the whole year rather than to individual months. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Map symbol and soil name	Hydro- logic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Feet	Feet	Feet				
100: Buttelake-----	A	Jan-Dec	---	---	---	---	None	---	None
101: Buttewash-----	A	Jan-Dec	---	---	---	---	None	---	None
102: Ashbutte-----	A	Jan-Dec	---	---	---	---	None	---	None
Vitrandic Xerorthents-----	A	Jan-Dec	---	---	---	---	None	---	None
103: Scoured-----	B	Jan-Dec	---	---	---	---	None	---	None
104: Scoured-----	B	Jan-Dec	---	---	---	---	None	---	None
Juniperlake-----	A	Jan-Dec	---	---	---	---	None	---	None
Rock outcrop.									
105: Juniperlake-----	A	Jan-Dec	---	---	---	---	None	---	None
106: Cenplat-----	B	Jan-Dec	---	---	---	---	None	---	None
107: Badgerflat-----	B	Jan-Dec	---	---	---	---	None	---	None
Cenplat-----	B	Jan-Dec	---	---	---	---	None	---	None
Typic Xerorthents-----	A	Jan-Dec	---	---	---	---	None	---	None

Table 29.—Water Features—Continued

Map symbol and soil name	Hydro- logic group	Month	Water table		Ponding		Flooding		
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Feet	Feet	Feet				
109: Prospectpeak-----	A	Jan-Dec	---	---	---	---	None	---	None
110: Bearrubble----- Rubble land.	A	Jan-Dec	---	---	---	---	None	---	None
111: Vitrandic Xerorthents, debris fan-----	A	Jan-Dec	---	---	---	---	None	---	None
112: Cascadesprings-----	B	Jan-Dec	---	---	---	---	None	---	None
113: Terracelake----- Emeraldlake----- Readingpeak----- Rock outcrop.	B A A	Jan-Dec Jan-Dec Jan-Dec	---	---	---	---	None None None	---	None None None
114: Emeraldlake----- Terracelake----- Readingpeak----- Rock outcrop. Rubble land.	A B A	Jan-Dec Jan-Dec Jan-Dec	---	---	---	---	None None None	---	None None None
115: Shadowlake-----	A	Jan-Dec	---	---	---	---	None	---	None
116: Xeric Vitricryands, tephra over till----- Terracelake----- Rock outcrop. Xeric Vitricryands, cirque floor-----	A B B	Jan-Dec Jan-Dec Jan-Dec	---	---	---	---	None None None	---	None None None

Table 29.--Water Features--Continued

Map symbol and soil name	Hydro- logic group	Month	Water table		Ponding		Flooding		
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Feet	Feet	Feet				
117: Humic Haploxerands, moist lake terrace---	C	January	1.6-5.0	1.7-5.0	---	---	None	---	None
		February	1.6-5.0	1.7-5.0	---	---	None	---	None
		March	1.6-5.0	1.7-5.0	---	---	None	---	None
		April	1.6-5.0	1.7-5.0	---	---	None	---	None
		May	1.6-5.0	1.7-5.0	---	---	None	---	None
		June	1.6-5.0	1.7-5.0	---	---	None	---	None
		December	1.6-5.0	1.7-5.0	---	---	None	---	None
118: Typic Dystroxerepts, landslides-----	A	Jan-Dec	---	---	---	---	None	---	None
119: Diamondpeak-----	B	Jan-Dec	---	---	---	---	None	---	None
Brokeoff-----	B	Jan-Dec	---	---	---	---	None	---	None
Endoaquepts-----	C	January	0.0-6.7	---	---	---	None	---	None
		February	0.0-6.7	---	---	---	None	---	None
		March	0.0-6.7	---	---	---	None	---	None
		April	0.0-6.7	---	---	---	None	---	None
		May	0.0-6.7	---	---	---	None	---	None
		June	0.0-6.7	---	---	---	None	---	None
		July	0.0-6.7	---	---	---	None	---	None
		December	0.0-6.7	---	---	---	None	---	None
Aquic Dystroxerepts, debris flows-----	C	January	0.0-6.7	---	---	---	None	---	None
		February	0.0-6.7	---	---	---	None	---	None
		March	0.0-6.7	---	---	---	None	---	None
		April	0.0-6.7	---	---	---	None	---	None
		May	0.0-6.7	---	---	---	None	---	None
		June	0.0-6.7	---	---	---	None	---	None
		July	0.0-6.7	---	---	---	None	---	None
		December	0.0-6.7	---	---	---	None	---	None
Typic Dystroxerepts-----	B	Jan-Dec	---	---	---	---	None	---	None
120: Buttelake-----	A	Jan-Dec	---	---	---	---	None	---	None
Sunhoff-----	B	Jan-Dec	---	---	---	---	None	---	None
Talved-----	A	Jan-Dec	---	---	---	---	None	---	None

Table 29.—Water Features—Continued

Map symbol and soil name	Hydro- logic group	Month	Water table		Ponding		Flooding		
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Feet	Feet	Feet				
122:									
Xeric Vitricryands, colluvium-----	A	Jan-Dec	---	---	---	---	None	---	None
Xeric Vitricryands, ash over cinders-----	A	Jan-Dec	---	---	---	---	None	---	None
Xeric Vitricryands, bedrock-----	B	Jan-Dec	---	---	---	---	None	---	None
125:									
Humic Haploxerands, stream terrace-----	C	January	2.0-6.7	---	---	---	None	---	None
		February	2.0-6.7	---	---	---	None	---	None
		March	2.0-6.7	---	---	---	None	---	None
		April	2.0-6.7	---	---	---	None	---	None
		May	2.0-6.7	---	---	---	None	---	None
		June	2.0-6.7	---	---	---	None	---	None
		December	2.0-6.7	---	---	---	None	---	None
Aquandic Humaquepts, flood plains-----	C	January	0.0-4.3	---	---	---	None	Brief	Rare
		February	0.0-4.3	---	---	---	None	Brief	Rare
		March	0.0-4.3	---	---	---	None	Long	Occasional
		April	0.0-4.3	---	---	---	None	Long	Frequent
		May	0.0-4.3	---	---	---	None	Long	Frequent
		June	0.0-4.3	---	---	---	None	Long	Frequent
		July	0.0-4.3	---	---	---	None	Brief	Occasional
		August	0.0-4.3	---	---	---	None	---	None
		September	0.0-4.3	---	---	---	None	---	None
		October	0.0-4.3	---	---	---	None	---	None
		November	0.0-4.3	---	---	---	None	---	None
		December	0.0-4.3	---	---	---	None	Brief	Rare
126:									
Kingsiron-----	A	Jan-Dec	---	---	---	---	None	---	None
Dittmar-----	D	Jan-Dec	---	---	---	---	None	---	None
Rock outcrop.									
127:									
Humic Haploxerands, strath terrace-----	B	Jan-Dec	---	---	---	---	None	---	None

Table 29.—Water Features—Continued

Map symbol and soil name	Hydro- logic group	Month	Water table			Ponding		Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Feet	Feet	Feet				
127: Aquepts-----	C	January	0.0-0.9	3.3-6.7	---	---	None	---	None
		February	0.0-0.9	3.3-6.7	---	---	None	---	None
		March	0.0-0.9	3.3-6.7	---	---	None	---	None
		April	0.0-0.9	3.3-6.7	---	---	None	---	None
		May	0.0-0.9	3.3-6.7	---	---	None	---	None
		June	0.0-0.9	3.3-6.7	---	---	None	---	None
		July	0.0-4.1	3.3-6.7	---	---	None	---	None
		August	0.9-4.1	3.3-6.7	---	---	None	---	None
		September	0.9-4.1	3.3-6.7	---	---	None	---	None
		October	0.9-4.1	3.3-6.7	---	---	None	---	None
		November	0.9-4.1	3.3-6.7	---	---	None	---	None
		December	0.9-4.1	3.3-6.7	---	---	None	---	None
129: Humic Haploxerands, colluvium-----	A	Jan-Dec	---	---	---	---	None	---	None
130: Histic Humaquepts, lake sediments-----	C	January	0.0-5.0	---	0.1-0.5	Long	Occasional	---	None
		February	0.0-5.0	---	0.1-0.5	Long	Occasional	---	None
		March	0.0-5.0	---	0.1-0.5	Long	Frequent	---	None
		April	0.0-5.0	---	0.1-0.5	Long	Frequent	---	None
		May	0.0-5.0	---	0.1-0.5	Long	Frequent	---	None
		June	0.0-5.0	---	0.1-0.5	Long	Frequent	---	None
		July	0.0-5.0	---	0.1-0.5	Long	Frequent	---	None
		August	0.0-5.0	---	0.1-0.5	Long	Occasional	---	None
		September	0.0-5.0	---	0.1-0.5	Long	Rare	---	None
		October	0.0-5.0	---	0.1-0.5	Long	Rare	---	None
		November	0.0-5.0	---	0.1-0.5	Long	Rare	---	None
		December	0.0-5.0	---	0.1-0.5	Long	Occasional	---	None
Histic Humaquepts, frequently flooded----	C	January	0.0-5.0	---	---	---	None	Long	Rare
		February	0.0-5.0	---	---	---	None	Long	Rare
		March	0.0-5.0	---	---	---	None	Long	Occasional
		April	0.0-5.0	---	---	---	None	Long	Frequent
		May	0.0-5.0	---	---	---	None	Long	Frequent
		June	0.0-5.0	---	---	---	None	Long	Frequent
		July	0.0-5.0	---	---	---	None	Long	Frequent
		August	0.0-5.0	---	---	---	None	Long	Occasional
		September	0.0-5.0	---	---	---	None	Brief	Rare
		October	0.0-5.0	---	---	---	None	Brief	Rare
		November	0.0-5.0	---	---	---	None	Brief	Rare
		December	0.0-5.0	---	---	---	None	Brief	None

Table 29.—Water Features—Continued

Map symbol and soil name	Hydro- logic group	Month	Water table		Ponding		Flooding		
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Feet	Feet	Feet				
130: Typic Endoaquands-----	C	January	0.0-5.0	---	---	---	None	Brief	Rare
		February	0.0-5.0	---	---	---	None	Brief	Rare
		March	0.0-5.0	---	---	---	None	Long	Occasional
		April	0.0-5.0	---	---	---	None	Long	Frequent
		May	0.0-5.0	---	---	---	None	Long	Frequent
		June	0.0-5.0	---	---	---	None	Long	Frequent
		July	0.0-5.0	---	---	---	None	Long	Occasional
		August	0.0-5.0	---	---	---	None	---	None
		September	0.0-5.0	---	---	---	None	---	None
		October	0.0-5.0	---	---	---	None	---	None
		November	0.0-5.0	---	---	---	None	---	None
		December	0.0-5.0	---	---	---	None	Brief	Rare
132: Vitrandic Cryorthents, debris flows-----	B	Jan-Dec	---	---	---	---	None	---	None
133: Vitrandic Xerofluvents-----	A	Jan-Dec	---	---	---	---	None	---	None
Typic Endoaquents-----	C	January	0.0-3.2	---	---	---	None	Brief	Occasional
		February	0.0-3.2	---	---	---	None	Brief	Occasional
		March	0.0-3.2	---	---	---	None	Long	Frequent
		April	0.0-3.2	---	---	---	None	Long	Frequent
		May	0.0-3.2	---	---	---	None	Long	Frequent
		June	0.0-3.2	---	---	---	None	Long	Frequent
		July	0.0-3.2	---	---	---	None	Brief	Occasional
		August	0.0-3.2	---	---	---	None	---	None
		September	0.0-3.2	---	---	---	None	---	None
		October	0.0-3.2	---	---	---	None	---	None
		November	0.0-3.2	---	---	---	None	---	None
		December	0.0-3.2	---	---	---	None	Brief	Rare
134: Chaos-----	A	Jan-Dec	---	---	---	---	None	---	None
136: Terracelake-----	B	Jan-Dec	---	---	---	---	None	---	None
Rock outcrop. Xeric Vitricryands, cirque floor-----	B	Jan-Dec	---	---	---	---	None	---	None

Table 29.—Water Features—Continued

Map symbol and soil name	Hydro- logic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Feet	Feet	Feet				
137: Xeric Vitricryands----- Rock outcrop, rhyodacite.	A	Jan-Dec	---	---	---	---	None	---	None
138: Vitrandic Xerofluvents, debris flows-----	C	January	0.8-5.0	---	---	---	None	---	None
		February	0.8-5.0	---	---	---	None	---	None
		March	0.8-5.0	---	---	---	None	---	None
		April	0.8-5.0	---	---	---	None	---	None
		May	0.8-5.0	---	---	---	None	---	None
		June	0.8-5.0	---	---	---	None	---	None
		July	0.8-5.0	---	---	---	None	---	None
		December	0.8-5.0	---	---	---	None	---	None
Typic Endoaquents-----	C	January	0.0-3.2	---	---	---	None	Brief	Occasional
		February	0.0-3.2	---	---	---	None	Brief	Occasional
		March	0.0-3.2	---	---	---	None	Long	Frequent
		April	0.0-3.2	---	---	---	None	Long	Frequent
		May	0.0-3.2	---	---	---	None	Long	Frequent
		June	0.0-3.2	---	---	---	None	Long	Frequent
		July	0.0-3.2	---	---	---	None	Brief	Occasional
		August	0.0-3.2	---	---	---	None	---	None
		September	0.0-3.2	---	---	---	None	---	None
		October	0.0-3.2	---	---	---	None	---	None
		November	0.0-3.2	---	---	---	None	---	None
		December	0.0-3.2	---	---	---	None	Brief	Rare
139: Duric Vitraquands-----	C	January	0.6-5.0	3.3-5.0	---	---	None	---	None
		February	0.6-5.0	3.3-5.0	---	---	None	---	None
		March	0.6-5.0	3.3-5.0	---	---	None	---	None
		April	0.6-5.0	3.3-5.0	---	---	None	---	None
		May	0.6-5.0	3.3-5.0	---	---	None	---	None
		June	0.6-5.0	3.3-5.0	---	---	None	---	None
		December	0.6-5.0	3.3-5.0	---	---	None	---	None

Table 29.—Water Features—Continued

Map symbol and soil name	Hydro- logic group	Month	Water table		Ponding		Flooding		
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Feet	Feet	Feet				
139: Typic Endoaquands-----	C	January	0.0-5.0	---	---	---	None	Brief	Rare
		February	0.0-5.0	---	---	---	None	Brief	Rare
		March	0.0-5.0	---	---	---	None	Long	Occasional
		April	0.0-5.0	---	---	---	None	Long	Frequent
		May	0.0-5.0	---	---	---	None	Long	Frequent
		June	0.0-5.0	---	---	---	None	Long	Frequent
		July	0.0-5.0	---	---	---	None	Long	Occasional
		August	0.0-5.0	---	---	---	None	---	None
		September	0.0-5.0	---	---	---	None	---	None
		October	0.0-5.0	---	---	---	None	---	None
		November	0.0-5.0	---	---	---	None	---	None
		December	0.0-5.0	---	---	---	None	Brief	Rare
Aquandic Cryaquents-----		C	January	0.0-3.3	---	---	---	None	Long
	February		0.0-3.3	---	---	---	None	Long	Rare
	March		0.0-3.3	---	---	---	None	Long	Occasional
	April		0.0-3.3	---	---	---	None	Long	Frequent
	May		0.0-3.3	---	---	---	None	Long	Frequent
	June		0.0-3.3	---	---	---	None	Long	Frequent
	July		0.0-3.3	---	---	---	None	Long	Frequent
	August		0.0-3.3	---	---	---	None	Long	Occasional
	September		0.0-3.3	---	---	---	None	Brief	Rare
	October		0.0-3.3	---	---	---	None	Brief	Rare
	November		0.0-3.3	---	---	---	None	Brief	Rare
	December		0.0-3.3	---	---	---	None	Brief	None
140: Vitriixerands-----	B		Jan-Dec	---	---	---	---	None	---
141: Humic Haploxerands-----	A	Jan-Dec	---	---	---	---	None	---	None
Typic Haploxerands-----	A	Jan-Dec	---	---	---	---	None	---	None
Bearrubble-----	A	Jan-Dec	---	---	---	---	None	---	None
Rubble land.		Jan-Dec	---	---	---	---	None	---	None
142: Cragwash-----	A	Jan-Dec	---	---	---	---	None	---	None

Table 29.—Water Features—Continued

Map symbol and soil name	Hydro- logic group	Month	Water table		Ponding		Flooding		
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Feet	Feet	Feet				
143: Andic Durixerpts-----	B	Jan-Dec	---	---	---	---	None	---	None
144: Xeric Vitricryands, cirque floor-----	B	Jan-Dec	---	---	---	---	None	---	None
Humic Xeric Vitricryands-----	B	Jan-Dec	---	---	---	---	None	---	None
145: Sueredo-----	A	Jan-Dec	---	---	---	---	None	---	None
146: Sueredo-----	A	Jan-Dec	---	---	---	---	None	---	None
147: Summertown-----	B	Jan-Dec	---	---	---	---	None	---	None
148: Humic Haploxerands, lake terrace-----	B	Jan-Dec	---	---	---	---	None	---	None
Typic Endoaquands-----	C	January	0.0-5.0	---	---	---	None	Brief	Rare
		February	0.0-5.0	---	---	---	None	Brief	Rare
		March	0.0-5.0	---	---	---	None	Long	Occasional
		April	0.0-5.0	---	---	---	None	Long	Frequent
		May	0.0-5.0	---	---	---	None	Long	Frequent
		June	0.0-5.0	---	---	---	None	Long	Frequent
		July	0.0-5.0	---	---	---	None	Long	Occasional
		August	0.0-5.0	---	---	---	None	---	None
		September	0.0-5.0	---	---	---	None	---	None
		October	0.0-5.0	---	---	---	None	---	None
		November	0.0-5.0	---	---	---	None	---	None
		December	0.0-5.0	---	---	---	None	Brief	Rare
149: Rubble land. Rock outcrop, cliffs. Emeraldlake-----	A	Jan-Dec	---	---	---	---	None	---	None

Table 29.—Water Features—Continued

Map symbol and soil name	Hydro- logic group	Month	Water table		Surface water depth	Ponding		Flooding	
			Upper limit	Lower limit		Duration	Frequency	Duration	Frequency
			Feet	Feet	Feet				
150:									
Shadowlake-----	A	Jan-Dec	---	---	---	---	None	---	None
Terracelake-----	B	Jan-Dec	---	---	---	---	None	---	None
Acroph-----	D	Jan-Dec	---	---	---	---	None	---	None
Rock outcrop.									
151:									
Terracelake-----	B	Jan-Dec	---	---	---	---	None	---	None
Acroph-----	D	Jan-Dec	---	---	---	---	None	---	None
Rock outcrop.									
Shadowlake-----	A	Jan-Dec	---	---	---	---	None	---	None
152:									
Terracelake-----	B	Jan-Dec	---	---	---	---	None	---	None
Shadowlake-----	A	Jan-Dec	---	---	---	---	None	---	None
Acroph-----	D	Jan-Dec	---	---	---	---	None	---	None
Rock outcrop.									
153:									
Typic Vitrixerands-----	B	Jan-Dec	---	---	---	---	None	---	None
Vitrandic Xerorthents, moraine-----	B	Jan-Dec	---	---	---	---	None	---	None
154:									
Typic Vitrixerands-----	B	Jan-Dec	---	---	---	---	None	---	None
Vitrandic Xerorthents, moraine-----	B	Jan-Dec	---	---	---	---	None	---	None
155:									
Xeric Vitricryands, pyroclastic surge----	A	Jan-Dec	---	---	---	---	None	---	None
156:									
Xeric Vitricryands, pyroclastic surge----	A	Jan-Dec	---	---	---	---	None	---	None

Table 29.—Water Features—Continued

Map symbol and soil name	Hydro- logic group	Month	Water table		Surface water depth	Ponding		Flooding	
			Upper limit	Lower limit		Duration	Frequency	Duration	Frequency
			Feet	Feet	Feet				
157: Typic Vitrixerands, very deep-----	A	Jan-Dec	---	---	---	---	None	---	None
158: Typic Vitrixerands, unglaciated----- Rock outcrop, rhyodacite.	B	Jan-Dec	---	---	---	---	None	---	None
159: Typic Vitrixerands, bouldery----- Typic Vitrixerands, tephra over colluvium Rubble land.	A A	Jan-Dec Jan-Dec	---	---	---	---	None None	---	None None
160: Aeric Endoaquents----- Humic Haploxerands, stream terrace----- Riverwash.	C B	January February March April May June December	1.1-6.7 1.1-6.7 1.1-6.7 1.1-6.7 1.1-6.7 1.1-6.7 1.1-6.7	--- --- --- --- --- --- ---	--- --- --- --- --- --- ---	--- --- --- --- --- --- ---	None None None None None None None	Brief Brief Long Long Long Long Brief	Rare Rare Occasional Occasional Occasional Occasional Rare
161: Typic Psammaquents----- Riverwash.	C	January February March April May June July December	0.0-5.0 0.0-5.0 0.0-5.0 0.0-5.0 0.0-5.0 0.0-5.0 --- 0.0-5.0	--- --- --- --- --- --- --- ---	--- --- --- --- --- --- --- ---	--- --- --- --- --- --- --- ---	None None None None None None None None	Brief Brief Long Long Long Long Brief Brief	Rare Rare Occasional Occasional Occasional Occasional Rare Rare

Table 29.--Water Features--Continued

Map symbol and soil name	Hydro- logic group	Month	Water table			Ponding		Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Feet	Feet	Feet				
162: Humic Haploxerands, outwash-----	A	Jan-Dec	---	---	---	---	None	---	None
163: Vitrandic Cryofluvents-----	C	January	0.0-5.0	---	0.1-0.5	Long	Occasional	---	None
		February	0.0-5.0	---	0.1-0.5	Long	Occasional	---	None
		March	0.0-5.0	---	0.1-0.5	Long	Frequent	---	None
		April	0.0-5.0	---	0.1-0.5	Long	Frequent	---	None
		May	0.0-5.0	---	0.1-0.5	Long	Frequent	---	None
		June	0.0-5.0	---	0.1-0.5	Long	Frequent	---	None
		July	0.0-5.0	---	0.1-0.5	Long	Frequent	---	None
		August	0.0-5.0	---	0.1-0.5	Long	Occasional	---	None
		September	0.0-5.0	---	0.1-0.5	Long	Rare	---	None
		October	0.0-5.0	---	0.1-0.5	Long	Rare	---	None
		November	0.0-5.0	---	0.1-0.5	Long	Rare	---	None
		December	0.0-5.0	---	0.1-0.5	Long	Occasional	---	None
Aquandic Cryaquents-----	C	January	0.0-3.3	---	---	---	None	Long	Rare
		February	0.0-3.3	---	---	---	None	Long	Rare
		March	0.0-3.3	---	---	---	None	Long	Occasional
		April	0.0-3.3	---	---	---	None	Long	Frequent
		May	0.0-3.3	---	---	---	None	Long	Frequent
		June	0.0-3.3	---	---	---	None	Long	Frequent
		July	0.0-3.3	---	---	---	None	Long	Frequent
		August	0.0-3.3	---	---	---	None	Long	Occasional
		September	0.0-3.3	---	---	---	None	Brief	Rare
		October	0.0-3.3	---	---	---	None	Brief	Rare
		November	0.0-3.3	---	---	---	None	Brief	Rare
		December	0.0-3.3	---	---	---	None	Brief	None
164: Aquepts-----	C	January	0.0-0.9	3.3-6.7	---	---	None	---	None
		February	0.0-0.9	3.3-6.7	---	---	None	---	None
		March	0.0-0.9	3.3-6.7	---	---	None	---	None
		April	0.0-0.9	3.3-6.7	---	---	None	---	None
		May	0.0-0.9	3.3-6.7	---	---	None	---	None
		June	0.0-0.9	3.3-6.7	---	---	None	---	None
		July	0.0-4.1	3.3-6.7	---	---	None	---	None
		August	0.9-4.1	3.3-6.7	---	---	None	---	None
		September	0.9-4.1	3.3-6.7	---	---	None	---	None
		October	0.9-4.1	3.3-6.7	---	---	None	---	None
		November	0.9-4.1	3.3-6.7	---	---	None	---	None
		December	0.9-4.1	3.3-6.7	---	---	None	---	None

Table 29.—Water Features—Continued

Map symbol and soil name	Hydro- logic group	Month	Water table		Surface water depth	Ponding		Flooding	
			Upper limit	Lower limit		Duration	Frequency	Duration	Frequency
			Feet	Feet	Feet				
164: Typic Petraquepts, bedrock-----	D	January	0.0-0.6	0.8-3.3	---	---	None	---	None
		February	0.0-0.6	0.8-3.3	---	---	None	---	None
		March	0.0-0.6	0.8-3.3	---	---	None	---	None
		April	0.0-0.6	0.8-3.3	---	---	None	---	None
		May	0.0-0.6	0.8-3.3	---	---	None	---	None
		June	0.0-0.6	0.8-3.3	---	---	None	---	None
		July	0.0-0.8	0.8-3.3	---	---	None	---	None
		August	0.0-0.8	0.8-3.3	---	---	None	---	None
		September	0.0-0.8	0.8-3.3	---	---	None	---	None
		October	0.0-0.8	0.8-3.3	---	---	None	---	None
		November	0.0-0.8	0.8-3.3	---	---	None	---	None
		December	0.0-0.8	0.8-3.3	---	---	None	---	None
Aquic Haploxerands-----	C	January	1.3-5.0	1.7-5.0	---	---	None	---	None
		February	1.3-5.0	1.7-5.0	---	---	None	---	None
		March	1.3-5.0	1.7-5.0	---	---	None	---	None
		April	1.3-5.0	1.7-5.0	---	---	None	---	None
		May	1.3-5.0	1.7-5.0	---	---	None	---	None
		June	1.3-5.0	1.7-5.0	---	---	None	---	None
		December	1.3-5.0	1.7-5.0	---	---	None	---	None
Typic Petraquepts-----	D	January	0.0-0.6	---	---	---	None	---	None
		February	0.0-0.6	---	---	---	None	---	None
		March	0.0-0.6	---	---	---	None	---	None
		April	0.0-0.6	---	---	---	None	---	None
		May	0.0-0.6	---	---	---	None	---	None
		June	0.0-0.6	---	---	---	None	---	None
		July	0.6-2.5	---	---	---	None	---	None
		August	0.6-2.5	---	---	---	None	---	None
		September	0.6-2.5	---	---	---	None	---	None
		October	0.6-2.5	---	---	---	None	---	None
		November	0.6-2.5	---	---	---	None	---	None
		December	0.6-2.5	---	---	---	None	---	None

Table 29.—Water Features—Continued

Map symbol and soil name	Hydro- logic group	Month	Water table		Ponding		Flooding		
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Feet	Feet	Feet				
165: Aquandic Humaquepts-----	C	January	0.0-5.0	---	0.1-0.5	Long	Occasional	---	None
		February	0.0-5.0	---	0.1-0.5	Long	Occasional	---	None
		March	0.0-5.0	---	0.1-0.5	Long	Occasional	---	None
		April	0.0-5.0	---	0.1-0.5	Long	Frequent	---	None
		May	0.0-5.0	---	0.1-0.5	Long	Frequent	---	None
		June	0.0-5.0	---	0.1-0.5	Long	Frequent	---	None
		July	0.0-5.0	---	0.1-0.5	Long	Occasional	---	None
		August	0.0-5.0	---	0.1-0.5	Long	Rare	---	None
		September	0.0-5.0	---	0.1-0.5	Long	Rare	---	None
		October	0.0-5.0	---	0.1-0.5	Long	Rare	---	None
		November	0.0-5.0	---	0.1-0.5	Long	Rare	---	None
		December	0.0-5.0	---	0.1-0.5	Long	Occasional	---	None
Histic Humaquepts-----	C	January	0.0-5.0	---	---	---	None	Brief	Rare
		February	0.0-5.0	---	---	---	None	Brief	Rare
		March	0.0-5.0	---	---	---	None	Brief	Rare
		April	0.0-5.0	---	---	---	None	Brief	Rare
		May	0.0-5.0	---	---	---	None	Brief	Rare
		June	0.0-5.0	---	---	---	None	---	None
		July	0.0-5.0	---	---	---	None	---	None
		August	0.0-5.0	---	---	---	None	---	None
		September	0.0-5.0	---	---	---	None	---	None
		October	0.0-5.0	---	---	---	None	---	None
		November	0.0-5.0	---	---	---	None	---	None
		December	0.0-5.0	---	---	---	None	Brief	Rare
Aquandic Endoaquepts-----	C	January	1.0-3.0	---	---	---	None	---	None
		February	1.0-3.0	---	---	---	None	---	None
		March	1.0-3.0	---	---	---	None	---	None
		April	1.0-3.0	---	---	---	None	---	None
		May	1.0-3.0	---	---	---	None	---	None
		June	1.0-3.0	---	---	---	None	---	None
		July	3.0-4.2	---	---	---	None	---	None
		August	3.0-4.2	---	---	---	None	---	None
		September	3.0-4.2	---	---	---	None	---	None
		October	3.0-4.2	---	---	---	None	---	None
		November	3.0-4.2	---	---	---	None	---	None
		December	1.0-3.0	---	---	---	None	---	None

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Table 29.--Water Features--Continued

Map symbol and soil name	Hydro- logic group	Month	Water table		Ponding		Flooding		
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Feet	Feet	Feet				
165: Terric Haplohemists-----	D	January	0.0-2.0	---	0.1-0.5	Long	Occasional	---	None
		February	0.0-2.0	---	0.1-0.5	Long	Occasional	---	None
		March	0.0-2.0	---	0.1-0.5	Long	Occasional	---	None
		April	0.0-2.0	---	0.1-0.5	Long	Frequent	---	None
		May	0.0-2.0	---	0.1-0.5	Long	Frequent	---	None
		June	0.0-2.0	---	0.1-0.5	Long	Frequent	---	None
		July	0.0-2.0	---	0.1-0.5	Long	Rare	---	None
		August	0.0-2.0	---	0.1-0.5	Long	Rare	---	None
		September	0.0-2.0	---	0.1-0.5	Long	Occasional	---	None
		October	0.0-2.0	---	0.1-0.5	Long	Occasional	---	None
		November	0.0-2.0	---	0.1-0.5	Long	Occasional	---	None
		December	0.0-2.0	---	0.1-0.5	Long	Occasional	---	None
166: Aquic Haploxerands-----	C	January	1.3-5.0	1.7-5.0	---	---	None	---	None
		February	1.3-5.0	1.7-5.0	---	---	None	---	None
		March	1.3-5.0	1.7-5.0	---	---	None	---	None
		April	1.3-5.0	1.7-5.0	---	---	None	---	None
		May	1.3-5.0	1.7-5.0	---	---	None	---	None
		June	1.3-5.0	1.7-5.0	---	---	None	---	None
		December	1.3-5.0	1.7-5.0	---	---	None	---	None
Humic Haploxerands, outwash terrace-----	B	Jan-Dec	---	---	---	---	None	---	None
167: Emeraldlake-----	A	Jan-Dec	---	---	---	---	None	---	None
Readingpeak-----	A	Jan-Dec	---	---	---	---	None	---	None
Terracelake-----	B	Jan-Dec	---	---	---	---	None	---	None
Rock outcrop, dacite.									
168: Vitrixerands, low elevation-----	B	Jan-Dec	---	---	---	---	None	---	None
169: Sueredo-----	A	Jan-Dec	---	---	---	---	None	---	None
Rock outcrop, cliffs.									
Scoured-----	B	Jan-Dec	---	---	---	---	None	---	None

Table 29.—Water Features—Continued

Map symbol and soil name	Hydro- logic group	Month	Water table		Ponding		Flooding		
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Feet	Feet	Feet				
170: Rock outcrop, rhyodacite. Emeraldlake-----	A	Jan-Dec	---	---	---	---	None	---	None
Rubble land. Readingpeak-----	A	Jan-Dec	---	---	---	---	None	---	None
171: Aquepts-----	C	January	0.0-0.9	3.3-6.7	---	---	None	---	None
		February	0.0-0.9	3.3-6.7	---	---	None	---	None
		March	0.0-0.9	3.3-6.7	---	---	None	---	None
		April	0.0-0.9	3.3-6.7	---	---	None	---	None
		May	0.0-0.9	3.3-6.7	---	---	None	---	None
		June	0.0-0.9	3.3-6.7	---	---	None	---	None
		July	0.0-4.1	3.3-6.7	---	---	None	---	None
		August	0.9-4.1	3.3-6.7	---	---	None	---	None
		September	0.9-4.1	3.3-6.7	---	---	None	---	None
		October	0.9-4.1	3.3-6.7	---	---	None	---	None
		November	0.9-4.1	3.3-6.7	---	---	None	---	None
		December	0.9-4.1	3.3-6.7	---	---	None	---	None
Typic Petraquepts, bedrock-----	D	January	0.0-0.6	0.8-3.3	---	---	None	---	None
		February	0.0-0.6	0.8-3.3	---	---	None	---	None
		March	0.0-0.6	0.8-3.3	---	---	None	---	None
		April	0.0-0.6	0.8-3.3	---	---	None	---	None
		May	0.0-0.6	0.8-3.3	---	---	None	---	None
		June	0.0-0.6	0.8-3.3	---	---	None	---	None
		July	0.0-3.3	0.8-3.3	---	---	None	---	None
		August	2.8-3.3	0.8-3.3	---	---	None	---	None
		September	2.8-3.3	0.8-3.3	---	---	None	---	None
		October	2.8-3.3	0.8-3.3	---	---	None	---	None
		November	2.8-3.3	0.8-3.3	---	---	None	---	None
		December	2.8-3.3	0.8-3.3	---	---	None	---	None
172: Badgerflat-----	B	Jan-Dec	---	---	---	---	None	---	None
173: Badgerwash-----	B	Jan-Dec	---	---	---	---	None	---	None

Table 29.--Water Features--Continued

Map symbol and soil name	Hydro- logic group	Month	Water table		Ponding		Flooding		
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Feet	Feet	Feet				
174:									
Vitrandid Cryorthents-----	A	Jan-Dec	---	---	---	---	None	---	None
Readingpeak-----	A	Jan-Dec	---	---	---	---	None	---	None
Rock outcrop.									
175:									
Shadowlake-----	A	Jan-Dec	---	---	---	---	None	---	None
Vitrandid Cryofluvents-----	C	January	0.0-5.0	---	0.1-0.5	Long	Occasional	---	None
		February	0.0-5.0	---	0.1-0.5	Long	Occasional	---	None
		March	0.0-5.0	---	0.1-0.5	Long	Frequent	---	None
		April	0.0-5.0	---	0.1-0.5	Long	Frequent	---	None
		May	0.0-5.0	---	0.1-0.5	Long	Frequent	---	None
		June	0.0-5.0	---	0.1-0.5	Long	Frequent	---	None
		July	0.0-5.0	---	0.1-0.5	Long	Frequent	---	None
		August	0.0-5.0	---	0.1-0.5	Long	Occasional	---	None
		September	0.0-5.0	---	0.1-0.5	Long	Rare	---	None
		October	0.0-5.0	---	0.1-0.5	Long	Rare	---	None
		November	0.0-5.0	---	0.1-0.5	Long	Rare	---	None
		December	0.0-5.0	---	0.1-0.5	Long	Occasional	---	None
176:									
Juniperlake, bouldery-----	A	Jan-Dec	---	---	---	---	None	---	None
177:									
Vitrandid Cryorthents, debris flows, high elevation-----	A	Jan-Dec	---	---	---	---	None	---	None
200.									
Cinder land									
201.									
Lava flows									
202:									
Typic Xerorthents, tephra-----	A	Jan-Dec	---	---	---	---	None	---	None
Typic Xerorthents, welded-----	A	Jan-Dec	---	---	---	---	None	---	None

Table 29.—Water Features—Continued

Map symbol and soil name	Hydro- logic group	Month	Water table		Ponding		Flooding		
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Feet	Feet	Feet				
203: Typic Xerorthents, tephra-----	A	Jan-Dec	---	---	---	---	None	---	None
205. Beaches									
W. Water									

Table 30.—Soil Features

(See text for definitions of terms used in this table. Absence of an entry indicates that data were not populated. Components with no data in all columns will not display)

Map symbol and soil name	Restrictive layer			Potential for frost action	Risk of corrosion	
	Kind	Depth to top In	Hardness		Uncoated steel	Concrete
100: Buttelake-----	Dense material	40-60	Noncemented	Low	High	Low
101: Buttewash-----	Duripan	40-60	Weakly cemented	Low	High	Low
102: Ashbutte-----	No restriction	---	---	Low	Low	Low
Vitrandid Xerorthents-----	No restriction	---	---	Low	Low	Moderate
103: Scoured-----	Lithic bedrock	20-40	Indurated	Low	High	Moderate
104: Scoured-----	Lithic bedrock	20-40	Indurated	Low	High	Moderate
Juniperlake-----	Dense material	35-60	Noncemented	Low	High	Moderate
105: Juniperlake-----	Dense material	35-60	Noncemented	Low	High	Moderate
106: Cenplat-----	Lithic bedrock	20-40	Indurated	Low	High	Low
107: Badgerflat-----	Dense material	20-40	Noncemented	Low	High	Low
Cenplat-----	Lithic bedrock	20-40	Indurated	Low	High	Low
108: Typic Xerorthents-----	No restriction	---	---	Low	Low	Low
109: Prospectpeak-----	Lithic bedrock	40-63	Indurated	Low	High	Low
110: Bearrubble-----	No restriction	---	---	Low	High	Moderate
111: Vitrandid Xerorthents, debris fan----	Dense material	20-80	Noncemented	Low	Low	Low
112: Cascadesprings-----	Dense material	20-40	Noncemented	Low	High	Moderate

Table 30.—Soil Features—Continued

Map symbol and soil name	Restrictive layer			Potential for frost action	Risk of corrosion	
	Kind	Depth to top In	Hardness		Uncoated steel	Concrete
113:						
Terracelake-----	Lithic bedrock	20-40	Indurated	Moderate	High	Moderate
Emeraldlake-----	No restriction	---	---	Moderate	High	Moderate
Readingpeak-----	Lithic bedrock	40-60	Indurated	Moderate	High	Moderate
114:						
Emeraldlake-----	No restriction	---	---	Moderate	High	Moderate
Terracelake-----	Lithic bedrock	20-40	Indurated	Moderate	High	Moderate
Readingpeak-----	Lithic bedrock	40-60	Indurated	Moderate	High	Moderate
115:						
Shadowlake-----	Dense material	35-60	Noncemented	Moderate	High	Moderate
116:						
Xeric Vitricryands, tephra over till--	Dense material	20-80	Noncemented	Moderate	High	High
Terracelake-----	Lithic bedrock	20-40	Indurated	Moderate	High	Moderate
Xeric Vitricryands, cirque floor-----	Dense material	20-40	Noncemented	Moderate	Low	Moderate
117:						
Humic Haploxerands, moist lake terrace	Duripan	20-60	Strongly cemented	Low	High	Low
118:						
Typic Dystroxerepts, landslides-----	No restriction	---	---	Low	High	High
119:						
Diamondpeak-----	No restriction	---	---	Low	High	High
Brokeoff-----	Lithic bedrock	20-40	Indurated	Low	High	High
Endoaquepts-----	No restriction	---	---	Low	High	Low
Aquic Dystroxerepts, debris flows-----	No restriction	---	---	Low	High	High
Typic Dystroxerepts-----	Paralithic bedrock	10-60	Moderately cemented	Low	High	High
120:						
Buttelake-----	Dense material	40-60	Noncemented	Low	High	Low
Sunhoff-----	Dense material	20-40	Noncemented	Low	High	Low
Talved-----	No restriction	---	---	Low	Low	Low

Table 30.—Soil Features—Continued

Map symbol and soil name	Restrictive layer			Potential for frost action	Risk of corrosion	
	Kind	Depth to top In	Hardness		Uncoated steel	Concrete
122:						
Xeric Vitricryands, colluvium-----	No restriction	---	---	Moderate	Low	Low
Xeric Vitricryands, ash over cinders--	No restriction	---	---	Moderate	High	Moderate
Xeric Vitricryands, bedrock-----	Lithic bedrock	10-40	Indurated	Moderate	Low	Low
125:						
Humic Haploxerands, stream terrace----	No restriction	---	---	Low	High	Moderate
Aquandic Humaquepts, flood plains----	No restriction	---	---	Low	High	Low
126:						
Kingsiron-----	No restriction	---	---	Low	Low	Low
Dittmar-----	Lithic bedrock	10-20	Indurated	Low	High	Moderate
127:						
Humic Haploxerands, strath terrace----	Lithic bedrock	20-60	Strongly cemented	Low	High	Moderate
Aquepts-----	Lithic bedrock	40-80	Indurated	Low	Moderate	Low
129:						
Humic Haploxerands, colluvium-----	Lithic bedrock	20-80	Indurated	Low	High	Moderate
130:						
Histic Humaquepts, lake sediments----	No restriction	---	---	Low	High	Low
Histic Humaquepts, frequently flooded-	No restriction	---	---	Low	High	Moderate
Typic Endoaquands-----	Duripan	40-80	Weakly cemented	Low	High	Moderate
132:						
Vitrandic Cryorthents, debris flows---	Dense material	20-60	Noncemented	Moderate	Low	Low
133:						
Vitrandic Xerofluvents-----	No restriction	---	---	Low	Low	Low
Typic Endoaquents-----	No restriction	---	---	Low	High	Low
134:						
Chaos-----	No restriction	---	---	Low	Low	Moderate
136:						
Terracelake-----	Lithic bedrock	20-40	Indurated	Moderate	High	Moderate
Xeric Vitricryands, cirque floor-----	Dense material	20-40	Noncemented	Moderate	Low	Moderate

Table 30.—Soil Features—Continued

Map symbol and soil name	Restrictive layer			Potential for frost action	Risk of corrosion	
	Kind	Depth to top In	Hardness		Uncoated steel	Concrete
137: Xeric Vitricryands-----	Dense material	40-80	Noncemented	Moderate	Low	Low
138: Vitrandic Xerofluvents, debris flows--	No restriction	---	---	Low	High	Moderate
Typic Endoaquents-----	No restriction	---	---	Low	High	Low
139: Duric Vitraquands-----	Duripan	40-60	Very weakly cemented	Low	High	Moderate
Typic Endoaquands-----	Duripan	40-80	Weakly cemented	Low	High	Moderate
Aquandic Cryaquents-----	No restriction	---	---	Moderate	High	Low
140: Vitrixerands-----	Duripan	20-60	Strongly cemented	Low	High	Moderate
141: Humic Haploxerands-----	No restriction	---	---	Low	High	Low
Typic Haploxerands-----	No restriction	---	---	Low	High	Low
Bearrubble-----	No restriction	---	---	Low	High	Moderate
142: Cragwash-----	Duripan	40-60	Strongly cemented	Low	High	Moderate
143: Andic Durixerepts-----	Duripan	20-40	Strongly cemented	Low	High	Moderate
144: Xeric Vitricryands, cirque floor-----	Dense material	20-40	Noncemented	Moderate	Low	Moderate
Humic Xeric Vitricryands-----	Dense material	20-40	Noncemented	Moderate	High	Moderate
145: Sueredo-----	Dense material	55-80	Noncemented	Low	High	Moderate
146: Sueredo-----	Dense material	55-80	Noncemented	Low	High	Moderate
147: Summertown-----	Dense material	20-40	Noncemented	Low	High	Moderate

Table 30.—Soil Features—Continued

Map symbol and soil name	Restrictive layer			Potential for frost action	Risk of corrosion	
	Kind	Depth to top In	Hardness		Uncoated steel	Concrete
148: Humic Haploxerands, lake terrace-----	Duripan	20-80	Moderately cemented	Low	High	Low
Typic Endoaquands-----	Duripan	40-80	Weakly cemented	Low	High	Moderate
149: Emeraldlake-----	No restriction	---	---	Moderate	High	Moderate
150: Shadowlake-----	Dense material	35-60	Noncemented	Moderate	High	Moderate
Terracelake-----	Lithic bedrock	20-40	Indurated	Moderate	High	Moderate
Acroph-----	Lithic bedrock	10-20	Indurated	Moderate	High	Moderate
151: Terracelake-----	Lithic bedrock	20-40	Indurated	Moderate	High	Moderate
Acroph-----	Lithic bedrock	10-20	Indurated	Moderate	High	Moderate
Shadowlake-----	Dense material	35-60	Noncemented	Moderate	High	Moderate
152: Terracelake-----	Lithic bedrock	20-40	Indurated	Moderate	High	Moderate
Shadowlake-----	Dense material	35-60	Noncemented	Moderate	High	Moderate
Acroph-----	Lithic bedrock	10-20	Indurated	Moderate	High	Moderate
153: Typic Vitrixerands-----	Dense material	20-60	Noncemented	Low	High	Moderate
Vitrantic Xerorthents, moraine-----	Dense material	20-60	Noncemented	Low	Moderate	Moderate
154: Typic Vitrixerands-----	Dense material	20-60	Noncemented	Low	High	Moderate
Vitrantic Xerorthents, moraine-----	Dense material	20-60	Noncemented	Low	Moderate	Moderate
155: Xeric Vitricryands, pyroclastic surge-	Dense material	40-80	Noncemented	Moderate	High	Low
156: Xeric Vitricryands, pyroclastic surge-	Dense material	40-80	Noncemented	Moderate	High	Low
157: Typic Vitrixerands, very deep-----	No restriction	---	---	Low	Moderate	Moderate

Table 30.—Soil Features—Continued

Map symbol and soil name	Restrictive layer			Potential for frost action	Risk of corrosion	
	Kind	Depth to top In	Hardness		Uncoated steel	Concrete
158: Typic Vitrixerands, unglaciated-----	Paralithic bedrock	20-60	Moderately cemented	Low	Moderate	Low
159: Typic Vitrixerands, bouldery-----	No restriction	---	---	Low	Low	Low
Typic Vitrixerands, tephra over colluvium-----	No restriction	---	---	Low	High	Moderate
160: Aeric Endoaquents-----	No restriction	---	---	Low	High	Low
Humic Haploxerands, stream terrace----	No restriction	---	---	Low	High	Moderate
161: Typic Psammaquents-----	No restriction	---	---	Low	High	Moderate
162: Humic Haploxerands, outwash-----	No restriction	---	---	Low	High	Moderate
163: Vitrandic Cryofluvents-----	No restriction	---	---	Moderate	High	Moderate
Aquandic Cryaquepts-----	No restriction	---	---	Moderate	High	Low
164: Aquepts-----	Lithic bedrock	40-80	Indurated	Low	Moderate	Low
Typic Petraquepts, bedrock-----	Lithic bedrock	10-40	Indurated	Low	Moderate	Moderate
Aquic Haploxerands-----	Duripan	20-40	Indurated	Low	High	Moderate
Typic Petraquepts-----	Duripan	10-40	Moderately cemented	Low	Moderate	Low
165: Aquandic Humaquepts-----	No restriction	---	---	Low	High	Low
Histic Humaquepts-----	No restriction	---	---	Low	High	High
Aquandic Endoaquepts-----	No restriction	---	---	Low	High	Low
Terric Haplohemists-----	No restriction	---	---	Low	Moderate	Moderate

Table 30.--Soil Features--Continued

Map symbol and soil name	Restrictive layer			Potential for frost action	Risk of corrosion	
	Kind	Depth to top In	Hardness		Uncoated steel	Concrete
166: Aquic Haploxerands-----	Duripan	20-40	Indurated	Low	High	Moderate
Humic Haploxerands, outwash terrace---	Duripan	20-40	Moderately cemented	Low	High	Moderate
167: Emeraldlake-----	No restriction	---	---	Moderate	High	Moderate
Readingpeak-----	Lithic bedrock	40-60	Indurated	Moderate	High	Moderate
Terracelake-----	Lithic bedrock	20-40	Indurated	Moderate	High	Moderate
168: Vitrixerands, low elevation-----	Duripan	20-60	Strongly cemented	Low	High	Moderate
169: Sueredo-----	Dense material	55-80	Noncemented	Low	High	Moderate
Scoured-----	Lithic bedrock	20-40	Indurated	Low	High	Moderate
170: Emeraldlake-----	No restriction	---	---	Moderate	High	Moderate
Readingpeak-----	Lithic bedrock	40-60	Indurated	Moderate	High	Moderate
171: Aquepts-----	Lithic bedrock	40-80	Indurated	Moderate	Moderate	Low
Typic Petraquepts, bedrock-----	Lithic bedrock	10-40	Indurated	Low	Moderate	Moderate
172: Badgerflat-----	Dense material	20-40	Noncemented	Low	High	Low
173: Badgerwash-----	Duripan	20-40	Strongly cemented	Low	High	Moderate
174: Vitrandic Cryorthents-----	No restriction	---	---	Moderate	Low	Low
Readingpeak-----	Lithic bedrock	40-60	Indurated	Moderate	High	Moderate
175: Shadowlake-----	Dense material	35-60	Noncemented	Moderate	High	Moderate
Vitrandic Cryofluvents-----	No restriction	---	---	Moderate	High	Moderate

Table 30.—Soil Features—Continued

Map symbol and soil name	Restrictive layer			Potential for frost action	Risk of corrosion	
	Kind	Depth to top <u>In</u>	Hardness		Uncoated steel	Concrete
176: Juniperlake, bouldery-----	Dense material	35-60	Noncemented	Low	High	Moderate
177: Vitrandic Cryorthents, debris flows, high elevation-----	No restriction	---	---	Moderate	Low	Low
202: Typic Xerorthents, tephra-----	No restriction	---	---	Low	Low	Low
Typic Xerorthents, welded-----	Cemented horizon	7-20	Very strongly cemented	Low	Low	Low
203: Typic Xerorthents, tephra-----	No restriction	---	---	Low	Low	Low

Soil Survey of Lassen Volcanic National Park, California

Table 31.--Taxonomic Classification of the Soils

Soil name	Family or higher taxonomic class
Acroph-----	Ashy-skeletal, glassy Lithic Vitricryands
Aeric Endoaquents-----	Frigid Aeric Endoaquents
Andic Durixercepts-----	Frigid Andic Durixercepts
Aquandic Cryaquents-----	Aquandic Cryaquents
Aquandic Endoaquepts-----	Frigid Aquandic Endoaquepts
Aquandic Humaquepts-----	Frigid Aquandic Humaquepts
Aquandic Humaquepts, flood plains-----	Frigid Aquandic Humaquepts
Aquepts-----	Aquepts
Aquic Dystroxerepts, debris flows-----	Frigid Aquic Dystroxerepts
Aquic Haploxerands-----	Frigid Aquic Haploxerands
Ashbutte-----	Ashy over medial-skeletal, amorphic, frigid Typic Vitrikerands
Badgerflat-----	Ashy-skeletal, mixed, frigid Typic Vitrikerands
Badgerwash-----	Ashy-skeletal, mixed, frigid Humic Vitrikerands
Bearrubble-----	Medial-skeletal, amorphic, frigid Typic Vitrikerands
Brokeoff-----	Loamy-skeletal over fragmental, isotic, frigid Typic Dystroxerepts
Buttelake-----	Ashy over medial-skeletal, glassy over amorphic, frigid Humic Vitrikerands
Buttewash-----	Ashy over medial, glassy over amorphic, frigid Humic Haploxerands
Cascadesprings-----	Ashy over medial-skeletal, glassy over amorphic, frigid Typic Vitrikerands
Cenplat-----	Ashy over medial-skeletal, glassy over amorphic, frigid Typic Haploxerands
Chaos-----	Loamy-skeletal, isotic, nonacid, frigid Typic Xerorthents
Cragwash-----	Ashy-skeletal over sandy or sandy-skeletal, glassy over isotic, frigid Typic Vitrikerands
Diamondpeak-----	Fine-loamy, isotic, frigid Typic Dystroxerepts
Dittmar-----	Medial-skeletal, amorphic, frigid Lithic Haploxerands
Duric Vitraquands-----	Frigid Duric Vitraquands
Emeraldlake-----	Ashy-skeletal, amorphic, nonacid Vitrandic Cryorthents
Endoaquepts-----	Endoaquepts
Histic Humaquepts-----	Frigid Histic Humaquepts
Histic Humaquepts, frequently flooded-----	Frigid Histic Humaquepts
Histic Humaquepts, lake sediments-----	Frigid Histic Humaquepts
Humic Haploxerands-----	Frigid Humic Haploxerands
Humic Haploxerands, colluvium-----	Frigid Humic Haploxerands
Humic Haploxerands, lake terrace-----	Frigid Humic Haploxerands
Humic Haploxerands, moist lake terrace-----	Frigid Humic Haploxerands
Humic Haploxerands, outwash-----	Frigid Humic Haploxerands
Humic Haploxerands, outwash terrace-----	Frigid Humic Haploxerands
Humic Haploxerands, strath terrace-----	Frigid Humic Haploxerands
Humic Haploxerands, stream terrace-----	Frigid Humic Haploxerands
Humic Xeric Vitricryands-----	Humic Xeric Vitricryands
Juniperlake-----	Medial-skeletal, amorphic, frigid Humic Haploxerands
Kingsiron-----	Medial-skeletal, amorphic, frigid Typic Haploxerands
Prospectpeak-----	Fragmental, isotic, frigid Typic Vitrikerands
Readingpeak-----	Ashy-skeletal, amorphic Xeric Vitricryands
Scoured-----	Medial-skeletal over fragmental or cindery, amorphic over isotic, frigid Humic Haploxerands
Shadowlake-----	Ashy-skeletal, glassy Xeric Vitricryands
Sueredo-----	Ashy-skeletal, mixed, frigid Typic Vitrikerands
Summertown-----	Ashy-skeletal, glassy, frigid Humic Vitrikerands
Sunhoff-----	Medial-skeletal, amorphic, frigid Typic Vitrikerands
Talved-----	Medial-skeletal, amorphic, frigid Typic Vitrikerands
Terracelake-----	Ashy-skeletal, amorphic Xeric Vitricryands

Soil Survey of Lassen Volcanic National Park, California

Table 31.--Taxonomic Classification of the Soils--Continued

Soil name	Family or higher taxonomic class
Terric Haplohemists-----	Frigid Terric Haplohemists
Typic Dystroxerepts-----	Frigid Typic Dystroxerepts
Typic Dystroxerepts, landslides-----	Frigid Typic Dystroxerepts
Typic Endoaquands-----	Frigid Typic Endoaquands
Typic Endoaquents-----	Frigid Typic Endoaquents
Typic Haploxerands-----	Frigid Typic Haploxerands
Typic Petraquepts-----	Frigid Typic Petraquepts
Typic Petraquepts, bedrock-----	Typic Petraquepts
Typic Psammaquents-----	Frigid Typic Psammaquents
Typic Vitrixerands-----	Frigid Typic Vitrixerands
Typic Vitrixerands, bouldery-----	Frigid Typic Vitrixerands
Typic Vitrixerands, tephra over colluvium---	Frigid Typic Vitrixerands
Typic Vitrixerands, unglaciaded-----	Frigid Typic Vitrixerands
Typic Vitrixerands, very deep-----	Frigid Typic Vitrixerands
Typic Xerorthents-----	Frigid Typic Xerorthents
Typic Xerorthents, tephra	Frigid Typic Xerorthents
Typic Xerorthents, welded	Frigid, shallow Typic Xerorthents
Vitrandic Cryofluvents---	Vitrandic Cryofluvents
Vitrandic Cryorthents---	Vitrandic Cryorthents
Vitrandic Cryorthents, debris flows-----	Vitrandic Cryorthents
Vitrandic Xerofluvents---	Frigid Vitrandic Xerofluvents
Vitrandic Xerofluvents, debris flows-----	Frigid Vitrandic Xerofluvents
Vitrandic Xerorthents---	Frigid Vitrandic Xerorthents
Vitrandic Xerorthents, debris fan-----	Frigid Vitrandic Xerorthents
Vitrandic Xerorthents, moraine-----	Frigid Vitrandic Xerorthents
Vitrixerands-----	Vitrixerands
Xeric Vitricryands-----	Xeric Vitricryands
Xeric Vitricryands, ash over cinders-----	Xeric Vitricryands
Xeric Vitricryands, bedrock-----	Xeric Vitricryands
Xeric Vitricryands, cirque floor-----	Xeric Vitricryands
Xeric Vitricryands, colluvium-----	Xeric Vitricryands
Xeric Vitricryands, pyroclastic surge-----	Xeric Vitricryands
Xeric Vitricryands, tephra over till-----	Xeric Vitricryands

Soil Survey of Lassen Volcanic National Park, California

Table 32.—Classification Key

ORDER
 +Suborder
 ++Great Group
 +++Subgroup
 Soils in Classification

ANDISOLS

+Aquands

++Vitraquands

+++Duric Vitraquands

Duric Vitraquands-----Frigid Duric Vitraquands

++Endoaquands

+++Typic Endoaquands

Typic Endoaquands-----Frigid Typic Endoaquands

+Cryands

++Vitricryands

+++Humic Xeric Vitricryands

Humic Xeric Vitricryands-----Humic Xeric Vitricryands

+++Lithic Vitricryands

Acroph-----Ashy-skeletal, glassy Lithic Vitricryands

+++Xeric Vitricryands

Readingpeak-----Ashy-skeletal, amorphic Xeric Vitricryands

Terracelake-----Ashy-skeletal, amorphic Xeric Vitricryands

Shadowlake-----Ashy-skeletal, glassy Xeric Vitricryands

Xeric Vitricryands-----Xeric Vitricryands

Xeric Vitricryands, ash over
 cinders-----Xeric Vitricryands

Xeric Vitricryands, bedrock---Xeric Vitricryands

Xeric Vitricryands, cirque
 floor-----Xeric Vitricryands

Xeric Vitricryands, colluvium-Xeric Vitricryands

Xeric Vitricryands,
 pyroclastic surge-----Xeric Vitricryands

Xeric Vitricryands, tephra
 over till-----Xeric Vitricryands

Soil Survey of Lassen Volcanic National Park, California

Table 32.—Classification Key—Continued

ORDER
 +Suborder
 ++Great Group
 +++Subgroup
 Soils in Classification

+Xerands

++Haploxerands

+++Typic Haploxerands

 Cenplat-----Ashy over medial-skeletal, glassy over amorphic, frigid Typic Haploxerands

 Typic Haploxerands-----Frigid Typic Haploxerands

 Kingsiron-----Medial-skeletal, amorphic, frigid Typic Haploxerands

+++Aquic Haploxerands

 Aquic Haploxerands-----Frigid Aquic Haploxerands

+++Humic Haploxerands

 Buttewash-----Ashy over medial, glassy over amorphic, frigid Humic Haploxerands

 Humic Haploxerands-----Frigid Humic Haploxerands

 Humic Haploxerands, colluvium-----Frigid Humic Haploxerands

 Humic Haploxerands, lake terrace-----Frigid Humic Haploxerands

 Humic Haploxerands, moist lake terrace-----Frigid Humic Haploxerands

 Humic Haploxerands, outwash---Frigid Humic Haploxerands

 Humic Haploxerands, outwash terrace-----Frigid Humic Haploxerands

 Humic Haploxerands, strath terrace-----Frigid Humic Haploxerands

 Humic Haploxerands, stream terrace-----Frigid Humic Haploxerands

 Scoured-----Medial-skeletal over fragmental or cindery, amorphic over isotic, frigid Humic Haploxerands

 Juniperlake-----Medial-skeletal, amorphic, frigid Humic Haploxerands

+++Lithic Haploxerands

 Dittmar-----Medial-skeletal, amorphic, frigid Lithic Haploxerands

++Vitrixerands

 Vitrixerands-----Vitrixerands

Soil Survey of Lassen Volcanic National Park, California

Table 32.—Classification Key—Continued

ORDER
 +Suborder
 ++Great Group
 +++Subgroup
 Soils in Classification

+++Typic Vitriixerands

Ashbutte-----Ashy over medial-skeletal, amorphic, frigid Typic Vitriixerands
 Cascadesprings-----Ashy over medial-skeletal, glassy over amorphic, frigid Typic
 Vitriixerands
 Cragwash-----Ashy-skeletal over sandy or sandy-skeletal, glassy over isotic,
 frigid Typic Vitriixerands
 Badgerflat-----Ashy-skeletal, mixed, frigid Typic Vitriixerands
 Sueredo-----Ashy-skeletal, mixed, frigid Typic Vitriixerands
 Prospectpeak-----Fragmental, isotic, frigid Typic Vitriixerands
 Typic Vitriixerands-----Frigid Typic Vitriixerands
 Typic Vitriixerands, bouldery--Frigid Typic Vitriixerands
 Typic Vitriixerands, tephra
 over colluvium-----Frigid Typic Vitriixerands
 Typic Vitriixerands,
 unglaciated-----Frigid Typic Vitriixerands
 Typic Vitriixerands, very deep--Frigid Typic Vitriixerands
 Bearrubble-----Medial-skeletal, amorphic, frigid Typic Vitriixerands
 Sunhoff-----Medial-skeletal, amorphic, frigid Typic Vitriixerands
 Talved-----Medial-skeletal, amorphic, frigid Typic Vitriixerands

+++Humic Vitriixerands

Buttelake-----Ashy over medial-skeletal, glassy over amorphic, frigid Humic
 Vitriixerands
 Summertown-----Ashy-skeletal, glassy, frigid Humic Vitriixerands
 Badgerwash-----Ashy-skeletal, mixed, frigid Humic Vitriixerands

=====
 ENTISOLS

+Aquents

++Cryaquents

+++Aquandic Cryaquents

Aquandic Cryaquents-----Aquandic Cryaquents

++Psammaquents

+++Typic Psammaquents

Typic Psammaquents-----Frigid Typic Psammaquents

Soil Survey of Lassen Volcanic National Park, California

Table 32.—Classification Key—Continued

ORDER
 +Suborder
 ++Great Group
 +++Subgroup
 Soils in Classification

++Endoaquents

+++Typic Endoaquents
 Typic Endoaquents-----Frigid Typic Endoaquents

+++Aeric Endoaquents
 Aeric Endoaquents-----Frigid Aeric Endoaquents

+Fluvents

++Cryofluvents

+++Vitrandic Cryofluvents
 Vitrandic Cryofluvents-----Vitrandic Cryofluvents

++Xerofluvents

+++Vitrandic Xerofluvents
 Vitrandic Xerofluvents-----Frigid Vitrandic Xerofluvents
 Vitrandic Xerofluvents, debris
 flows-----Frigid Vitrandic Xerofluvents

+Orthents

++Cryorthents

+++Vitrandic Cryorthents
 Emeraldlake-----Ashy-skeletal, amorphic, nonacid Vitrandic Cryorthents
 Vitrandic Cryorthents-----Vitrandic Cryorthents
 Vitrandic Cryorthents, debris
 flows-----Vitrandic Cryorthents

++Xerorthents

+++Typic Xerorthents
 Typic Xerorthents-----Frigid Typic Xerorthents
 Typic Xerorthents, tephra-----Frigid Typic Xerorthents
 Typic Xerorthents, welded-----Frigid, shallow Typic Xerorthents
 Chaos-----Loamy-skeletal, isotic, nonacid, frigid Typic Xerorthents

Soil Survey of Lassen Volcanic National Park, California

Table 32.—Classification Key—Continued

ORDER

+Suborder

++Great Group

+++Subgroup

 Soils in Classification

 +++Vitrandic Xerorthents

 Vitrandic Xerorthents-----Frigid Vitrandic Xerorthents

 Vitrandic Xerorthents, debris

 fan-----Frigid Vitrandic Xerorthents

 Vitrandic Xerorthents,

 moraine-----Frigid Vitrandic Xerorthents

=====

HISTOSOLS

 +Hemists

 ++Haplohemists

 +++Terric Haplohemists

 Terric Haplohemists-----Frigid Terric Haplohemists

=====

INCEPTISOLS

 +Aquepts

 Aquepts-----Aquepts

 ++Humaquepts

 +++Aquandic Humaquepts

 Aquandic Humaquepts-----Frigid Aquandic Humaquepts

 Aquandic Humaquepts, flood

 plains-----Frigid Aquandic Humaquepts

 +++Histic Humaquepts

 Histic Humaquepts-----Frigid Histic Humaquepts

 Histic Humaquepts, frequently

 flooded-----Frigid Histic Humaquepts

 Histic Humaquepts, lake

 sediments-----Frigid Histic Humaquepts

Soil Survey of Lassen Volcanic National Park, California

Table 32.—Classification Key—Continued

ORDER
 +Suborder
 ++Great Group
 +++Subgroup
 Soils in Classification

++Endoaquepts
 Endoaquepts-----Endoaquepts
 +++Aquandic Endoaquepts
 Aquandic Endoaquepts-----Frigid Aquandic Endoaquepts
 ++Petraquepts
 +++Typic Petraquepts
 Typic Petraquepts-----Frigid Typic Petraquepts
 Typic Petraquepts, bedrock----Typic Petraquepts
 +Xerepts
 ++Durixerepts
 +++Andic Durixerepts
 Andic Durixerepts-----Frigid Andic Durixerepts
 ++Dystroxerepts
 +++Aquic Dystroxerepts
 Aquic Dystroxerepts, debris
 flows-----Frigid Aquic Dystroxerepts
 +++Typic Dystroxerepts
 Diamondpeak-----Fine-loamy, isotic, frigid Typic Dystroxerepts
 Typic Dystroxerepts-----Frigid Typic Dystroxerepts
 Typic Dystroxerepts,
 landslides-----Frigid Typic Dystroxerepts
 Brokeoff-----Loamy-skeletal over fragmental, isotic, frigid Typic Dystroxerepts

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