United States Department of Agriculture

NRCS

Natural Resources Conservation Service

United States Department of the Interior

National Park Service

Soil Survey of North Cascades National Park Complex, Washington

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.

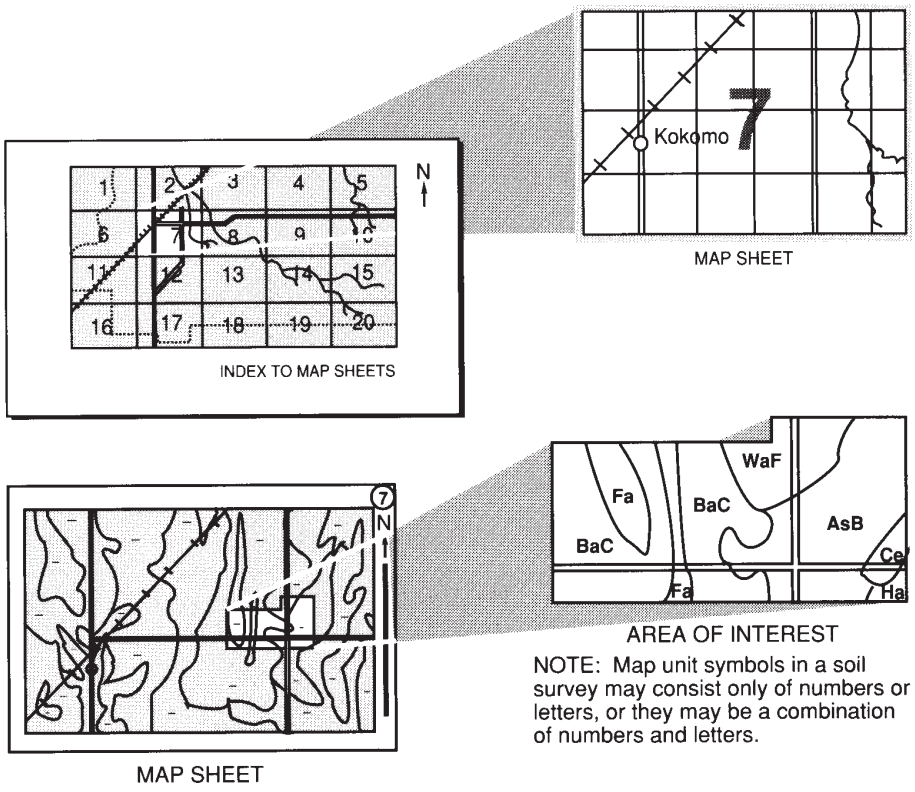
Detailed Soil Maps

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 turn to that sheet.

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

The **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.



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

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 and the National Park Service.

Major fieldwork for this soil survey was completed in 2009. Soil names and descriptions were approved in 2010. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 2010. 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.

Citation

The proper citation for this soil survey report is as follows:

United States Department of Agriculture, Natural Resources Conservation Service, and United States Department of the Interior, National Park Service. 2012. Soil survey of North Cascades National Park Complex, Washington.

Nondiscrimination Statement

Additional Information

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

Cover Caption

View looking northwest across Perry Creek to Mount Spickard.

Contents

Issued 2012

Foreword

This soil survey was developed in conjunction with the Inventory and Monitoring Program of the National Park Service. It serves as the official source document for the soils in the North Cascades National Park Complex, Washington.

The survey contains information that affects current and future land use planning in the survey area. It includes 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.

The survey is designed to meet the needs of the National Park Service and its partners. The information provides for a better understanding of the various properties of the soils in the area and their affect on various natural ecological properties. It can be used to help 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 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 soil 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 offices of the Natural Resources Conservation Service or the North Cascades National Park Complex.

Roylene Rides at the Door
State Conservationist
Natural Resources Conservation Service

Chip Jenkins
Superintendent
North Cascades National Park Complex

Soil Survey of North Cascades National Park Complex, Washington

By Toby Rodgers and Philip Roberts, Natural Resources Conservation Service

Fieldwork by Toby Rodgers, Crystal Briggs, Kathryn Smith, and Philip Roberts, Natural Resources Conservation Service, and Sharon Brady, National Park Service

United States Department of Agriculture, Natural Resources Conservation Service, and United States Department of the Interior, National Park Service

North Cascades National Park Complex is at the northern end of the Cascade Range in western Washington State (fig. 1). The survey area covers 277,142 hectares (1,070 square miles). It extends approximately 85 kilometers south from the Canadian border. It ranges from 47 kilometers wide in the northern part to 7 kilometers wide in the southern part. It is bounded by the International Boundary to the north, the Okanogan-Wenatchee National Forest to the east and south, and the Mount Baker–Snoqualmie National Forest to the west.

The survey area is within parts of Whatcom, Skagit, and Chelan Counties, and it is comprised of three management units, including North Cascades National Park, Ross Lake National Recreation Area, and Lake Chelan National Recreation Area (fig. 2). The North Cascades Scenic Highway (Washington State Route 20) passes through Ross Lake National Recreation Area and is the primary entrance to the survey area. Seattle City Light public utility operates three hydroelectric facilities along the

Figure 1.—Location of the North Cascades National Park Complex in Washington.

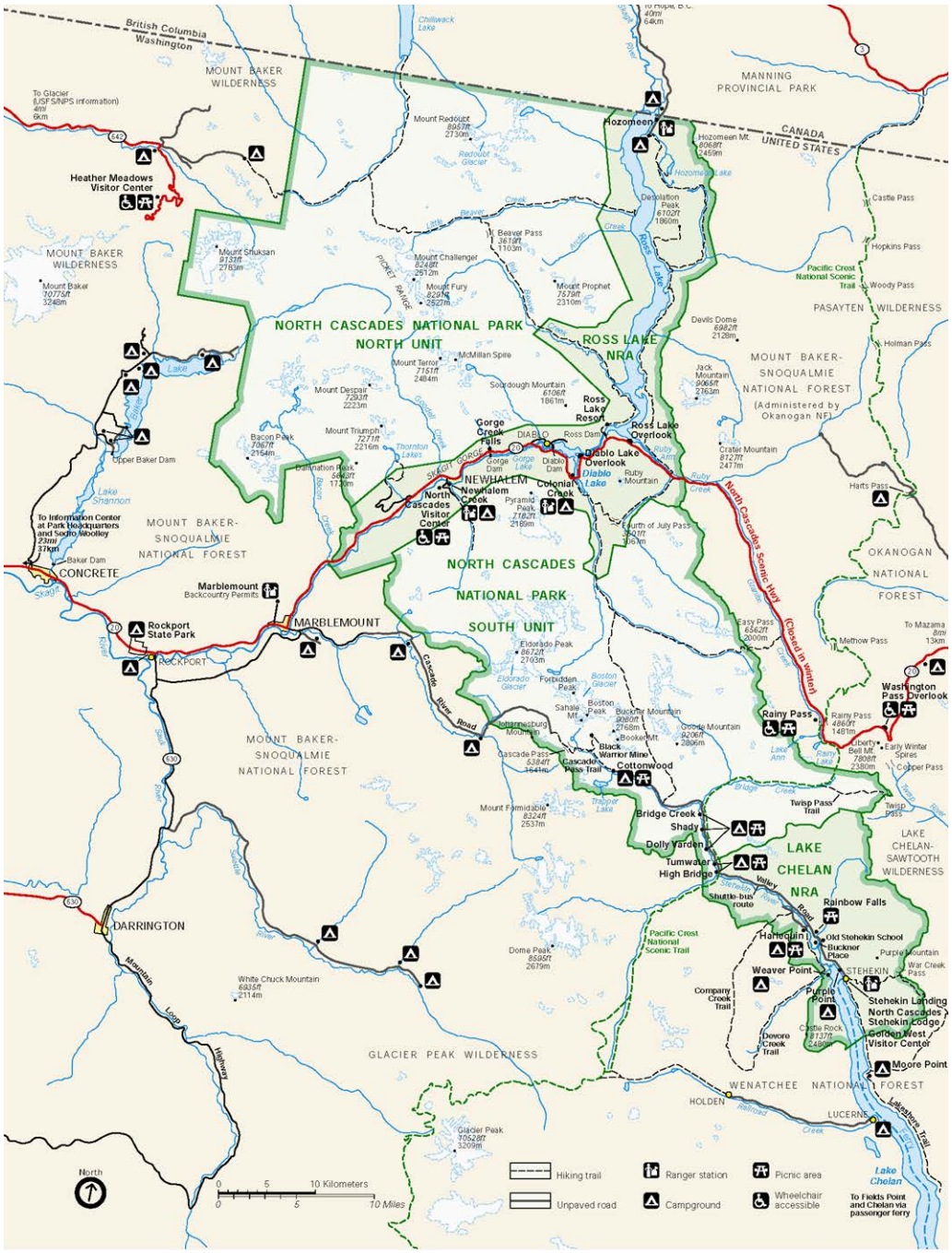


Figure 2.—Map of the North Cascades National Park Complex showing the major geographic features.

Skagit River in the recreation area, providing about 800 megawatts of electricity for the city of Seattle. Stehekin, Washington, an unincorporated community of 75 permanent residents, is at the head of Lake Chelan, in the Lake Chelan National Recreation Area. The Stehekin River in this area empties into Lake Chelan, which is 89 kilometers long and is the third deepest lake in the United States. This remote and isolated community can only be reached by plane or boat or on foot.

The survey area is a wild, rugged wilderness in the Pacific Northwest. A long and diverse geologic history has resulted in a variety of landforms, soils, and dramatic

topography. The scenic appeal of many of the topographic features in the area is a result of glacial processes. The area has more than 300 glaciers, which is more than half of all glaciers in the continental United States. The climate barrier provided by the Cascade Crest separates the distinctively wetter climate on the west side from the drier climate on the east side. A complex mosaic of mountainous topography and varied climatic conditions produces a diverse ecology of temperate rainforests, cool mountain forests, alpine parklands, and open, dry woodlands. The survey area also has a rich cultural history that spans thousands of years.

General Nature of the Survey Area

This section provides general information about the North Cascades National Park Complex. It discusses history and development, geology, and climate. This soil survey is an initial soil resource inventory. No previous investigations into the soils have been conducted due mainly to the logistical challenges of conducting a soil survey in such a remote mountain wilderness area.

History and Development

The North Cascades National Park Complex was established in 1968 “to preserve for the benefit, use, and inspiration of present and future generations certain majestic mountain scenery, snowfields, glaciers, alpine meadows, and other unique natural features in the North Cascade Mountains of the State of Washington” (USDI, 2010). The Stephen Mather Wilderness, created by Congress in 1988, encompasses 93 percent of the survey area. Balancing the conservation of the wilderness and the management of hydroelectric facilities along the Skagit River as well as land policy issues in the Stehekin River Valley is a challenge. The area offers a wealth of scenic, recreational, educational, and naturalistic opportunities for visitors from the largely urban population of the Puget Sound, which is less than 100 kilometers to the west.

The North Cascades Scenic Highway was completed in 1972, providing vehicle access to the area north of Stevens Pass. This highway is the only road crossing the Cascade Range between the Canadian Border and U.S. Highway 2, which is 135 kilometers to the south. Prior to construction of the highway, Native Americans relied on vital trading routes through the mountains to connect the Pacific Coast with Eastern Plateau Country for more than 8,000 years (Washington State Department of Transportation, 2010). Initial plans for a highway began as early as 1896, with a proposed route over the Cascade Pass. By 1940, plans for the Cascade Pass route were dropped and plans for the current route over Rainy Pass (1,480 meters) and Washington Pass (1,669 meters) were adopted. By 1968 a pioneer road for four-wheel drive vehicles was completed. On September 2, 1972, North Cascades Scenic Highway was officially opened. The highway is seasonally closed because of snowfall and a risk of avalanches sometime between October and December, and it reopens sometime between March and May.

The headquarters for the North Cascades National Park Complex is in Sedro-Woolley, along the North Cascades Scenic Highway (State Route 20) about 80 kilometers west of the park entrance and 8 kilometers east of U.S. Interstate 5. In addition, the Wilderness Information Center is in Marblemount, about 8 kilometers west of the park entrance on the North Cascades Scenic Highway. The towns of Newhalem, Diablo, and Hozomeen are in the Ross Lake National Recreation Area. The North Cascades Visitor Center is in Newhalem, and numerous campgrounds are along the Skagit River in Newhalem. Diablo is a small town along Gorge Lake, at the base of Diablo Dam. Hozomeen consists of a seasonal ranger station and campground at the head of Ross Lake. The town of Stehekin is in the Lake Chelan National Recreation Area, at the head of Lake Chelan. The Golden West Visitor Center is in Stehekin.

The survey area offers a wide variety of recreational opportunities. Activities include camping, hiking, boating, fishing, climbing, wildlife viewing, bird watching, horseback riding, guided tours, and numerous interpretive and educational programs. It offers a primitive wilderness experience for those who desire to explore its backcountry while numerous visitor centers offer opportunities to learn about the region without traveling into the wilderness.

In 2009, North Cascades National Park received 26,972 visitors. This was the second lowest total for a National park in the continental United States; however, this total does not include visitors to the Lake Chelan and Ross Lake National Recreation Areas. Total visitors to the entire survey area was 349,984. For comparison, the Olympic National Park received over 3 million visitors, roughly 9 times as many as the North Cascades National Park Complex during the same period. Because of the North Cascades Scenic Highway, more than 80 percent of the people visiting the survey area went to the Ross Lake National Recreation Area. Most of the visitor centers, vehicle-accessible campgrounds, and local merchants are along the highway. In the last decade, an average of 6 percent of all visitors to the survey area traveled in North Cascades National Park.

Geology

By Jon Riedel and Stephen Dorsch, geologists, National Park Service, North Cascades National Park Complex.

The North Cascade Range is a geologic mosaic consisting of parts of old continents, volcanic island arcs, deep ocean sediment, basaltic ocean floors, continental-margin submarine fans, and pieces of the deep subcrustal mantle (Haugerud and Tabor, 2009). Bedrock of the range was formed by a complex series of igneous, metamorphic, and tectonic events beginning in the Cretaceous (145 to 65 million years ago [Ma]). Numerous faulting events and intrusions have created diverse types of bedrock. Because of the complicated geology in this part of the United States, geologists have summarized it into five broad events: 1) accumulation of massive bodies of rock (terranes) on the west coast of North America between 200 Ma (early Jurassic) and 50 Ma (late Cretaceous); 2) uplift and erosion of this rock, creating a mountain range between 130 Ma (early Cretaceous) and 50 Ma (Eocene); 3) intensive movement and faulting 50 to 40 Ma that fragmented the pre-existing mountains; 4) uplifting that created the modern North Cascade Range beginning 40 Ma (Eocene) along with a developing volcanic arc, both of which continue at present; and 5) Ice Age glaciers that not only created the jagged arêtes and horns but also broadened passes, rounded ridges, and deepened valleys from about 2.6 Ma and continuing intermittently at present.

Tectonics and Structure

The rugged peaks of the North Cascade Range represent a unique physiographic province with greater uplift, higher relief, and broader west to east expression than the Cascade Range to the south (Haugerud and Tabor, 2009).

The survey area is divided by two major faults that separate the bedrock into three different domains. The westernmost major fault is the Straight Creek Fault, and east of it is the Ross Lake Fault. The Straight Creek Fault trends north to south. It is a strike-slip, extensional fault that is about 400 kilometers long. The fault separates low-grade metamorphic rock of the western part from highly metamorphosed rock of the metamorphic core to the east. The Ross Lake Fault separates the North Cascades metamorphic core from the sedimentary and volcanic deposits of the Methow domain to the east. The Ross Lake Fault is part of a 500-kilometer-long zone of high-angle faults in the northern Cordillera that trends northwest to southeast. Tertiary arc plutons have erased some evidence of both faults in Washington and southernmost British Columbia.

Regional uplift and exhumation of the North Cascade Range that began in the Eocene (45 to 36 Ma) continues at present as part of the Cascade Magmatic Arc (Reiners and others, 2002). This uplift established compressional faults that trend northeast to southwest. These faults control the trend of the upper Skagit Valley in British Columbia and possibly the Skagit Gorge (Riedel, 2007).

Geologic Units

A folded and thrust-faulted stack of terranes makes up the area west of the Straight Creek Fault. Rock of the Easton terrane is extensive in the survey area. Originating from deep-ocean sand and mud along with underlying basaltic ocean floor about 150 Ma, this rock has been metamorphosed at high pressure to form the Shuksan Greenschist and Darrington Phyllite (Tabor and Haugerud, 1999).

Between the Straight Creek Fault and Ross Lake Fault zones is the metamorphic core area. Rock in this area can be generally divided into four terranes—the Chelan Mountain, Nason, Swakane, and Little Jack terranes (Tabor and Haugerud, 1999). The majority of the bedrock in the metamorphic core area is the Chelan Mountain terrane, composed primarily of the Skagit Gneiss Complex. Outcroppings of the Skagit Gneiss Complex are along State Route 20, from Newhalem through the Skagit Gorge. Consisting mainly of banded gneiss and banded tonalite, the rock is thought to be derived from intense metamorphism of the Cascade River Schist and Napeequa Schist, both thought to be arc-derived. The exception to this is the banded tonalite, which is thought to be intrusive igneous material (Haugerud and others, 1991). Other rock west of the Ross Lake Fault zone includes intrusive plutons that were emplaced during a period of crustal extension that began 35 Ma. These plutons include the intrusive rock of the Chilliwack Composite Batholith, which is mostly tonalite and granodiorite. The Napeequa Schist, part of the Chelan Mountains terrane, has an oceanic origin and is composed of schist with local serpentinite, talc, tremolite, and olivine-talc.

To the east of the Ross Lake Fault zone is the older rock of the Hozomeen and Methow terranes. The Hozomeen terrane is composed of mostly greenstone, chert, clastic sedimentary rock, gabbro, and argillite. An oceanic rock assemblage, the Hozomeen Group, represents the accretion of terranes along the west coast of North America between 200 and 50 Ma. The Cretaceous Methow terrane exposed in the survey area is mainly thick-bedded marine sandstone with thin beds of sandstone and argillite.

Glacial History

The topography of the survey area reflects multiple glaciations occurring from 2.6 Ma, which have carved deep U-shaped valleys, steep valley walls, and jagged horns and arêtes. The geomorphology of the North Cascade Range during this period has been shaped by both alpine and continental glaciations. Glaciation has altered both local and regional drainage patterns (Riedel and others, 2007). The North Cascade Range was inundated by the south-flowing Cordilleran Ice Sheet (Armstrong and others, 1965; Porter and Swanson, 1998) during the Fraser Glaciation 35 to 11.5 thousand years ago (Ka) following the end of the Olympia nonglacial interval (60 to 30 Ka) (Clague, 1981a and 1981b).

Impacts from the ice sheet are evident throughout the North Cascade Range. They include broad passes and beveled ridges, enlarged valley cross-sections, truncated valley spurs, and thick accumulations of till and outwash. Between multiple ice sheet glaciations, valley glaciers flowed from cirques throughout the survey area, forming large, complex valley glacier systems. Tributary systems were left as hanging valleys with bedrock canyons or narrow-stepped waterfalls at the mouth. Alpine glaciers advanced and retreated several times during the Fraser Glaciation (Riedel and others,

2010). Following ice sheet deglaciation, alpine glaciers advanced 5 to 10 kilometers from cirques into valleys between 13 and 11.5 Ka (Riedel, 2007).

Neoglacial

Glaciers in the survey area probably reached their minimum extent since the last ice age about 8 Ka. During the next several thousand years, small alpine glaciers advanced and retreated several times (Porter and Denton, 1967), as evidenced by Neoglacial moraines in the North Cascade Range. The most extensive of these advances occurred during the Little Ice Age between 1350 and 1900 AD.

Glacial advance during the Little Ice Age created hundreds of small moraines and left vast fields of unconsolidated glacial till. Presently, small cirque glaciers and permanent snowfields are 45 to 50 percent less extensive than at the end of the Little Ice Age 100 years ago. Retreating alpine glacial ice left many tarns on the high landscapes of the survey area. Numerous cirque alpine glaciers remain at the high elevations, most of which have a north or east aspect and are sheltered from the sun by steep cirque walls, horns, and arêtes. The giant glaciers of the last ice age and alpine glaciers of the Little Ice Age left behind large amounts of glacial drift, including till and outwash, which has been reworked by subsequent surficial processes or abandoned as terraces not related to modern stream deposition processes. This sediment fills the lower parts of numerous valleys in the area and is 100 meters thick or more.

In addition to glacial advance and retreat during the Neoglacial Period, volcanic eruptions from Mount Mazama (present day Crater Lake in Crater Lake National Park) and Mount St. Helens (Mount St. Helens National Volcanic Monument) provided a lasting geologic imprint on the landscape and ecology of the area. Tephra ejected by the volcanoes was deposited as airfall across the landscape and can today be found unevenly distributed in a variety of landscape positions as a result of erosion and deposition processes (Rodgers, 2000; Briggs and others, 2006).

Landforms

Over the last 15 years, landforms in the survey area have been mapped by geologists of the National Park Service (Riedel and others, 2011). High-elevation landforms include horns, arêtes, cirques, ridges, passes, Little Ice Age moraines, and other mountains. These landforms are generally characterized by an alpine environment that is devoid of vegetation and is covered either by seasonal snowfields or permanent glaciers. Valley slope landforms are in lower lying landscape positions and are primarily erosional. These landforms include valley walls, bedrock benches, and river canyons. Valley walls are the most common landform in the survey area. In the lowest landscape positions, valley floor landforms include flood plains, terraces, fan terraces, shorelines, deltas, and valley bottoms. These landforms are primarily depositional. Between the valley floors and valley slopes are a group of transitional landforms. These include debris aprons, debris cones, and alluvial fans. Mass movement, including rock falls and topples, debris avalanches, slumps and creeps, and debris torrents, has occurred on these transitional landforms.

Climate

Prepared by the Natural Resources Conservation Service, National Water and Climate Center, Portland, Oregon.

The climate tables were created from data recorded at the climate station at Ross Dam, Washington, during the period 1971 to 2000. Thunderstorm days, relative humidity, percent sunshine, and wind information are estimated from various climate atlases.

Table 1 gives data on temperature and precipitation for the survey area. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on the length of the growing season.

In winter, the average temperature is 1.3 degrees C and the average daily minimum temperature is -1.3 degrees. The lowest temperature on record, which occurred at Ross Dam on December 30, 1968, is -23.3 degrees. In summer, the average temperature is 17.4 degrees and the average daily maximum temperature is 23.4 degrees. The highest temperature, which occurred at Ross Dam on July 27, 1998, is 38.3 degrees. Within the survey area, the average temperatures decrease about 0.6 degrees C for every increase of 300 meters in elevation from Ross Dam.

Growing degree days are shown in table 1. They are equivalent to “heat units.” During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (4.4 degrees C). The normal monthly accumulation is a reference from cropland areas where it is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall. In mountainous areas, growing degree days can serve as a rough approximation for when plants, especially trees, might be actively growing.

The average annual total precipitation is about 1,464 millimeters. Of this, about 427 millimeters, or 29 percent, usually falls in April through October, which constitutes the bulk of the growing season for the survey area. The heaviest 1-day rainfall during the period of record was 136 millimeters at Ross Dam on November 8, 1995. Thunderstorms occur on about 10 days each year, and most occur in June and July. At the highest peaks, precipitation is more than twice the annual total recorded at Ross Dam.

The average seasonal snowfall is 122 centimeters. The greatest snow depth at any one time during the period of record was 112 centimeters recorded on December 30, 1996. On an average, 50 days per year have at least 2.5 centimeters of snow on the ground. The heaviest 1-day snowfall on record was 50.8 centimeters recorded on February 15, 1995. The snowfall total doubles for every increase of 600 meters in elevation from Ross Dam.

The average relative humidity in midafternoon is about 45 percent. Humidity is higher at night, and the average at dawn is about 85 percent. The sun shines 75 percent of the time possible in summer and 28 percent in winter. The highest average windspeed is 19 kilometers per hour. The prevailing wind is from the south.

How This Survey Was Made

This survey was made in conjunction with the Soil Inventory and Monitoring Program of the National Park Service to provide information about the soils and miscellaneous areas within the North Cascades National Park Complex. A meeting of park staff was held in 2004 to identify the soil resource information needs and to relate those needs to the proposed soil survey. Of particular importance to park staff was information regarding a baseline inventory of soil types and their distribution across the survey area and how such an inventory might relate to studies on air pollution input, organic carbon sequestration, and site rehabilitation.

The soil survey of the North Cascades National Park Complex was initiated in 2005. Fieldwork for the project began in 2005 and continued through 2009, concentrating on establishing new series for broadly defined components. Forty-two new soil series were established as a result of this soil survey, and these currently are only mapped in the North Cascades National Park Complex. Two additional soils, the Farway and Treen series, already exist in survey areas adjacent to this area.

During the soil survey, ecological site and soil component relationships 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.

Soils and miscellaneous areas within 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 and field experience of specialists such as botanists and geologists.

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.

Use of Soil Modeling

For this soil survey, a new technique was used to augment the traditional methods used in soil survey. 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. In addition to this mental model of soil distribution, a Remote Area Soil Proxy (RASP) model based on a Geographic Information System (GIS) was used to extract preliminary delineations that were further refined through manual digitizing on digital imagery (Rodgers, 2000; Briggs, 2004). This model was developed cooperatively by the Natural Resources Conservation Service, the Forest Service, and the National Park Service through research projects at Washington State University. The purpose of the model is to consistently and rapidly delineate map unit polygons that have similar climatic, vegetation, landscape/landform, and topographic patterns.

The map unit polygon lines derived from the RASP model were plotted at a scale of 1:24,000 and were evaluated and compared digitally to hillshade topographic relief maps and 1-meter resolution National Agriculture Image Program (NAIP) publication base imagery (fig. 3). Map unit polygon lines were compared to observable vegetative, topographic, and landform breaks on the imagery and adjusted accordingly based on the field experience of the soil scientists. The decision to revert to traditional line placement techniques for the final soil survey was based on reasoned examination by soil survey staff. Areas where RASP line placement did not coincide with changes in tonal patterns were problematic when considering the final deliverable map, which serves as an example of a drawback to using a GIS model for mapping.
GIS techniques cannot always replicate the soil-landscape relationships that can be portrayed by trained and experienced field soil scientists. However, the RASP modeling system is an example of a GIS auto-recognition technique that identifies landscape attributes useful in the final mapping process. Complex manipulations of digital terrain layers within a GIS framework allow soil scientists to consistently identify repeating patterns that may be overlooked through the use of traditional methods.

The following is a synopsis of the digital information used in the development of the RASP model, the design of the map units, and the field documentation for determining map unit components. A more thorough discussion of the RASP model framework is available in the masters theses written by Rodgers and Briggs (Rodgers, 2000; Briggs, 2004). This information included a 10-meter digital elevation model (DEM), landforms (Riedel and Probala, 2005; Riedel and others, 2011), NAIP imagery, a 90-meter computer-based model for potential natural vegetation (PNV) developed by Henderson (Henderson, 2001), a map of actual vegetation (Pacific Meridian Resources, 1996) derived from 30-meter resolution Landsat Thematic Mapper data (National Aeronautics and Space Administration, 2010), and PRISM Climate Group mean annual precipitation and mean annual air temperature data (PRISM Climate Group, 2010). The primary terrain attributes derived from the DEM were topographic relief hillshade, slope, aspect, and profile curvature. Secondary terrain attributes included flow direction, flow accumulation, and wetness index (Moore and others, 1991) calculated with TauDEM version 3.1 (Tarboton, 2005) as an extension within ArcGIS.

Map units were developed by querying single or multiple digital information layers. The PNV layer was used as a proxy for predicting soil climate (soil temperature and moisture regimes). This layer is a computer-based model for predicting potential vegetation. It predicts potential forest vegetative types across all landscapes. In the areas east of Ross Lake and in the Stehekin River watershed, Douglas-fir

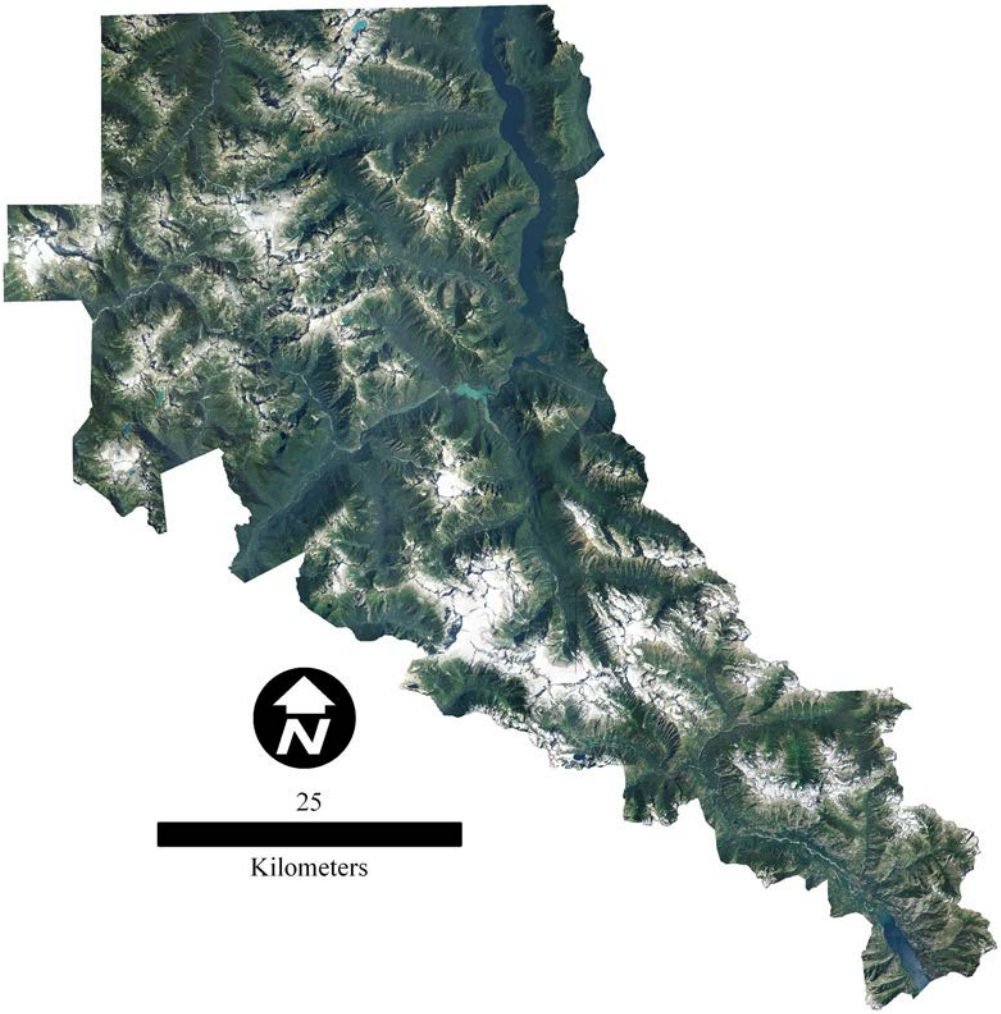


Figure 3.—Composite aerial photograph of the North Cascades National Park Complex from 2006 National Agriculture Image Program.

(*Pseudotsuga menziesii*), grand fir (*Abies grandis*), and ponderosa pine (*Pinus ponderosa*) were considered to be indicators of the xeric and frigid regimes. Codominant Douglas-fir and western hemlock (*Tsuga heteropylla*) throughout the rest of the survey area were considered to be indicators of the udic and frigid regimes. Pacific silver fir (*Abies amabilis*) was used as an indicator of the udic and cryic intermediate elevations, and mountain hemlock (*Tsuga mertensiana*), subalpine fir (*Abies lasiocarpa*) west of the Cascade Crest, and alpine zones were used to identify areas with udic and cryic conditions at higher elevations. Subalpine fir east of the Cascade Crest was considered to be an indicator of the xeric and cryic regimes. Ultimately, the PNV zones were used to divide the survey area into six soil climate zones—frigid/udic, frigid/xeric, cryic/xeric, west low cryic/udic, east low cryic/udic, and high cryic/udic (fig. 4).

Pacific Meridian Resources classes of vegetative cover types were aggregated to arrive at discernible and repeating patterns across the survey area (Pacific Meridian Resources, 1996). Classes identified included coniferous forest, deciduous forest, shrub, meadow, Rock outcrop, and water. Knowledge of the occurrence of these broad cover types was useful in developing the map units. Final line placement for map unit

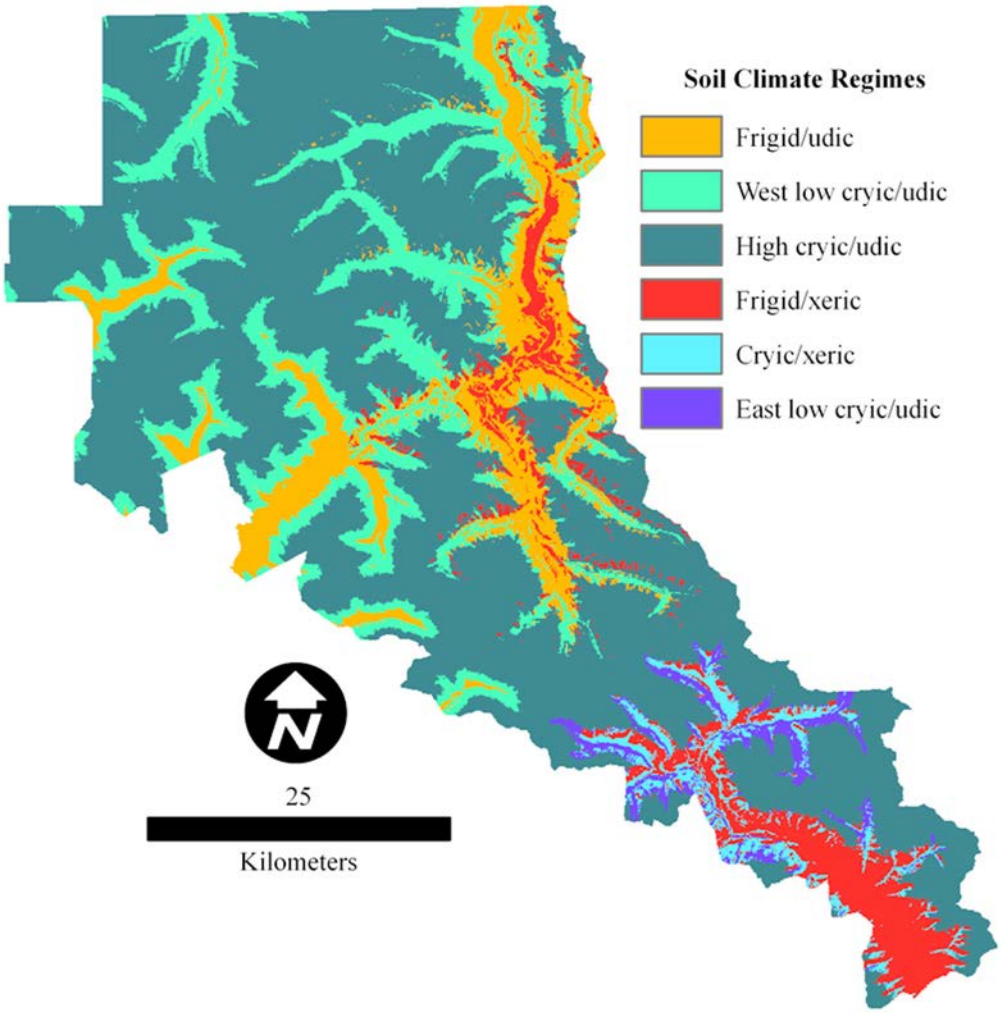


Figure 4.—Soil climate regimes of the North Cascades National Park Complex.

delineations dependent on vegetative cover types was confirmed by NAIP imagery during the final digitizing process.

The rationale for the design and delineation of many map units was based on landforms mapped by the National Park Service (Riedel and Probala, 2005; Riedel and others, 2011) (fig. 5). Landforms serve as a proxy for predicting parent material and landscape stability and thereby time of soil formation. In general, soil-forming processes have influenced the soil types on stable landforms for a longer period of time. Parent material composition and therefore soil type are more consistent and predictable on these landforms. On less stable landforms, parent material is less predictable because of the movement and mixing of soil material over time. In addition, the soil material on more active landforms has had less time for pedogenic processes to influence diagnostic soil features.

Primary and secondary terrain attributes were used to varying degrees in the final map unit design and delineation. For instance, the wetness index was calculated for the entire survey area. Areas that had a high relative wetness value (more than 0.00015) were more closely examined during the final digitizing process to ensure that the areas subject to a seasonal high water table were identified in the final soil map.

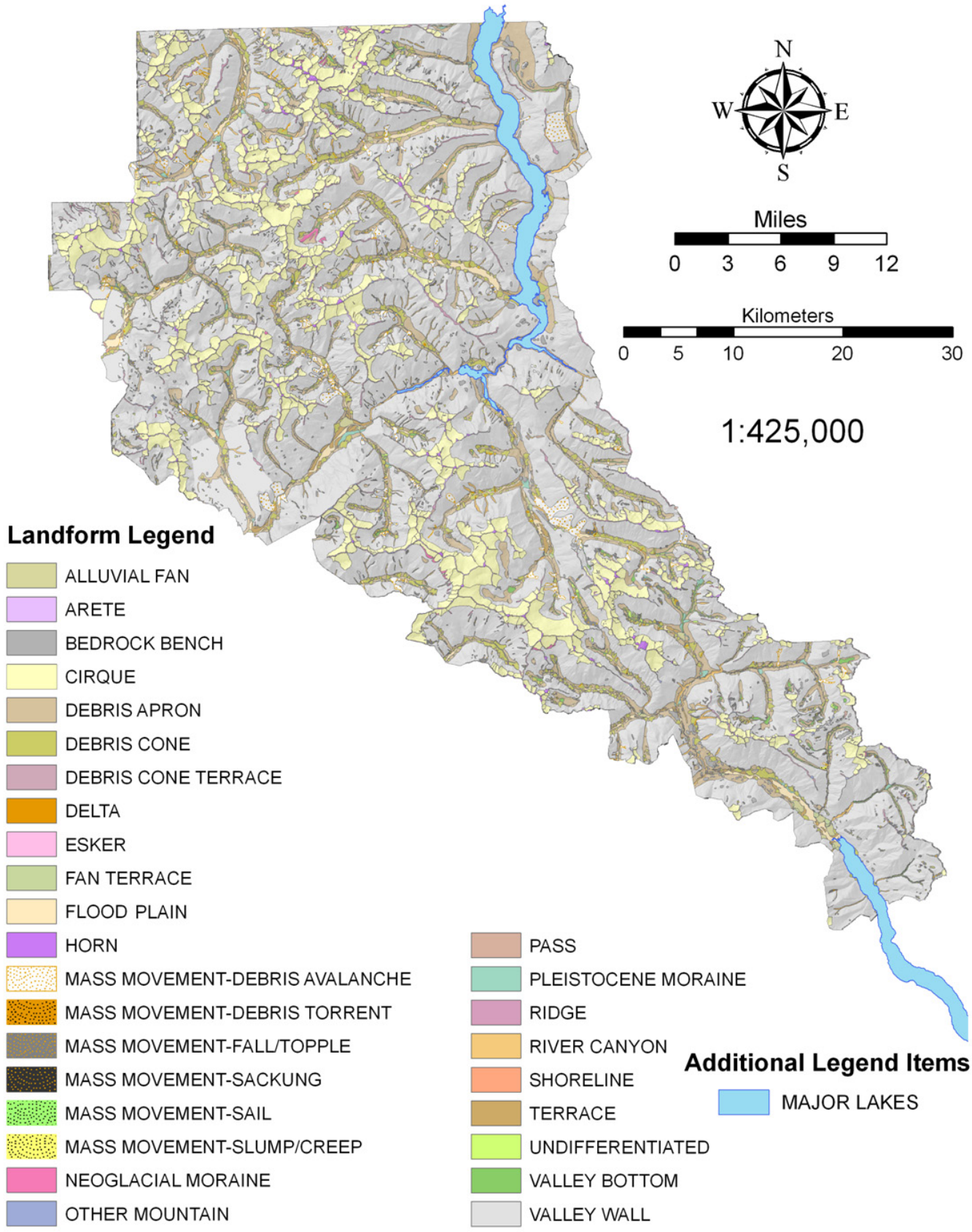


Figure 5.—Landform map of the North Cascades National Park Complex (Riedel and others, 2011).

Once the map unit polygons were digitized, slope was analyzed to develop a range of slope values within the polygons and attribute these values to the map unit names and components.

During the summers of 2005 through 2009, data were collected in the field to determine the properties and distribution of all named components in the survey area. Additional pedons were described during the summers of 2002 and 2003 (Briggs, 2004) and 2007 and 2008 (Meirik, 2008; Roberts, 2009). During these periods, about 450 pedons were described. Pedon locations were entered into a digital layer to show the distribution of point data information, and each pedon was classified to the family level in Soil Taxonomy to determine the major soil components in the map units (Soil Survey Staff, 2010).

Prior to the development of the soil-landscape model for the survey area, Order 4 mapping had been completed in adjacent Forest Service wilderness areas using only an early version of the RASP model. Experience and observations from the mapping of adjacent soil survey areas provided valuable data for this survey. As a result of this data, predictions of the soil types likely to be observed in the survey area could be made at an early stage. Mapping in the survey area then added to the overall understanding of soil-landscape relationships and the documentation of new soil types. Ultimately, this survey area was mapped at an Order 3 level. The dominant soil orders in the survey area are Inceptisols, Andisols, Spodosols, and, to a lesser extent, Histosols and Entisols.

Formation of the Soils

Forty-four soil series are described and delineated in the North Cascades National Park Complex. All of these series, except the Farway and Treen series, were established for this soil survey because of the unique conditions in the survey area. At this time, these forty-two soil series are unique to this area.

The appearance and properties of the soils in the area are a result of the interaction of five soil-forming factors—climate, biological factors, topography, parent material, and time. Although each of the factors are discussed separately in this section, they are inseparable with respect to soil formation. For example, a change in climate influences the ecology that is adapted to a soil type.

Climate

The survey area is characterized by a humid, temperate climate. The topography and proximity to the ocean are the major influences on the climate. The maritime influence is prominent, as tidewater is as close as 80 kilometers to the Cascade Range. Proximity to the northern part of the Pacific Ocean results in significant rain and snow. Precipitation falls mostly in winter, and the summers are relatively warm and dry. The Skagit and Fraser River Valleys allow marine air to flow deep into the mountainous interior.

Two semi-permanent pressure systems control the local climate (Beckey, 1995; Beckey, 2003). In summer, the North Pacific high pressure system migrates over the northern part of the Cascade Range. This clockwise circulation brings cool marine air from the south and east to the Cascade Range. The Aleutian low pressure system produces a rainy season late in fall and in winter. This counterclockwise circulation produces a southwesterly flow of cool marine air. Most of the precipitation falls as snow, and the snowpack commonly is more than 5 meters deep at the higher elevations. In summer, the low pressure cells weaken and move to the north and the North Pacific high pressure system creates a northwesterly flow of cool, dry air.

Proximity to the drainage divide, topography, and the Aleutian low pressure system control the distribution of precipitation. Because the survey area is on the Cascade Crest, the climate is transitional between the western and eastern slopes of the range. The climate ranges from wetter in the west to drier in the east. Orographic effects contribute to a humid climate on the western slopes of the northern part of the Cascade Range while the eastern slopes are drier. Mountains force moist air masses to higher, colder altitudes, releasing moisture and thus forming snowfields and alpine glaciers at the higher elevations. The survey area has the most glaciers in the contiguous United States.

The average annual precipitation is 430 to 3,940 millimeters, varying with elevation and location relative to the Cascade Crest (fig. 6). In general, the eastern edge and southern part of the area are drier than the northwestern part. Temperatures are moderated by the proximity to the ocean, but they also vary seasonally as a result of the northerly latitude. The average annual air temperature is -2 to 11 degrees C, depending on elevation (fig. 7). Changes in topography also

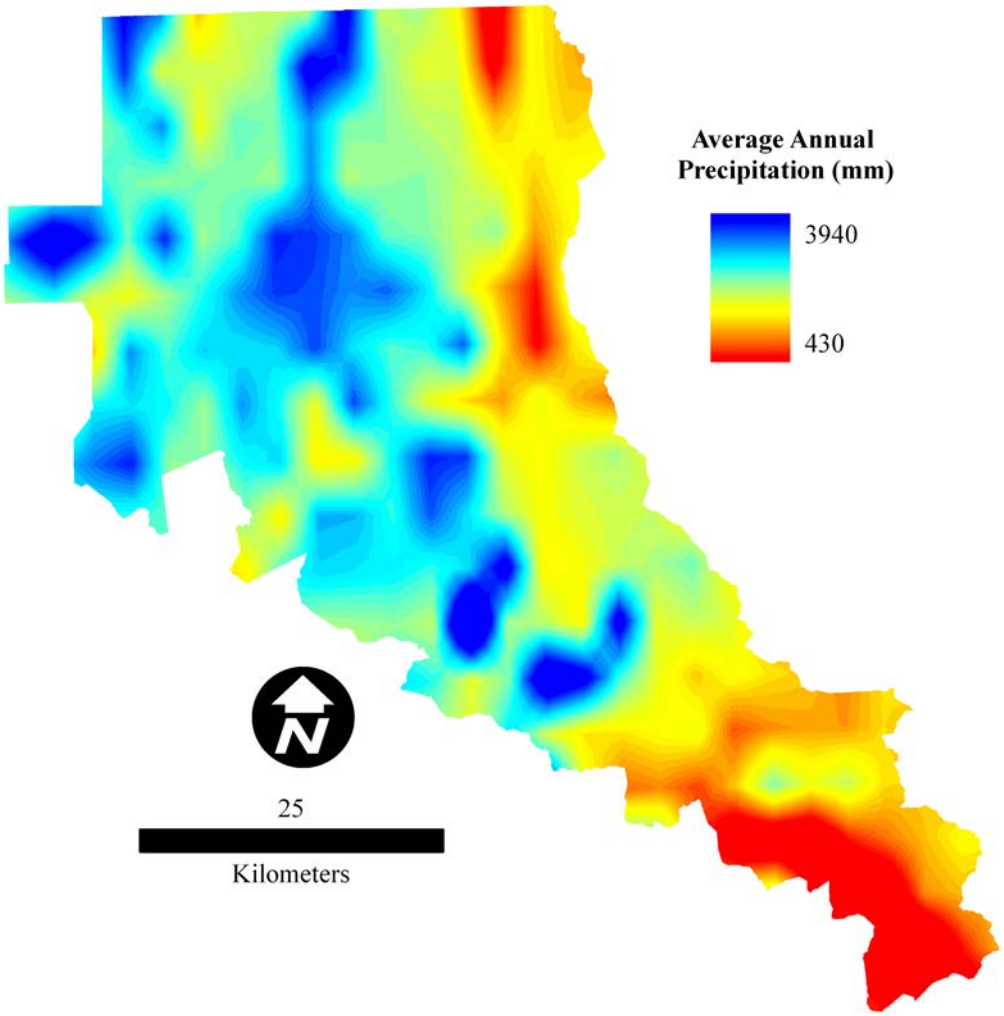


Figure 6.—Average annual precipitation (millimeters) in the North Cascades National Park Complex.

produce distinct microclimates, resulting in characteristics such as cold air drainages and warmer south-facing slopes.

Soil climate regimes vary greatly in the survey area (see figure 4, page 11). The drier climates on the eastern side contrast with the wetter climates on the western side. The soils in the area have a xeric or udic moisture regime. Variations in elevation produce gradations in temperature that affect soil formation. Frigid temperature regimes are at the lower elevations in the area, and cryic temperature regimes are at the higher elevations. The Chilliwack and Easy soils both are Spodosols that formed in volcanic ash under forested plant communities; however, the temperature regime of the Chilliwack series is cryic and that of the Easy series is frigid.

Overall, the variations in climate in the area affect the other soil-forming factors. The Chilliwack and Easy series are both in similar stable landform positions and have similar parent material. The Chilliwack soils, however, are at the higher elevations where snow accumulation is significantly greater and subsequent seasonal snowmelt and infiltration through the soil profile is more prolonged. As a result, these soils exhibit a stronger morphological expression of Spodosol characteristics, such as thicker and more pronounced albic and spodic horizons, than do the Easy soils. In addition, the Chilliwack soils are classified as medial and the Easy soils are classified as ashy (Buol and others, 2003).

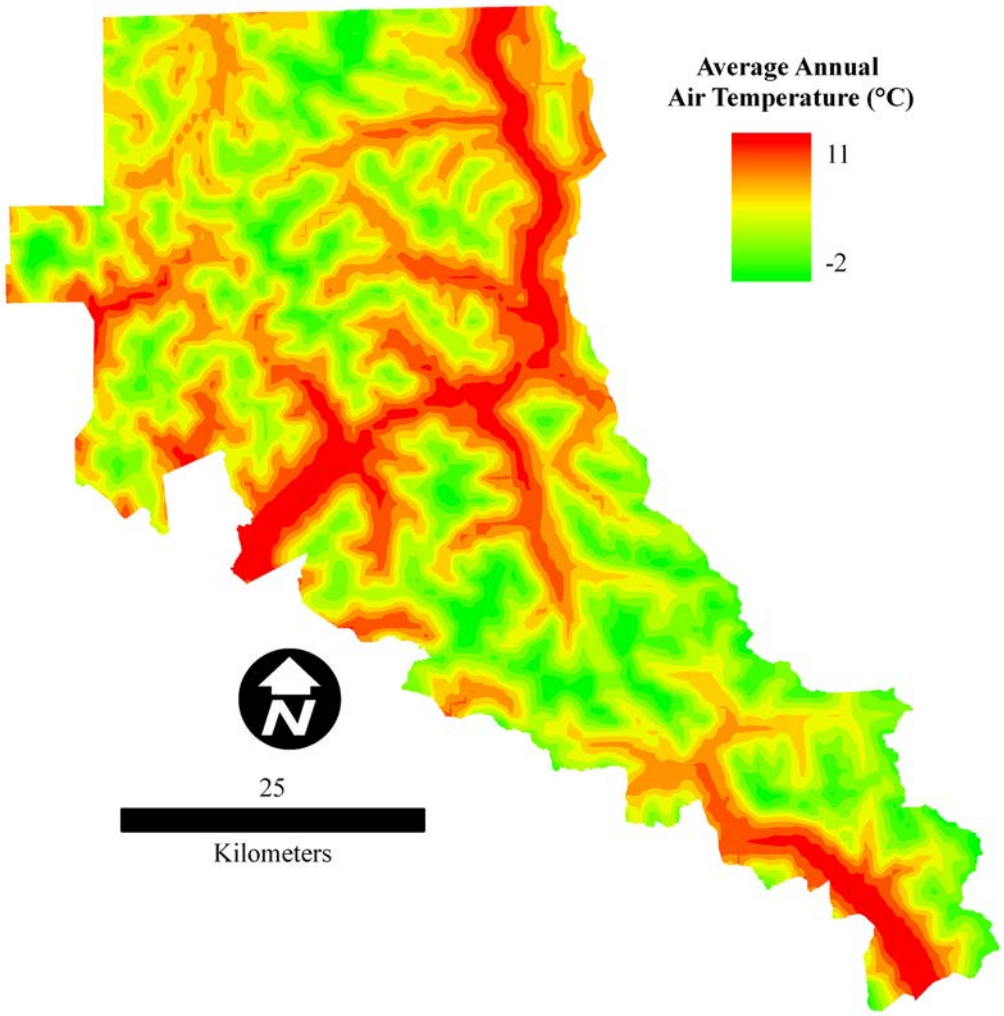


Figure 7.—Average annual air temperature (degrees C) in the North Cascades National Park Complex.

Biological Factors

Temperate coniferous forests are the most dominant ecological community in the area (Franklin and Dyrness, 1973; Pojar and MacKinnon, 1994) (see figure 3, page 10). Forest communities transition from low elevation, to montane, to subalpine, and ultimately to alpine areas, which are dominantly devoid of vegetation. Other plant communities in the survey area include herbaceous meadows, deciduous shrubs and trees, and subalpine meadows. The biological factors of the area are strongly influenced by the climate. As precipitation and temperature change, the mosaic of vegetation also changes accordingly.

Organisms affect soil formation in many ways. Plant communities provide habitat and nutrition for a variety of animals. Because of the abundance of moisture and woody debris, a variety of fungi and molds are in the area. Pioneering organisms, such as lichens, facilitate the weathering of rock (Birkeland, 1999). Soil horizons can be mixed when trees are toppled by wind or when burrowing animals, such as marmots and pikas, excavate the soil material. Other soil fauna, such as insects and worms, increase the porosity of the soils. Increased porosity can enhance the ability of the soils to store water, cycle nutrients, and provide a medium for plant roots.

The relationship between ecological communities and soil genesis is significant (Meirik, 2008). Podzolization occurs in areas that support woody evergreen vegetation, and melanization occurs in areas that support deciduous vegetation. The color and thickness of a surface layer is significantly influenced by the plant community. Soils that formed under a meadow plant community, such as the Arriva, Doubtful, and Stetattle series, have a thick, dark-colored surface layer as a result of the concentration of biomass in the root zone. In contrast, forested soils, such as the Chilliwack and Easy series, have a lighter colored surface layer as a result of the concentration of biomass in the forest canopy and the layer of duff layer on the mineral soil material.

The lower, western flank of the Cascade Range is dominantly characterized by the western hemlock (*Tsuga heterophylla*) forest zone, which includes Douglas-fir (*Pseudotsuga menziesii*) and western redcedar (*Thuja plicata*) in the canopy. These species are at an elevation of about 300 to 1,000 meters, and generally are in areas that receive more than 1,700 millimeters of precipitation. This corresponds with the frigid soil temperature regime, and the udic soil moisture regime. Examples of soils that formed in this zone include the Ledeir, Ragged, and Thorton series. Because of the concentration of forest litter, these soils are typified by thin transitional A horizon immediately below the layer of duff.

In contrast, the lower, eastern flank of the Cascade Range is characterized by the more open, drier Douglas-fir and ponderosa pine (*Pinus ponderosa*) forest zone. This zone includes a higher proportion of grasses and herbs in the understory; thus, the soils have a thicker and darker colored A horizon. Examples are the Goode, Lyall, and Sawtooth series.

Different forest zones are at the higher elevations. Pacific silver fir (*Abies amabilis*) is indicative of the west slope of the Cascade Range at elevations of 750 to 1,400 meters. The soils in this zone have a cryic temperature regime and a udic moisture regime. Western hemlock and western redcedar occur in lesser amounts. Soils in this zone include the Perfect and Spickard series, and they exhibit an increase in andisolization and podzolization.

At elevations of 900 to 1,800 meters, the soils have a cryic temperature regime and a udic moisture regime. Mountain hemlock (*Tsuga mertensiana*) is dominant, but the plant community also includes Pacific silver fir (*Abies amabilis*), subalpine fir (*Abies lasiocarpa*), and Alaska yellow-cedar (*Chamaecyparis nootkatensis*). Soils in this zone, such as the Chilliwack and Maggib series and the cold phase of the Perfect and Spickard series, exhibit a high degree of mineral weathering and a strong morphological expression of Andisols and Spodosols.

At intermediate elevations on the east slope of the Cascade Range, where the total annual precipitation generally is lower than that of west slope, Pacific silver fir (*Abies amabilis*) and Engelmann spruce (*Picea engelmannii*) are dominant. Soils in this zone generally are the dry phase of the soils that occur on the west slope or at the higher elevations, such as the dry phase of the Noca and Chilliwack series.

A narrow transition area is on the east slope of the Cascade Range between the frigid/xeric and cryic/udic zones. It is characterized by the dominance of subalpine fir. The soils have a cryic temperature regime and a xeric moisture regime. The Primus and Stehekin series are in this unique zone.

At elevations above the high cryic/udic forested zone are the subalpine and alpine zones, which are characterized dominantly by shrubs and herbs. Soils such as the Arriva, Doubtful, Treen, and Stetattle series are in these areas. They exhibit a high degree of mineral weathering and an accumulation of organic matter in the profile.

Also in the survey area are areas that support dominantly deciduous species, including red alder (*Alnus rubra*), black cottonwood (*Populus balsamifera*), bigleaf maple (*Acer macrophyllum*), Sitka alder (*Alnus viridis*), and vine maple (*Acer circinatum*). Generally, the soils in these areas have a thick, dark-colored surface layer

as a result of the accumulation of organic matter. These soils include the deciduous phase of the Stetattle and Tricouni series and the Inspiration and Mesahchie series.

Topography

Steep, mountainous topography is extensive in the survey area (figs. 8 and 9). Rivers, glaciers, mass movement, and avalanches have produced a wide variety of unique landforms and have sculpted the valleys and peaks. A humid climate and high precipitation supplies the rivers and glaciers and controls the hydrology of the area. Principle drainage divides are the Pacific Crest, trending north to south and dividing the Skagit and Columbia Rivers, and the North Cascade Crest, trending east to west and dividing the Skagit and Fraser Rivers (Riedel and others, 2007). The Skagit River drains most of the area into Puget Sound, the northwestern part drains north into the Chilliwack and Fraser Rivers, and the southeastern part drains into the Stehekin and Columbia Rivers. Larger tributaries tend to follow structural controls on bedrock and produce rivers and valleys that trend northwest to southeast, and smaller first-order streams tend to have parallel drainage patterns and flow from steep valley walls.

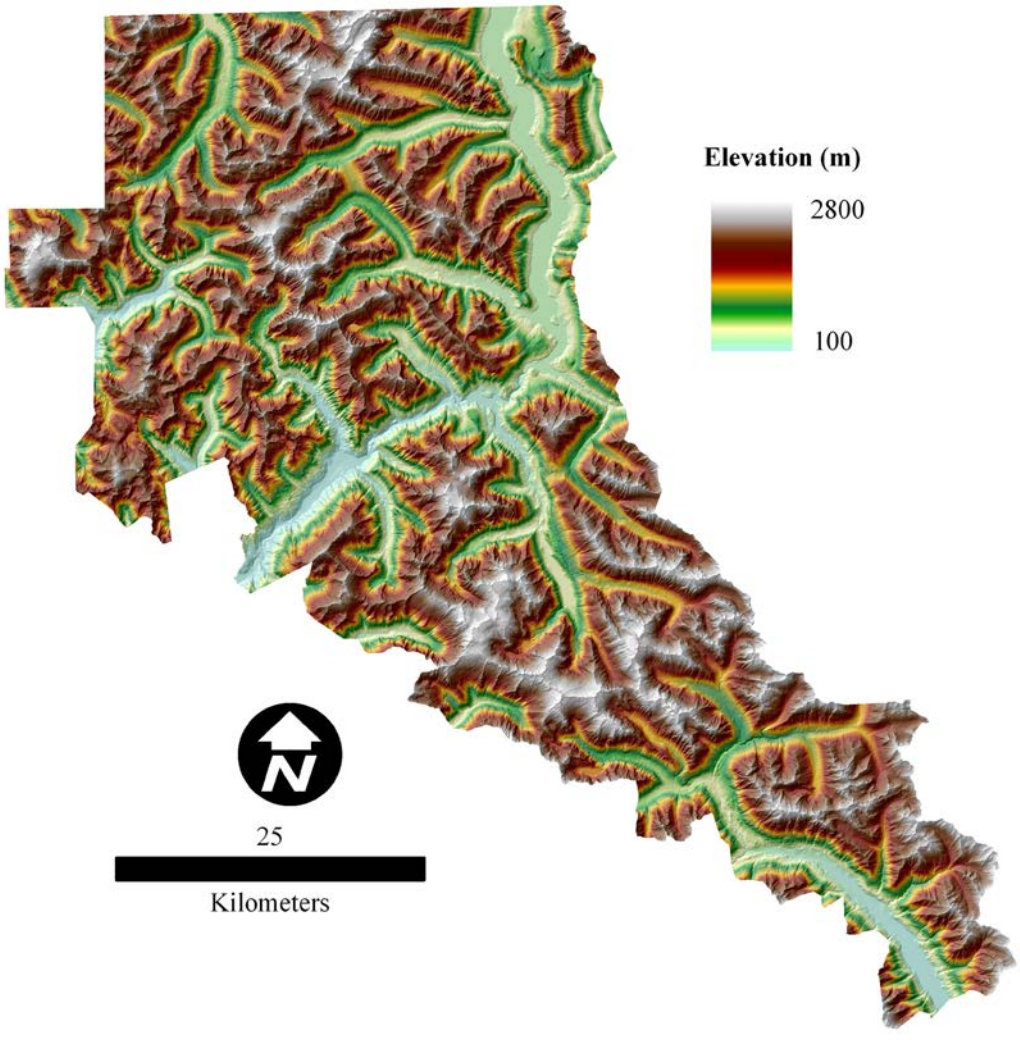


Figure 8.—Elevations (meters) derived from a 10-meter digital elevation model and draped over a hillshade image of the North Cascades National Park Complex.

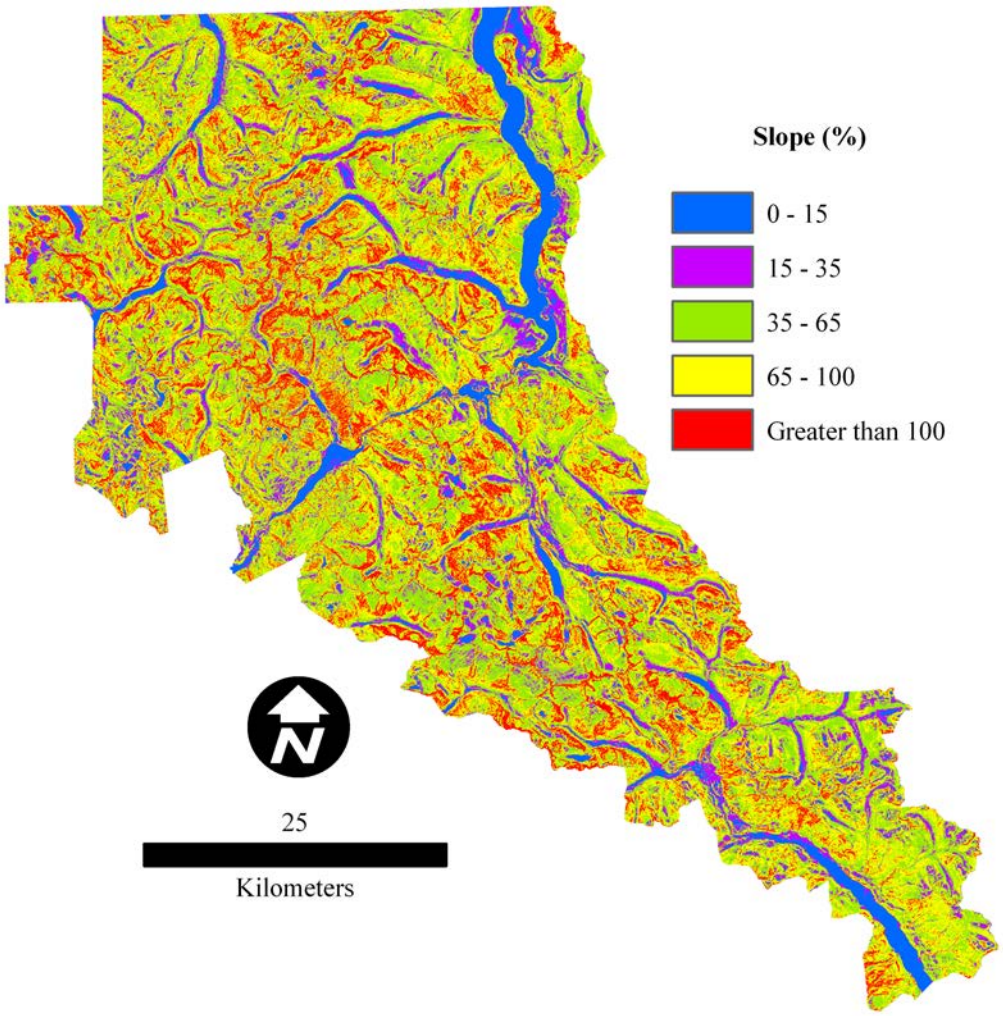


Figure 9.—Slope classes (percent) in the North Cascades National Park Complex derived from a 10-meter digital elevation model.

Alpine and continental glaciations have had a major impact on the landscape. Broad passes and beveled ridges, enlarged valley cross-sections, lateral moraines, terminal moraines, truncated valley spurs, and thick accumulations of till and outwash are the result of continental ice sheets and alpine glaciers. Terraces, flood plains, valley bottoms, alluvial fans, and deltas are the result of detachment, transportation, and deposition of material by rivers and streams.

Gravity constantly acts on the topography of the survey area. Mass movement is common because of the steep topography. It has impacted the morphology of the land surface, the stream courses, and the biotic communities. One notable landslide is on the western flank of Ragged Ridge. This large slide (618 hectares) produced a swamp near the confluence of Logan and Fisher Creeks by blocking drainage from Fisher Creek. Similar slides have occurred between Marblemount and Newhalem, producing a lake that existed for more than 1,500 years (Tabor and Haugerud, 1999; Riedel and others, 2001).

Soil creep and mixing on debris aprons and steep valley walls are also effects of gravity. Over time, soil material moves downslope and results in mixed soil profiles and an accumulation of soil material in lower lying areas. Soils such as the Tricouni, Ragged, Perfect, Stehekin, and Sawtooth series are in active slope positions.

The relative stability of a landform influences the kind of soil that forms in an area (Briggs and others, 2006). On active alluvial flood plains and valley bottoms are young soils that exhibit little profile development and are subject to continuous deposition of alluvium. The Nohokomeen, Roland, Skymo, Torment, Bacon, and Purple series are examples. In contrast, on a Pleistocene moraine that has been stable for thousands of years are older soils that have a more developed profile. The Chilliwack, Noca, Farway, and Thorton series are examples.

A toposequence, or catena, is also useful in understanding the role of topography in the formation of soils. Most of the drainage divides in the survey area are characterized by steep cliffs with pointed rocky summits that may or may not be mantled with Rubble land, ice, or seasonal snowfields. In these alpine areas, little formation of soils occurs, especially in areas that have been recently deglaciated. Pockets of Harlequin and Doubtful series are in small, isolated areas.

From the summits to the shoulder slopes, the slope gradient generally is gentler and subalpine vegetation can grow in these areas. The soils are shallow to deep. Examples are the Treen, Harlequin, Doubtful, and Arriva series. Below the shoulder slopes are the backslopes (valley walls). These areas are characterized by steep, linear slopes, with relief commonly as much as 1,000 meters. These slopes are characterized by soil movement downslope and colluvial-influenced soils. Examples are the Chilliwack, Noca, Spickard, Farway, and Thorton series.

At the lowest elevations in the catena are the alluvial soils near stream channels. These soils are distinguished by the presence of redoximorphic features and alluvial deposition.

Parent Material

Parent material is the material in which a soil forms over time. The soils in the survey area formed in a variety of parent material. One of the most common is glacial till deposited during the last ice age. This material is coarse textured and contains a high concentration of rock fragments. Originally deposited as a discontinuous mantle of varying thickness, this material has been reworked by gravity to varying degrees. In some soils, such as the Thorton, Chilliwack, Farway, and Noca series, this mantle is still a fairly distinct zone below the surface horizon in the profile. In other soils, such as the Perfect and Stehekin series, it has been more thoroughly mixed with the overlying material.

Volcanic ash is common in the soils in the area. The volcanic eruptions of Mount Mazama (present-day Crater Lake in Crater Lake National Park) and Mount St. Helens (Mount St. Helens National Volcanic Monument) produced tephra that was deposited as airfall across the area. Today, through gravitational processes and pedogenic disturbance, this volcanic ash is unevenly distributed in a variety of landscape positions (Briggs and others, 2006; Rodgers, 2000). Volcanic ash has an important role in retaining moisture and essential nutrients for plant growth. Most of the soils in the survey area have some ash influence and are classified as Andisols or andic and vitrandic intergrades of other soil orders. Soils on more stable landforms commonly have a thick mantle of volcanic ash from the eruption of Mount Mazama. These soils are classified as Andisols and include the Spickard, Treen, Primus, Cosho, Damnation, Thorton, Despair, and Inspiration series. Other ash-influenced soils have been subject to erosion and reworking. These soils include the Sawtooth, Mesahchie, Goode, Tricouni, Terror, Tepeh, and Forbidden series. These soils are classified as andic intergrades because of the volume of volcanic ash present. More highly eroded soils with an ash influence are classified as vitrandic intergrades. These include the Perfect, Triumph, Stehekin, Ragged, and Lyall series.

Soils on the most stable landscapes in the area have had sufficient time to develop into Spodosols. These soils are characterized by the translocation of iron and

aluminum vertically within the profile and are associated with coniferous vegetation (Meirik, 2008). They exhibit an albic-spodic horizon sequence. The albic horizon is light in color because of the removal of sesquioxides and organic matter. The spodic horizon has a richer color as a result of the deposition of these materials. These soils commonly have a considerable ash influence and have glacial till at a greater depth in the profile. Spodosols in the survey area include the Ledeir, Easy, Yawning, Maggib, Chilliwack, Mox, and Kimtah series. These soils commonly have volcanic ash over reworked colluvium derived from glacial till.

In contrast, some of the soils in the area are not influenced by ash or till. The soils of the Beaverpass series, for example, are organic. They formed almost entirely in organic material. In wet, cold environments, the rate of microbial decomposition of organic matter is slower than the rate in which it accumulates. Other soils have a thick deposit of organic matter mixed with mineral soil material. These include the Purple, Arriva, and Mox series. The soils of the Stetattle series are also strongly influenced by high concentrations of organic matter, as evident in the dark-colored surface mineral horizon.

Some soils in the survey area formed entirely in material transported by surface water. These alluvial soils are common in low-lying areas in proximity to major streams and rivers. The Skymo, Bacon, and Torment series are examples. These soils commonly have management restrictions because of wetness, and they support hydrophitic vegetation.

Time

The formation of a soil is ultimately the result of the interaction of the previously discussed soil-forming factors over time. The end of the last glaciation in this area effectively set the time for soil formation to begin about 11,500 years ago (Armstrong and others, 1965; Porter and Swanson, 1998). Soil formation has progressed since that time as a result of four general soil-forming processes—additions, losses, transformations, and translocations (Simonson, 1959). Soil horizonation is a result of these processes acting over time. The dark-colored surface layer of soils such as the Stetattle, Mox, and Purple series is a result of additions of organic matter that can occur in a relatively short amount of time.

Redoximorphic concentrations and depletions in the subsoil of the Terror, Kimtah, and Manlywham series are evidence of transformation and translocation of iron due to periodic saturation by water. These characteristics can form in a relatively short amount of time, but they can also persist for long periods of time because of the slow rate of loss within the soil environment. Presence of an albic-spodic horizon sequence that extends into the subsoil of soils such as the Easy, Ledeir, and Maggib series suggests that the landscape and soil-forming processes have been stable since the glacial till was deposited.

Absolute ages can be determined from specific events in the history of the area. Periodic eruptions of volcanoes in the Cascade Range provide chronostratigraphic markers in many soil profiles. Tephra deposits from Glacier Peak, Mount St. Helens, and ancient Mount Mazama have been observed throughout the Pacific Northwest, and tephrachronology has been used for dating in numerous pedological (Briggs and others, 2006), archaeological, and paleoclimatic reconstruction studies.

Biological succession is important in regard to soil genesis and profile development over time. The way in which a plant community matures over time has an impact on the development of soils. Meirik has studied the statistical correlations between soil properties and vegetation (Meirik, 2008). The concept of potential natural vegetation (PNV) is a useful analogy. To understand PNV, one must understand successional patterns and the response and recovery of an ecosystem after large-scale changes, such as landslides, fires, and logging. At the lower elevations, a forest composed of western hemlock, Douglas-fir, and western redcedar will develop if the area is

undisturbed. This forest association is the PNV for areas of the survey area below an elevation of about 1,250 meters. Following a stand-clearing disturbance, the plant community will respond by colonization of pioneering plant species such as alders, maples, and grasses.

Alders have the ability to biologically fix nitrogen due to a symbiotic relationship with soil micro-organisms. Alders are well suited to nutrient-poor soils. As this plant community matures, western redcedar (*Thuja plicata*) or lodgepole pine (*Pinus contorta*) may be the first coniferous species to become established. Douglas-fir and hemlock become established next. If the plant community has sufficient time to reach its climax stage, hemlock will mature and compete with Douglas-fir as the dominant species.

This ecological succession is analogous to the development of soils on disturbed land surfaces. An idealized sequence of soil development is useful in illustrating the effects of time on soil genesis. Initially, a landslide that begins on a valley wall will strip away soil material from the highest reaches and deposit fresh colluvial parent material on the valley floor. This is evident in the many boulder fields throughout the survey area. At the higher reaches where material was removed, the fresh, unweathered parent material then is subject to the four general soil-forming processes and soil formation begins. Coatings of moss or lichen may develop on this fresh parent material and may be enriched by litter from nearby plants. Young, shallow soils composed dominantly of organic matter form. When pioneering plant species, such as red alder and Sitka alder, colonize the new surface, the soil formation processes are accelerated as more organic matter is deposited. Organic compounds further break down the underlying parent material, and a mineral soil begins to develop. Eventually soils such as the Stetattle series form. These soils have a dark-colored horizon that contains organic matter and a high content of rock fragments more than 2 millimeters in diameter.

With sufficient time and stability of the area, coniferous forest communities become colonized and podzolization occurs so that soils such as the Chilliwack series form. These soils are characterized by an albic-spodic horizon sequence. These mature Spodosols are analogous to the mature stand of hemlock and Douglas-fir trees, which is the PNV. The well-developed Spodosols could be termed the “potential natural soils” for this environment.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (Soil Survey Staff, 1999 and 2010). 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. 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 Spodosol.

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 Cryod (*Cry*, meaning cold, plus *od*, from Spodosol).

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 Haplocryods (*Hapl*, meaning minimal horizonation, plus *cryod*, the suborder of the Spodosols that has a cryic temperature 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 Haplocryods.

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 loamy-skeletal, isotic Typic Haplocryods.

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.

Table 4 indicates the order, suborder, great group, subgroup, and family of the soil series in the survey area.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series 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) and in the "Field Book for Describing and Sampling Soils" (Schoeneberger and others, 2002). 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, 2010). 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.

Arriva Series

Depth class: Very deep
Drainage class: Well drained
Capacity to transmit water (Ksat): Moderately high to very high
Landscape: Mountains
Landform: Valley walls of mountain slopes
Parent material: Volcanic ash over glacial drift
Slope range: 15 to 65 percent
Elevation: 365 to 2,310 meters
Mean annual precipitation: 1,800 to 3,300 millimeters
Mean annual air temperature: 1 to 6 degrees C
Frost-free period: 30 to 60 days

Taxonomic class: Medial over sandy or sandy-skeletal, amorphic over isotic Thaptic Haplocryands

Typical Pedon

Arriva ashy fine sandy loam (fig. 10) in an area of Stetattle-Doubtful-Arriva complex, 15 to 100 percent slopes, about 27 kilometers southeast of the town of Newhalem, Washington; North Cascades National Park Complex, Skagit County, Washington; 795 meters east and 560 meters north of the southeast corner of section 36, T. 35 N., R. 13 E.; Cascade Pass, Washington, U.S. Geological Survey quadrangle; latitude 48 degrees, 28 minutes, 23 seconds north and longitude 121 degrees, 3 minutes, 23 seconds west; UTM 643640 meters E., 5370705 meters N., zone 10; NAD 83.

Oi—0 to 4 centimeters; slightly decomposed needles, leaves, and twigs; common very fine and medium roots; abrupt smooth boundary.

Oe—4 to 23 centimeters; very dark grayish brown (10YR 3/2) moderately decomposed needles and twigs, dark grayish brown (10YR 4/2) dry; common very fine and fine and many medium roots; common fine and medium irregular pores; very strongly acid (pH 4.6); abrupt smooth boundary.

E—23 to 26 centimeters; brown (7.5YR 4/2) ashy fine sandy loam, pinkish gray (7.5YR 6/2) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and medium roots at top of horizon; common fine irregular pores; very strongly acid (pH 4.8); abrupt wavy boundary.

Oa—26 to 37 centimeters; very dark grayish brown (10YR 3/2) highly decomposed plant material, dark grayish brown (10YR 4/2) dry; moderate medium subangular blocky structure; common very fine to coarse roots; common fine and medium irregular pores; very strongly acid (pH 4.5); abrupt wavy boundary.

Figure 10.—Typical profile of an Arriva soil. Numerals on tape indicate centimeters and inches.

Bw—37 to 47 centimeters; dark brown (7.5YR 3/2) medial sandy loam, brown (7.5YR 4/2) dry; moderate medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and few medium roots; common fine and medium irregular pores; 5 percent granite gravel; very strongly acid (pH 4.8); clear wavy boundary.

Ab—47 to 50 centimeters; black (10YR 2/1) medial loam, dark gray (10YR 4/1) dry; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; common fine and few medium irregular pores; 5 percent granite gravel; very strongly acid (pH 5.0); abrupt smooth boundary.

Bwb—50 to 60 centimeters; very dark brown (10YR 2/2) gravelly medial sandy loam, dark grayish brown (10YR 4/2) dry; weak fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; few very fine and fine roots; common fine and few medium irregular pores; 20 percent granite gravel and 10 percent granite cobbles; strongly acid (pH 5.2); gradual wavy boundary.

2C1—60 to 85 centimeters; light olive brown (2.5Y 5/3) very stony loamy coarse sand, light yellowish brown (2.5Y 6/3) dry; single grain; loose, nonsticky and nonplastic; common medium and coarse interstitial pores; 30 percent granite gravel, 10 percent granite cobbles, and 10 percent granite stones; moderately acid (pH 5.6); gradual wavy boundary.

2C2—85 to 152 centimeters; light yellowish brown (2.5Y 6/4) very stony loamy coarse sand, pale yellow (2.5Y 7/4) dry; single grain; loose, nonsticky and nonplastic; common medium and coarse interstitial pores; 20 percent granite gravel, 10 percent granite cobbles, and 20 percent granite stones; moderately acid (pH 5.6).

Range in Characteristics

Mean annual soil temperature: 2 to 8 degrees C
Moisture control section: Dry less than 30 consecutive days
Clay content: 0 to 10 percent
Thickness of volcanic ash mantle: 36 to 75 centimeters
Particle-size control section: Contrasting
Rock fragment content (medial part): 5 to 30 percent total, with 5 to 30 percent fine to coarse gravel, 0 to 15 percent cobbles, and 0 to 5 percent stones
Rock fragment content (sandy-skeletal part): 35 to 55 percent total, with 15 to 50 percent fine to coarse gravel, 10 to 30 percent cobbles, and 0 to 30 percent stones

E horizon
Hue—7.5YR or 10YR
Value—3 to 5 moist, 4 to 6 dry
Chroma—1 or 2 moist or dry
Fine-earth texture—ashy fine sandy loam or ashy sandy loam
Rock fragment content—0 to 15 percent fine to coarse gravel
Volcanic glass content—35 to 80 percent
Reaction—extremely acid or very strongly acid
Thickness—0 to 5 centimeters (not present in all pedons)

Bw horizon
Hue—7.5YR or 10YR
Value—3 to 5 moist, 4 to 6 dry
Chroma—2 to 6 moist or dry
Fine-earth texture—medial sandy loam or medial fine sandy loam
Rock fragment content—5 to 30 percent total, with 5 to 30 percent fine to coarse gravel and 0 to 15 percent cobbles
Volcanic glass content—15 to 70 percent
Reaction—very strongly acid or strongly acid
Thickness—5 to 25 centimeters

Ab horizon
Hue—10YR or 7.5YR
Value—2 to 3 moist, 3 to 5 dry
Chroma—1 or 2 moist or dry
Fine-earth texture—medial loam, medial sandy loam, or medial fine sandy loam
Rock fragment content—5 to 30 percent total, with 5 to 30 percent fine to coarse gravel, 0 to 15 percent cobbles, and 0 to 5 percent stones
Volcanic glass content—15 to 70 percent
Reaction—very strongly acid or strongly acid
Thickness—2 to 15 centimeters

Bwb horizon
Hue—10YR or 7.5YR
Value—2 to 5 moist, 4 to 6 dry
Chroma—2 to 6 moist or dry
Fine-earth texture—medial sandy loam or medial fine sandy loam
Rock fragment content—5 to 30 percent total, with 5 to 30 percent fine to coarse gravel, 0 to 15 percent cobbles, and 0 to 5 percent stones

Volcanic glass content—15 to 70 percent
Reaction—very strongly acid or strongly acid
Thickness—10 to 35 centimeters

2C horizon
Hue—2.5Y or 10YR
Value—4 to 6 moist, 5 to 7 dry
Chroma—3 to 6 moist or dry
Fine-earth texture—loamy coarse sand, loamy sand, coarse sand, or sand
Rock fragment content—35 to 55 percent total, with 15 to 50 percent fine to coarse gravel, 10 to 30 percent cobbles, and 0 to 30 percent stones
Reaction—moderately acid or strongly acid

Bacon Series

Depth class: Very deep (more than 150 centimeters)
Drainage class: Very poorly drained
Capacity to transmit water (Ksat): High or very high
Landscape: Valleys
Landform: Depressions, flood plains, and terraces
Parent material: Alluvium
Slope range: 0 to 15 percent
Elevation: 325 to 2,110 meters
Mean annual precipitation: 1,750 to 2,800 millimeters
Mean annual air temperature: 3 to 6 degrees C
Frost-free period: 30 to 60 days

Taxonomic class: Coarse-loamy over sandy or sandy-skeletal, isotic, acid Typic Cryaquepts

Typical Pedon

Bacon fine sandy loam (fig. 11) in an area of Beaverpass-Purple-Bacon complex, 0 to 15 percent slopes, in Pelton Basin in the Stehekin River Watershed; North Cascades National Park Complex, Chelan County, Washington; 435 meters east and 430 meters north of the southwest corner of section 6, T. 34 N., R. 14 E.; Cascade Pass, Washington, U.S. Geological Survey quadrangle; latitude 48 degrees, 27 minutes, 34 seconds north and longitude 121 degrees, 2 minutes, 29 seconds west; UTM 644807 meters E., 5369211 meters N., zone 10; NAD 83.

Oe—0 to 2 centimeters; moderately decomposed plant material; common very fine and fine and many medium and coarse roots; very strongly acid (pH 4.5); abrupt smooth boundary.
Bg1—2 to 20 centimeters; greenish gray (5GY 5/) fine sandy loam, light greenish gray (5GY 7/) dry; moderate medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine to coarse roots; 60 percent strong brown (7.5YR 4/6) iron-manganese masses in matrix; very strongly acid (pH 5.0); clear irregular boundary.
Bg2—20 to 38 centimeters; greenish gray (5GY 5/) very fine sandy loam, light greenish gray (5GY 7/) dry; moderate medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; few very fine to coarse roots; 20 percent strong brown (7.5YR 4/6) iron-manganese masses on surfaces along root channels; very strongly acid (pH 5.0); abrupt wavy boundary.
Cg1—38 to 43 centimeters; greenish gray (5GY 5/) coarse sand, light greenish gray (5GY 7/) dry; single grain; soft, very friable, nonsticky and nonplastic; few very fine to coarse roots; strongly acid (pH 5.4); abrupt wavy boundary.

Figure 11.—Typical profile of a Bacon soil. The upper 25 centimeters exhibits strongly developed redoximorphic concentrations and depletions of iron.

Cg2—43 to 80 centimeters; greenish gray (5GY 5/) very fine sandy loam, light greenish gray (5GY 7/) dry; massive; soft, very friable, slightly sticky and slightly plastic; few very fine to coarse roots; 5 percent strong brown (7.5YR 4/6) iron-manganese masses on surfaces along root channels; strongly acid (pH 5.4); abrupt wavy boundary.

Cg3—80 to 150 centimeters; greenish gray (5GY 5/) gravelly sand, light greenish gray (5GY 7/) dry; massive; soft, very friable, nonsticky and nonplastic; 10 percent fine gravel and 20 percent medium and coarse gravel; strongly acid (pH 5.4).

Range in Characteristics

Mean annual soil temperature: 4 to 7 degrees C

Moisture control section: Seasonal high water table at soil surface for more than 30 consecutive days

Clay content: 0 to 15 percent

Particle-size control section: Contrasting

Rock fragment content (coarse-loamy part): 0 to 20 percent total, with 0 to 20 percent fine to coarse gravel, 0 to 10 percent cobbles, and 0 to 5 percent stones
Rock fragment content (sandy or sandy-skeletal part): 0 to 65 percent total, with 0 to 45 percent fine to coarse gravel, 0 to 20 percent cobbles, and 0 to 20 percent stones

Bg1 horizon
Hue—5GY, 2.5Y, or 10YR
Value—3 to 5 moist, 5 to 7 dry
Chroma—1 to 3 moist or dry
Fine-earth texture—fine sandy loam or sandy loam
Rock fragment content—0 to 20 percent total, with 0 to 15 percent fine to coarse gravel and 0 to 5 percent cobbles
Reaction—very strongly acid or strongly acid
Thickness—15 to 30 centimeters

Bg2 horizon
Hue—5GY, 2.5Y, or 10YR
Value—3 to 5 moist, 5 to 7 dry
Chroma—1 to 3 moist or dry
Fine-earth texture—very fine sandy loam, fine sandy loam, or sandy loam
Rock fragment content—0 to 20 percent total, with 0 to 20 percent fine to coarse gravel and 0 to 10 percent cobbles
Reaction—very strongly acid or strongly acid
Thickness—10 to 40 centimeters

Cg1 horizon
Hue—5GY, 2.5Y, or 10YR
Value—3 to 5 moist, 5 to 7 dry
Chroma—1 to 4 moist or dry
Fine-earth texture—coarse sand, coarse sandy loam, loamy sand, or sandy loam
Rock fragment content—0 to 65 percent total, with 0 to 45 percent fine to coarse gravel, 0 to 15 percent cobbles, 0 to 20 percent stones, and 0 to 20 percent boulders
Reaction—strongly acid or moderately acid
Thickness—5 to 45 centimeters

Cg2 horizon
Hue—2.5Y or 10YR
Value—3 to 5 moist, 5 or 6 dry
Chroma—2 to 4 moist or dry
Fine-earth texture—very fine sandy loam, sandy loam, loamy coarse sand, or sand
Rock fragment content—0 to 65 percent total, with 0 to 45 percent fine to coarse gravel, 0 to 15 percent cobbles, 0 to 20 percent stones, and 0 to 20 percent boulders
Reaction—strongly acid or moderately acid
Thickness—15 to 50 centimeters

Cg3 horizon
Hue—2.5Y or 10YR
Value—3 to 5 moist, 5 or 6 dry
Chroma—2 to 4 moist or dry
Fine-earth texture—sand, coarse sand, loamy coarse sand, or loamy sand
Rock fragment content—0 to 65 percent total, with 0 to 45 percent fine to coarse gravel, 0 to 15 percent cobbles, 0 to 20 percent stones, and 0 to 20 percent boulders

Reaction—strongly acid or moderately acid
Thickness—15 to 50 centimeters

Beaverpass Series

Depth class: Very deep (more than 150 centimeters)
Drainage class: Very poorly drained
Capacity to transmit water (Ksat): Moderately high to very high
Landscape: Valleys
Landform: Depressions
Parent material: Highly decomposed plant material
Slope range: 0 to 5 percent
Elevation: 545 to 1,750 meters
Mean annual precipitation: 1,800 to 3,300 millimeters
Mean annual air temperature: 2 to 6 degrees C
Frost-free period: 30 to 60 days

Taxonomic class: Sandy or sandy-skeletal, isotic, euic Terric Cryosaprists

Typical Pedon

Beaverpass woody mucky peat (fig. 12) in an area of Beaverpass-Purple-Bacon complex, 0 to 15 percent slopes, on a southwest-facing toeslope; North Cascades National Park Complex, Whatcom County, Washington; in the NW1/4SW1/4 of section 9, T. 39 N., R. 12 E.; Mount Redoubt, Washington, U.S. Geological Survey quadrangle; latitude 48 degrees, 52 minutes, 19 seconds north and longitude 121 degrees, 15 minutes, 19 seconds west; UTM 627916 meters E., 5415498 meters N., zone 10; NAD 83. (When described on August 8, 2007, the soil was moist throughout.)

Oe1—0 to 18 centimeters; very dark brown (7.5YR 2.5/2) moderately decomposed needles, leaves, and twigs, dark brown (7.5YR 3/2) dry; common very fine and medium and many coarse and very coarse roots; 10 percent wood fragments; extremely acid (pH 4.3); clear wavy boundary.

Oe2—18 to 56 centimeters; black (7.5YR 2.5/1) woody mucky peat, very dark gray (7.5YR 3/1) dry; massive; soft, very friable, nonsticky and nonplastic; 52 percent fiber, 28 percent rubbed; few very fine to very coarse roots; common fine and medium interstitial and tubular pores; 20 percent wood fragments; extremely acid (pH 4.3); abrupt wavy boundary.

Oa—56 to 91 centimeters; black (7.5YR 2.5/1) herbaceous muck, very dark gray (7.5YR 3/1) dry; massive; soft, very friable, nonsticky and nonplastic; 40 percent fiber, 8 percent rubbed; few very fine roots; common fine and medium interstitial and tubular pores; strongly acid (pH 5.3); abrupt wavy boundary.

Cg1—91 to 107 centimeters; dark grayish brown (2.5Y 4/2) coarse sand, grayish brown (2.5Y 5/2) dry; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine and medium interstitial pores; 100 percent reduced matrix; strongly acid (pH 5.2); abrupt wavy boundary.

Cg2—107 to 130 centimeters; very dark gray (10YR 3/1) fine sandy loam, gray (10YR 5/1) dry; moderate medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine interstitial pores; 100 percent reduced matrix; strongly acid (pH 5.2).

Range in Characteristics

Mean annual soil temperature: 2 to 7 degrees C
Soil temperature regime: Cryic
Moisture control section: Saturated for more than 30 days
Depth to redoximorphic features: 0 to 20 centimeters to hemic or sapric material

Figure 12.—Typical profile of a Beaverpass soil. Numerals on tape indicate inches.

Depth to mineral soil: 40 to 125 centimeters
Other features: Thin layers (as much as 2 centimeters thick) of diatomaceous earth and/or tephra deposits may be in soil profile.

Oe1 horizon
Hue—5YR to 10YR
Value—2 to 3 moist, 2 to 4 dry
Chroma—1 to 3 moist or dry
Fiber content—60 to 90 percent unrubbed, 30 to 75 percent rubbed
Reaction—very strongly acid or extremely acid
Coarse woody fragment content—0 to 15 percent total
Thickness—15 to 25 centimeters

Oe2 horizon
Hue—5YR to 10YR
Value—2 to 3 moist, 2 to 4 dry
Chroma—1 to 3 moist or dry
Fiber content—20 to 60 percent unrubbed, 10 to 30 percent rubbed

Reaction—very strongly acid or extremely acid
Coarse woody fragment content—0 to 30 percent total
Thickness—20 to 40 centimeters

Oa horizon
Hue—5YR to 10YR
Value—2 to 4 moist, 2 to 4 dry
Chroma—1 to 3 moist or dry
Fiber content—10 to 40 percent unrubbed, 0 to 16 percent rubbed
Reaction—strongly acid or very strongly acid
Coarse woody fragment content—0 to 30 percent total
Thickness—30 to 60 centimeters

Cg horizon
Hue—2.5Y, 10YR, or variegated primary mineral colors
Value—3 to 5 moist, 4 to 6 dry
Chroma—1 to 3 moist or dry
Texture—coarse sand, loamy coarse sand, fine sandy loam, or sandy loam
Clay content—0 to 10 percent
Reaction—moderately acid or strongly acid

Chilliwack Series

Depth class: Very deep (more than 150 centimeters)
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high
Landscape: Mountains
Landform: Debris aprons on mountain slopes
Parent material: Volcanic ash over glacial drift
Slope range: 15 to 65 percent
Elevation: 490 to 2,165 meters
Mean annual precipitation: 1,800 to 3,000 millimeters
Mean annual air temperature: 2 to 6 degrees C
Frost-free period: 30 to 60 days

Taxonomic class: Medial over sandy or sandy-skeletal, amorphic over isotic Andic Haplocryods

Typical Pedon

Chilliwack medial sandy loam (fig. 13) in an area of Chilliwack-Forbidden-Stetattle complex, 15 to 65 percent slopes, on a debris apron; North Cascades National Park Complex, Skagit County, Washington; 184 meters north and 743 meters east of section 5, T. 35 N., R. 14 E.; Forbidden Peak, Washington, U.S. Geological Survey quadrangle; latitude 48 degrees, 32 minutes, 37.57 seconds north and longitude 121 degrees, 41 minutes, 53.93 seconds west; UTM 646507 meters E., 5378644 meters N., zone 10; NAD 83.

Oe—0 to 3 centimeters; moderately decomposed plant material; abrupt wavy boundary.
E—3 to 13 centimeters; brown (7.5YR 5/2) medial sandy loam, light gray (7.5YR 7/1) dry; moderate medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few very fine, fine, medium, and coarse roots; 5 percent fine gravel; extremely acid (pH 4.4); abrupt irregular boundary.
Bs1—13 to 34 centimeters; strong brown (7.5YR 4/6) gravelly medial sandy loam, strong brown (7.5YR 5/8) dry; moderate medium subangular blocky structure parting to strong very fine subangular blocky; moderately hard, friable, nonsticky

Figure 13.—Typical profile of a Chilliwack soil. Numerals on tape indicate centimeters.

and nonplastic; many very fine and fine and common medium and coarse roots; 5 percent fine gravel, 5 percent medium and coarse gravel, and 5 percent cobbles; strongly acid (pH 5.5); clear irregular boundary.

Bs2—34 to 46 centimeters; strong brown (7.5YR 4/6) gravelly medial sandy loam, strong brown (7.5YR 5/6) dry; moderate medium subangular blocky structure parting to strong very fine subangular blocky; moderately hard, friable, nonsticky and nonplastic; common very fine and fine and few medium and coarse roots; 10 percent fine gravel, 10 percent medium and coarse gravel, 5 percent cobbles, and 2 percent stones; moderately acid (pH 5.6); clear irregular boundary.

2BC—46 to 70 centimeters; dark yellowish brown (10YR 4/6) extremely gravelly loamy sand, yellowish brown (10YR 5/6) dry; weak medium subangular blocky structure; moderately hard, friable, nonsticky and nonplastic; few very fine, fine, and medium roots; 15 percent fine gravel, 35 percent medium and coarse gravel, 10 percent cobbles, and 5 percent stones; moderately acid (pH 5.7); clear wavy boundary.

2C—70 to 150 centimeters; olive brown (2.5Y 4/4) extremely gravelly loamy sand, light olive brown (2.5Y 5/6) dry; single grain; loose, nonsticky and nonplastic; few very fine, fine, and medium roots; 20 percent fine gravel, 40 percent medium and coarse gravel, 15 percent cobbles, and 5 percent stones; moderately acid (pH 6.0).

Range in Characteristics

Mean annual soil temperature: 4 to 8 degrees C
Moisture control section: Dry for less than 30 consecutive days from June through October
Thickness of volcanic ash mantle (medial textural modifier): 40 to 75 centimeters
Particle-size control section: Contrasting

E horizon
Hue—7.5YR or 10YR
Value—4 to 6 moist, 5 to 7 dry
Chroma—1 or 2 moist or dry
Fine-earth texture—medial fine sandy loam or medial sandy loam
Rock fragment content—5 to 30 percent total, with 5 to 30 percent fine to coarse gravel, 0 to 10 percent cobbles, and 0 to 5 percent stones
Clay content—3 to 8 percent
Volcanic glass content—35 to 80 percent
Reaction—extremely acid or very strongly acid
Thickness—2 to 16 centimeters

Bhs horizon (where present)
Hue—7.5YR or 5YR
Value—2 to 4 moist
Chroma—2 or 4 moist
Texture—medial sandy loam or medial fine sandy loam
Reaction—very strongly acid or strongly acid
Thickness—1 to 4 centimeters

Bs horizon
Hue—7.5YR
Value—3 to 5 moist, 5 or 6 dry
Chroma—4 or 6 moist or dry
Fine-earth texture—medial sandy loam or medial coarse sandy loam
Rock fragment content—dominantly 10 to 30 percent total, with 10 to 30 percent fine to coarse gravel, 0 to 10 percent cobbles, and 0 to 10 percent stones (lower part of Bs2 horizon may have rock fragment content of 15 to 75 percent)
Clay content—2 to 10 percent
Volcanic glass content—15 to 70 percent
Reaction—very strongly acid or moderately acid
Thickness—30 to 70 centimeters

2BC horizon
Hue—10YR or 2.5Y
Value—3 to 5 moist, 5 or 6 dry
Chroma—4 or 6 moist or dry
Fine-earth texture—sandy loam, coarse sandy loam, loamy sand, or loamy coarse sand
Rock fragment content—35 to 80 percent total, with 20 to 60 percent fine to coarse gravel, 5 to 20 percent cobbles, and 0 to 10 percent stones
Clay content—1 to 6 percent
Volcanic glass content—5 to 15 percent
Reaction—strongly acid or moderately acid
Thickness—20 to 40 centimeters

2C horizon
Hue—2.5Y or variegated
Value—3 to 5 moist, 5 or 6 moist

Chroma—3 to 6 moist or dry
Fine-earth texture—loamy sand, loamy coarse sand, or coarse sand
Rock fragment content—50 to 85 percent total, with 30 to 75 percent fine to coarse gravel, 10 to 20 percent cobbles, and 0 to 20 percent stones
Clay content—0 to 4 percent
Volcanic glass content—0 to 10 percent
Reaction—moderately acid or slightly acid

Cosho Series

Depth class: Moderately deep to lithic bedrock
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high
Landscape: Mountains
Landform: Bedrock benches on mountain slopes
Parent material: Volcanic ash over glacial drift
Slope range: 15 to 65 percent
Elevation: 110 to 1,970 meters
Mean annual precipitation: 1,700 to 2,500 millimeters
Mean annual air temperature: 5 to 10 degrees C
Frost-free period: 60 to 90 days

Taxonomic class: Ashy over sandy or sandy-skeletal, amorphic over isotic, frigid Typic Udivitrands

Typical Pedon

Cosho gravelly ashy sandy loam (fig. 14) in an area of Ragged-Tricouni-Cosho complex, 15 to 65 percent slopes, on a bedrock bench; North Cascades National Park Complex, Whatcom County, Washington; 34 meters west and 141 meters south of the northeast corner of section 30, T. 37 N., R. 12 E., Willamette Meridian; Mount Triumph, Washington, U.S. Geological Survey quadrangle; latitude 48 degrees, 40 minutes, 7 seconds north and longitude 121 degrees, 16 minutes, 53 seconds west; UTM 626540 meters E., 5392037 meters N., zone 10; NAD 83.

Oi—0 to 6 centimeters; slightly decomposed plant material; common very fine, fine, and medium roots; clear wavy boundary.
Oe—6 to 14 centimeters; moderately decomposed plant material; many very fine and medium and few very fine, coarse, and very coarse roots; abrupt irregular boundary.
E—14 to 15 centimeters; very dark grayish brown (10YR 3/2) gravelly ashy sandy loam, light brownish gray (10YR 6/2) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and few medium roots; 10 percent fine gravel and 5 percent medium and coarse gravel; very strongly acid (pH 4.8); abrupt wavy boundary.
Bw—15 to 53 centimeters; dark yellowish brown (10YR 3/4) gravelly ashy sandy loam, yellowish brown (10YR 5/4) dry; moderate medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine, fine, coarse, and very coarse and common medium roots; 10 percent fine gravel and 15 percent medium and coarse gravel; moderately acid (pH 5.6); clear wavy boundary.
2BC—53 to 75 centimeters; dark yellowish brown (10YR 3/4) very gravelly loamy sand, dark yellowish brown (10YR 4/4) dry; moderate medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine, fine, medium, and coarse roots; 10 percent fine gravel, 20 percent medium and coarse gravel, and 15 percent cobbles; moderately acid (pH 5.9); gradual wavy boundary.

Figure 14.—Typical profile of a Cosho soil. Numerals on tape indicate centimeters.

2C—75 to 90 centimeters; olive brown (2.5Y 4/3) very gravelly loamy sand, light olive brown (2.5Y 5/3) dry; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; few fine roots; 15 percent fine gravel, 15 percent medium and coarse gravel, and 15 percent cobbles; moderately acid (pH 6.0).
2R—90 to 115 centimeters; metavolcanic bedrock.

Range in Characteristics

Mean annual soil temperature: 6 to 8 degrees C
Moisture control section: Dry for less than 45 consecutive days from June through October
Thickness of volcanic ash mantle: 38 to 83 centimeters
Depth to bedrock: 50 to 100 centimeters from the mineral soil surface
Particle-size control section: Contrasting

E horizon
Hue—7.5YR or 10YR
Value—3 to 5 moist, 5 to 7 dry
Chroma—1 to 3 moist or dry
Fine-earth texture—ashy fine sandy loam, ashy sandy loam, or ashy loamy sand
Rock fragment content—0 to 30 percent total, with 0 to 25 percent fine to coarse gravel, 0 to 10 percent cobbles, and 0 to 5 percent stones

Clay content—1 to 8 percent
Volcanic glass content—15 to 50 percent
Reaction—extremely acid to strongly acid
Thickness—1 to 13 centimeters

Bw horizon
Hue—7.5YR or 10YR
Value—3 or 4 moist, 5 or 6 dry
Chroma—3 to 6 moist or dry
Fine-earth texture—ashy fine sandy loam or ashy sandy loam
Rock fragment content—10 to 30 percent total, with 10 to 30 percent fine to coarse gravel, 0 to 15 percent cobbles, and 0 to 5 percent stones
Clay content—3 to 8 percent
Volcanic glass content—15 to 50 percent
Reaction—strongly acid or moderately acid
Thickness—38 to 70 centimeters

2BC horizon
Hue—10YR or 2.5Y
Value—3 to 5 moist, 4 to 6 dry
Chroma—4 to 6 moist or dry
Fine-earth texture—coarse sandy loam, loamy sand, or loamy coarse sand
Rock fragment content—35 to 80 percent total, with 25 to 55 percent fine to coarse gravel, 10 to 20 percent cobbles, and 0 to 10 percent stones
Clay content—1 to 6 percent
Volcanic glass content—5 to 15 percent
Reaction—moderately acid or slightly acid
Thickness—0 to 35 centimeters

2C horizon
Hue—2.5Y or variegated
Value—4 to 5 moist, 5 or 6 dry
Chroma—3 or 4 moist or dry
Fine-earth texture—loamy sand, loamy coarse sand, or sand
Rock fragment content—40 to 90 percent total, with 30 to 65 percent fine to coarse gravel, 10 to 25 percent cobbles, and 0 to 10 percent stones
Clay content—0 to 6 percent
Volcanic glass content—0 to 10 percent
Reaction—moderately acid or slightly acid

Damnation Series

Depth class: Shallow to lithic bedrock
Drainage class: Well drained
Capacity to transmit water (Ksat): High
Landscape: Mountains
Landform: Bedrock benches on mountain slopes
Parent material: Volcanic ash over glacial drift
Slope range: 35 to 100 percent
Elevation: 110 to 1,970 meters
Mean annual precipitation: 1,700 to 2,500 millimeters
Mean annual air temperature: 5 to 10 degrees C
Frost-free period: 60 to 90 days

Taxonomic class: Ashy, amorphic, frigid Lithic Udivitrands

Typical Pedon

Damnation cobbly ashy sandy loam (fig. 15) in an area of Damnation-Ragged-Rock outcrop complex, 35 to 100 percent slopes, about 500 meters southwest of the town of Diablo; North Cascades National Park Complex, Whatcom County, Washington; 380 meters east and 160 meters south of the northwest corner of section 8, T. 37 N., R. 13 E.; Diablo Dam, Washington, U.S. Geological Survey quadrangle; latitude 48 degrees, 42 minutes, 42 seconds north and longitude 121 degrees, 8 minutes, 43 seconds west; UTM 636422 meters E., 5397069 meters N., zone 10; NAD 83.

Oi—0 to 4 centimeters; slightly decomposed needles, leaves, and twigs; abrupt smooth boundary.

Oa—4 to 6 centimeters; dark brown (7.5YR 3/2) highly decomposed plant material, brown (7.5YR 5/2) dry; very strongly acid (pH 5.0); abrupt wavy boundary.

Bw1—6 to 14 centimeters; brown (7.5YR 4/4) cobbly ashy sandy loam, brown (7.5YR 5/4) dry; moderate medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine, many fine and medium, and common coarse roots; many fine and medium irregular pores; 5 percent fine gravel, 5 percent medium and coarse gravel, 10 percent cobbles, and 5 percent stones; very strongly acid (pH 5.0); clear wavy boundary.

Bw2—14 to 31 centimeters; yellowish red (5YR 4/6) cobbly ashy sandy loam, yellowish red (5YR 5/6) dry; moderate medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine and common fine and medium roots; many fine and medium irregular pores; 5 percent fine gravel, 5 percent medium and coarse gravel, 10 percent cobbles, and 5 percent stones; strongly acid (pH 5.5); abrupt wavy boundary.

Bw3—31 to 45 centimeters; dark brown (7.5YR 3/3) cobbly ashy sandy loam, brown (7.5YR 5/3) dry; moderate medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and few medium roots; common fine and medium irregular pores; 5 percent fine gravel, 5 percent medium and coarse gravel, 10 percent cobbles, and 5 percent stones; strongly acid (pH 5.5); abrupt wavy boundary.

R—45 to 70 centimeters; gneiss.

Figure 15.—Typical profile of a Damnation soil. Numerals on tape indicate centimeters.

Range in Characteristics

Depth to diagnostic horizons and features: Calculated from mineral soil surface
Mean annual soil temperature: 5 to 8 degrees C
Moisture control section: Dry 30 to 45 consecutive days
Depth to lithic contact: 25 to 50 centimeters
Reaction: Very strongly acid or strongly acid
Clay content: 2 to 10 percent throughout
Rock fragment content: 0 to 35 percent total throughout, with 0 to 35 percent fine to coarse gravel, 0 to 15 percent cobbles, and 0 to 5 percent stones

Bw1 horizon
Hue—7.5YR or 10YR
Value—3 or 4 moist, 4 to 6 dry
Chroma—3 to 6 moist or dry
Fine-earth texture—ashy sandy loam or ashy fine sandy loam
Thickness—5 to 10 centimeters

Bw2 and Bw3 horizons
Hue—5YR, 7.5YR, or 10YR
Value—3 or 4 moist, 4 to 6 dry
Chroma—3 to 6 moist or dry
Fine-earth texture—ashy sandy loam or ashy fine sandy loam
Combined thickness—15 to 40 centimeters

Deerlick Series

Depth class: Very deep (more than 150 centimeters)
Drainage class: Moderately well drained
Capacity to transmit water (Ksat): High or very high
Landscape: Mountains
Landform: Alluvial fans, flood plains, and terraces
Parent material: Volcanic ash and alluvium over alluvium and glacial drift
Slope range: 0 to 35 percent
Elevation: 100 to 1,970 meters
Mean annual precipitation: 1,700 to 2,500 millimeters
Mean annual air temperature: 5 to 7 degrees C
Frost-free period: 60 to 90 days

Taxonomic class: Ashy over sandy or sandy-skeletal, amorphic over isotic, frigid Aquic Udivitrands

Deerlick ashy silt loam (fig. 16) in an area of Roland-Skymo-Deerlick complex, 0 to 25 percent slopes, about 28 kilometers north of the town of Marblemount, along Sulphide Creek; North Cascades National Park Complex, Whatcom County, Washington; 170 meters east and 640 meters north of the southwest corner of section 17, T. 38 N., R. 10 E.; Willamette Meridian; Mount Shuksan, Washington, U.S. Geological Survey quadrangle; latitude 48 degrees, 46 minutes, 45 seconds north and longitude 120 degrees, 32 minutes, 15 seconds west; UTM zone 10N, 607435 meters E., 5403950 meters N.; NAD 83.

Typical Pedon

Oi—0 to 3 centimeters; slightly decomposed plant material; clear wavy boundary.
Oe—3 to 10 centimeters; moderately decomposed plant material; common very fine and medium roots; extremely acid (pH 4.0); clear wavy boundary.

Figure 16.—Typical profile of a Deerlick soil. Numerals on tape indicate centimeters.

A—10 to 14 centimeters; very dark gray (10YR 3/1) ashy silt loam, gray (10YR 5/1) dry; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine and common medium to very coarse roots; common fine and medium irregular pores; 5 percent fine gravel and 5 percent cobbles; strongly acid (pH 5.4); abrupt wavy boundary.

Bw—14 to 22 centimeters; dark brown (10YR 3/3) ashy sandy loam, brown (10YR 5/3) dry; moderate fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine and common medium to very coarse roots; common fine and medium irregular pores; 10 percent cobbles; strongly acid (pH 5.5); abrupt wavy boundary.

C1—22 to 30 centimeters; grayish brown (2.5Y 5/2) gravelly ashy coarse sand, light brownish gray (2.5Y 6/2) dry; single grain; loose, nonsticky and nonplastic; common very fine to coarse roots; common medium interstitial pores; 10 percent fine gravel, 10 percent medium and coarse gravel, and 10 percent cobbles; moderately acid (pH 5.9); clear smooth boundary.

C2—30 to 50 centimeters; gray (2.5Y 5/1) very gravelly ashy coarse sand, gray (2.5Y 6/1) dry; single grain; loose, nonsticky and nonplastic; common very fine and fine and few medium and coarse roots; common medium interstitial pores; 10 percent fine gravel, 15 percent medium and coarse gravel, and 10 percent cobbles; moderately acid (pH 6.0); abrupt smooth boundary.

2Bg—50 to 64 centimeters; brown (10YR 4/3) very fine sandy loam, pale brown (10YR 6/3) dry; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine and medium roots; common fine and medium irregular pores; 10 percent medium distinct yellowish red (5YR 4/6) irregular iron-manganese masses in matrix; 15 percent medium distinct gray (2.5Y 5/1) irregular iron depletions; slightly acid (pH 6.2); abrupt smooth boundary.

2Cg—64 to 80 centimeters; dark grayish brown (2.5Y 4/2) very fine sand, light brownish gray (2.5Y 6/2) dry; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; common fine interstitial pores; 15 percent medium distinct yellowish red (5YR 4/6) irregular iron-manganese masses in matrix; 20 percent medium distinct gray (2.5Y 6/1) irregular iron depletions; slightly acid (pH 6.4); clear wavy boundary.

3C—80 to 152 centimeters; dark grayish brown (2.5Y 4/2) extremely cobbly sand, light brownish gray (2.5Y 6/2) dry; single grain; loose, nonsticky and nonplastic; common medium interstitial pores; 20 percent fine gravel, 20 percent medium and coarse gravel, and 40 percent cobbles; slightly acid (pH 6.4).

Range in Characteristics

Mean annual soil temperature: 6 to 8 degrees C
Moisture control section: Dry less than 45 consecutive days
Particle-size control section: Contrasting
Clay content: 0 to 5 percent throughout
Thickness of volcanic ash mantle (ashy textural modifier): 35 to 80 centimeters
Volcanic glass content in ash mantle: 15 to 50 percent
Rock fragment content (ashy part): 5 to 35 percent total, with 5 to 30 percent gravel and 0 to 15 percent cobbles
Rock fragment content (sandy or sandy-skeletal part): 15 to 50 percent total, with 15 to 25 percent fine to coarse gravel and 5 to 15 percent cobbles

A horizon
Hue—10YR or 7.5YR
Value—2 to 4 moist, 4 to 6 dry
Chroma—1 or 2 moist or dry
Fine-earth texture—ashy silt loam, ashy sandy loam, or ashy fine sandy loam
Rock fragment content—0 to 15 percent total, with 0 to 15 percent gravel and 0 to 15 percent cobbles
Reaction—moderately acid or strongly acid
Thickness—4 to 15 centimeters

Bw horizon
Hue—10YR or 7.5YR
Value—3 or 4 moist, 4 to 6 dry
Chroma—2 to 4 moist or dry
Fine-earth texture—ashy sandy loam, ashy fine sandy loam, or ashy loam
Rock fragment content—0 to 30 percent total, with 0 to 30 percent gravel and 0 to 15 percent cobbles
Reaction—moderately acid or strongly acid
Thickness—8 to 36 centimeters

C horizon
Hue—10YR or 2.5Y
Value—2 to 4 moist, 4 to 6 dry
Chroma—1 or 2 moist or dry
Fine-earth texture—ashy coarse sand, ashy sand, or ashy loamy coarse sand
Rock fragment content—10 to 35 percent total, with 10 to 30 percent gravel and 0 to 15 percent cobbles
Reaction—moderately acid or strongly acid
Thickness—8 to 30 centimeters (combined thickness, may be only one C horizon)

2Bg horizon
Hue—10YR or 2.5Y
Value—2 to 4 moist, 4 to 6 dry
Chroma—1 or 2 moist or dry
Fine-earth texture—very fine sandy loam, fine sandy loam, or loamy sand
Rock fragment content—0 to 30 percent total, with 0 to 30 percent gravel and 0 to 10 percent cobbles
Reaction—slightly acid or moderately acid
Thickness—10 to 20 centimeters

2Cg horizon
Hue—10YR or 2.5Y
Value—2 to 4 moist, 4 to 6 dry
Chroma—1 or 2 moist or dry
Fine-earth texture—very fine sand, loamy sand, or loamy very fine sand
Rock fragment content—0 to 50 percent total, with 0 to 30 percent gravel and 0 to 20 percent cobbles
Reaction—slightly acid or moderately acid
Thickness—10 to 20 centimeters

3C horizon
Hue—10YR or 2.5Y
Value—2 to 4 moist, 4 to 6 dry
Chroma—1 or 2 moist or dry
Fine-earth texture—sand, loamy sand, or sandy loam
Rock fragment content—35 to 80 percent total, with 25 to 50 percent gravel, 15 to 50 percent cobbles, and 0 to 10 percent stones
Reaction—slightly acid or moderately acid

Despair Series

Depth class: Shallow to lithic bedrock
Drainage class: Well drained
Capacity to transmit water (Ksat): High
Landscape: Mountains
Landform: Bedrock benches on mountain slopes
Parent material: Volcanic ash over glacial drift
Slope range: 25 to 100 percent
Elevation: 270 to 2,710 meters
Mean annual precipitation: 1,700 to 2,500 millimeters
Mean annual air temperature: 5 to 10 degrees C
Frost-free period: 60 to 90 days

Taxonomic class: Ashy, glassy, frigid Lithic Vitrixerands

Typical Pedon

Despair ashy sandy loam (fig. 17) in an area of Farway-Sawtooth-Despair complex, 35 to 100 percent slopes, about 17 kilometers northwest of the town of Stehekin; North Cascades National Park Complex, Chelan County, Washington; 540 meters east and 400 meters north of the southeast corner of section 34, T. 34 N., R. 16 E.; McGregor Mountain, Washington, U.S. Geological Survey quadrangle; latitude 48 degrees, 24 minutes, 0 seconds north and longitude 120 degrees, 50 minutes, 53 seconds west; UTM 659270 meters E., 5363000 meters N., zone 10; NAD 83.

Oa—0 to 4 centimeters; dark brown (7.5YR 3/2) highly decomposed plant material, brown (7.5YR 5/2) dry; strongly acid (pH 5.2); abrupt wavy boundary.

A—4 to 21 centimeters; very dark brown (10YR 2/2) ashy sandy loam, very dark grayish brown (10YR 3/2) dry; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and few medium roots; common fine and medium irregular pores; 5 percent fine gravel and 5 percent medium and coarse gravel; strongly acid (pH 5.4); abrupt irregular boundary.

Bw—21 to 41 centimeters; brown (10YR 4/3) gravelly ashy sandy loam, brown (10YR 5/3) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine and medium roots; common fine and medium irregular pores; 10 percent fine gravel and 10 percent medium and coarse gravel; moderately acid (pH 5.6); abrupt irregular boundary.

R—41 to 66 centimeters; gneiss.

Range in Characteristics

Depth to diagnostic horizons and features: Calculated from mineral soil surface
Mean annual soil temperature: 5 to 8 degrees C

Figure 17.—Typical profile of a Despair soil. Numerals on tape indicate centimeters.

Moisture control section: Dry 60 to 90 consecutive days
Depth to lithic contact: 25 to 50 centimeters from the mineral soil surface
Reaction: Strongly acid or moderately acid
Clay content: 2 to 8 percent throughout
Rock fragment content: 0 to 35 percent total throughout, with 0 to 35 percent fine to coarse gravel, 0 to 15 percent cobbles, and 0 to 5 percent stones

A horizon
Hue—10YR or 7.5YR
Value—2 to 3 moist, 3 to 5 dry
Chroma—2 to 3 moist or dry
Fine-earth texture—ashy sandy loam or ashy fine sandy loam
Thickness—5 to 17 centimeters

Bw horizon
Hue—10YR or 7.5YR
Value—3 or 4 moist, 4 to 6 dry
Chroma—3 to 6 moist or dry
Fine-earth texture—ashy sandy loam or ashy fine sandy loam
Thickness—15 to 40 centimeters

Doubtful Series

Depth class: Moderately deep to lithic bedrock
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high
Landscape: Mountains
Landform: Bedrock benches on mountain slopes, valley walls of mountain slopes, and ridges
Parent material: Volcanic ash over glacial drift
Slope range: 35 to 100 percent
Elevation: 290 to 2,350 meters
Mean annual precipitation: 1,600 to 3,000 millimeters
Mean annual air temperature: 2 to 4 degrees C
Frost-free period: 30 to 60 days

Taxonomic class: Ashy over sandy or sandy-skeletal, amorphic over isotic Typic Vitricryands

Doubtful gravelly ashy sandy loam (fig. 18) in an area of Mox-Doubtful-Perfect complex, 35 to 100 percent slopes, on a rock knob south of Desolation Peak; North Cascades National Park Complex, Whatcom County, Washington; 520 meters north and 330 meters east of the southwest corner of section 32, T. 40 N., R. 14 E.; Hozomeen Mountain, Washington, U.S. Geological Survey quadrangle; latitude 48 degrees, 54 minutes, 20 seconds north and longitude 121 degrees, 0 minutes, 58 seconds west; UTM 645381 meters E., 5418867 meters N., zone 10; NAD 83.

Typical Pedon

Oi—0 to 2 centimeters; slightly decomposed plant material from forbs and twigs; abrupt smooth boundary.
A—2 to 9 centimeters; very dark brown (10YR 2/2) gravelly ashy sandy loam, dark grayish brown (10YR 4/2) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine and few medium roots; 5 percent fine gravel, 5 percent medium and coarse gravel, and 5 percent cobbles; moderately acid (pH 6.0); abrupt wavy boundary.

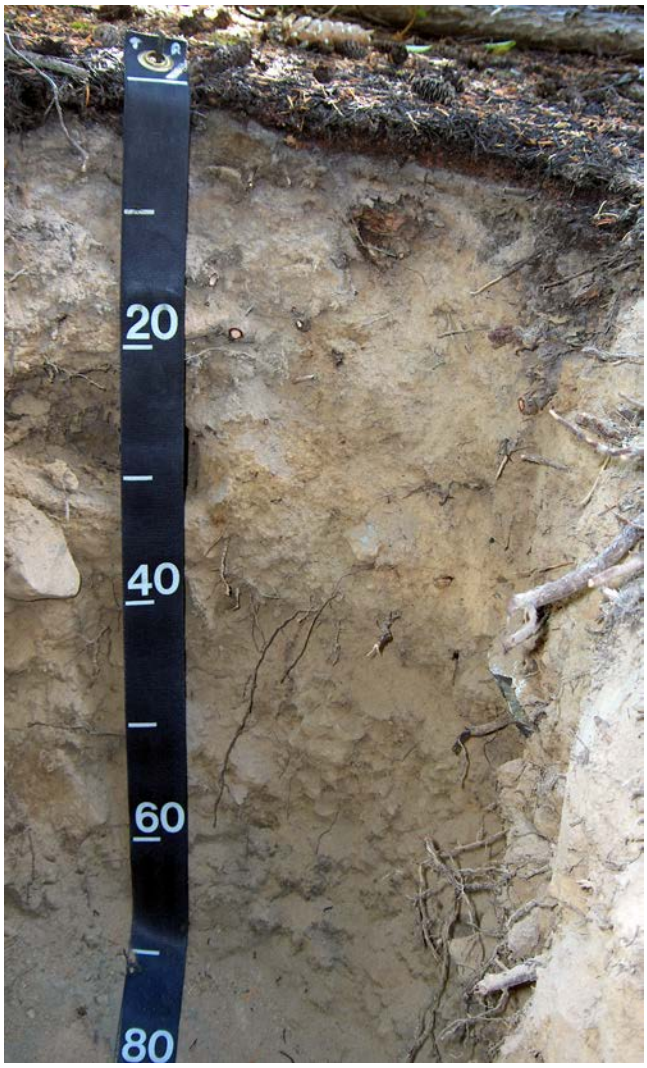


Figure 18.—Typical profile of a Doubtful soil. Numerals on tape indicate centimeters.

Bw1—9 to 27 centimeters; dark brown (10YR 3/3) gravelly ashy sandy loam, brown (10YR 5/3) dry; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine, common medium and coarse, and few very coarse roots; 10 percent fine gravel, 10 percent medium and coarse gravel, and 5 percent cobbles; slightly acid (pH 6.4); clear wavy boundary.

Bw2—27 to 58 centimeters; dark brown (10YR 3/3) gravelly ashy sandy loam, brown (10YR 5/3) dry; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; 5 percent fine gravel, 20 percent medium and coarse gravel, and 5 percent cobbles; slightly acid (pH 6.2); clear irregular boundary.

2C—58 to 70 centimeters; very dark brown (10YR 2/2) extremely gravelly loamy coarse sand, dark grayish brown (10YR 4/2) dry; single grain; loose, nonsticky and nonplastic; few very fine roots; 10 percent fine gravel, 60 percent medium and coarse gravel, and 10 percent cobbles; slightly acid (pH 6.1); gradual irregular boundary.

R—70 to 95 centimeters; metasedimentary rock.

Range in Characteristics

Mean annual soil temperature: 4 to 8 degrees C
Moisture control section: Dry for less than 45 consecutive days following the summer solstice
Thickness of volcanic ash mantle: 35 to 60 centimeters
Depth to bedrock (lithic contact): 50 to 100 centimeters from mineral soil surface
Particle-size control section: Contrasting

A horizon
Hue—10YR or 7.5YR
Value—2 or 3 moist, 3 or 4 dry
Chroma—1 or 2 moist or dry
Fine-earth texture—ashy sandy loam or ashy fine sandy loam
Rock fragment content—10 to 35 percent total, with 10 to 25 percent fine to coarse gravel and 0 to 10 percent cobbles
Clay content—1 to 6 percent
Volcanic glass content—15 to 50 percent
Reaction—moderately acid or strongly acid
Thickness—2 to 8 centimeters

Bw horizon
Hue—10YR or 7.5YR
Value—3 to 5 moist, 4 or 5 dry
Chroma—2 to 4 moist or dry
Fine-earth texture—ashy sandy loam, ashy fine sandy loam, or ashy coarse sandy loam
Rock fragment content—10 to 35 percent total, with 10 to 30 percent fine to coarse gravel and 0 to 10 percent cobbles
Clay content—2 to 6 percent
Volcanic glass content—20 to 50 percent
Reaction—slightly acid or moderately acid
Thickness—20 to 90 centimeters

2C horizon
Hue—10YR or 7.5YR
Value—2 to 4 moist, 4 or 5 dry
Chroma—2 to 4 moist or dry
Fine-earth texture—loamy coarse sand, loamy sand, or coarse sand
Rock fragment content—30 to 85 percent total, with 25 to 80 percent fine to coarse gravel and 5 to 25 percent cobbles
Clay content—0 to 4 percent
Volcanic glass content—0 to 5 percent
Reaction—slightly acid or moderately acid
Thickness—10 to 15 centimeters

Easy Series

Depth class: Very deep (more than 150 centimeters)
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high
Landscape: Mountains
Landform: Bedrock benches on mountain slopes
Parent material: Mixed volcanic ash over glacial drift
Slope range: 0 to 35 percent
Elevation: 110 to 1,490 meters

Mean annual precipitation: 1,500 to 2,300 millimeters
Mean annual air temperature: 5 to 8 degrees C
Frost-free period: 60 to 90 days

Taxonomic class: Ashy over loamy-skeletal, amorphic over isotic, frigid Andic Haplorthods

Typical Pedon

Easy ashy sandy loam (fig. 19) in an area of Tricouni-Ragged-Easy complex, 5 to 50 percent slopes, on a bedrock bench; North Cascades National Park Complex, Skagit County, Washington; 230 meters west and 640 meters north of the southeast corner of section 19, T. 36 N., R. 14 E.; Forbidden Peak, Washington, U.S. Geological Survey quadrangle; latitude 48 degrees, 35 minutes, 24 seconds north and longitude 121 degrees, 1 minute, 40 seconds west; UTM 645426 meters E., 5383763 meters N., zone 10; NAD 83.

Oi—0 to 3 centimeters; slightly decomposed plant material; common very fine and fine roots; abrupt smooth boundary.
Oe—3 to 6 centimeters; moderately decomposed plant material; common very fine and fine roots; abrupt wavy boundary.

Figure 19.—Typical profile of an Easy soil. Numerals on tape indicate centimeters.

E—6 to 12 centimeters; gray (10YR 5/1) ashy sandy loam, light gray (10YR 7/1) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and few medium and coarse roots; 5 percent fine gravel and 5 percent medium and coarse gravel; strongly acid (pH 5.1); clear irregular boundary.

Bs1—12 to 28 centimeters; strong brown (7.5YR 4/6) gravelly ashy sandy loam, reddish yellow (7.5YR 6/6) dry; weak fine subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; many very fine and fine and common medium, coarse, and very coarse roots; 10 percent fine gravel, 15 percent medium and coarse gravel, and 5 percent cobbles; moderately acid (pH 5.6); clear wavy boundary.

Bs2—28 to 41 centimeters; yellowish brown (10YR 5/6) gravelly ashy sandy loam, brownish yellow (10YR 6/6) dry; weak fine subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine and few medium and coarse roots; 10 percent fine gravel, 15 percent medium and coarse gravel, and 5 percent cobbles; moderately acid (pH 5.7); clear wavy boundary.

2BC—41 to 66 centimeters; light olive brown (2.5Y 5/4) extremely gravelly sandy loam, light yellowish brown (2.5Y 6/4) dry; single grain; loose, nonsticky and nonplastic; common very fine and fine and few medium roots; 15 percent fine gravel, 35 percent medium and coarse gravel, and 10 percent cobbles; moderately acid (pH 5.8); clear wavy boundary.

2C—66 to 150 centimeters; light olive brown (2.5Y 5/4) extremely gravelly coarse sandy loam, pale yellow (2.5Y 7/4) dry; single grain; loose, nonsticky and nonplastic; few very fine and fine roots; 20 percent fine gravel, 30 percent medium and coarse gravel, 10 percent cobbles, and 5 percent stones; slightly acid (pH 6.1).

Range in Characteristics

Mean annual soil temperature: 6 to 8 degrees C
Moisture control section: Dry for less than 45 consecutive days from June to October
Thickness of volcanic ash mantle: 35 to 90 centimeters
Particle-size control section: Contrasting

E horizon
Hue—7.5YR or 10YR
Value—3 to 5 moist, 4 to 7 dry
Chroma—1 or 2 moist or dry
Fine-earth texture—ashy fine sandy loam, ashy sandy loam, or ashy loamy sand
Rock fragment content—0 to 30 percent total, with 0 to 30 percent fine to coarse gravel, 0 to 10 percent cobbles, and 0 to 5 percent stones
Clay content—1 to 6 percent
Volcanic glass content—15 to 50 percent
Reaction—extremely acid to strongly acid
Thickness—1 to 11 centimeters

Bhs horizon (where present)
Hue—7.5YR or 5YR
Value—2 to 4 moist
Chroma—3 or 4 moist
Texture—ashy sandy loam or ashy fine sandy loam
Reaction—very strongly acid or strongly acid
Thickness—1 to 9 centimeters

Bs horizon
Hue—5YR or 7.5YR
Value—2 to 5 moist, 4 to 6 moist

Chroma—3 to 6 moist or dry
Fine-earth texture—ashy fine sandy loam or ashy sandy loam
Rock fragment content—10 to 35 percent total, with 10 to 35 percent fine to coarse gravel, 0 to 20 percent cobbles, and 0 to 5 percent stones
Clay content—3 to 10 percent
Volcanic glass content—15 to 50 percent
Reaction—strongly acid or moderately acid
Thickness—13 to 60 centimeters

2BC horizon
Hue—10YR or 2.5Y
Value—3 to 5 moist, 4 to 6 moist
Chroma—4 or 6 moist or dry
Fine-earth texture—sandy loam, coarse sandy loam, or loamy coarse sand
Rock fragment content—35 to 80 percent total, with 25 to 50 percent fine to coarse gravel, 10 to 20 percent cobbles, and 0 to 10 percent stones
Clay content—1 to 8 percent
Volcanic glass content—5 to 15 percent
Reaction—strongly acid to slightly acid
Thickness—30 to 70 centimeters

2C horizon
Hue—2.5Y
Value—4 to 5 moist, 5 or 6 moist
Chroma—3 or 4 moist or dry
Fine-earth texture—sandy loam, coarse sandy loam, or loamy sand
Rock fragment content—40 to 80 percent total, with 30 to 50 percent fine to coarse gravel, 10 to 25 percent cobbles, and 0 to 10 percent stones
Clay content—0 to 6 percent
Volcanic glass content—0 to 10 percent
Reaction—strongly acid to slightly acid

Farway Series

Depth class: Very deep (more than 150 centimeters)
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high
Landscape: Mountains
Landform: Debris aprons on mountain slopes
Parent material: Volcanic ash over colluvium and reworked glacial drift
Slope range: 5 to 100 percent
Elevation: 335 to 1,900 meters
Mean annual precipitation: 500 to 800 millimeters
Mean annual air temperature: 2 to 9 degrees C
Frost-free period: 75 to 115 days

Taxonomic class: Ashy over loamy-skeletal, glassy over isotic, frigid Typic Vitrixerands

Typical Pedon

Farway ashy fine sandy loam (fig. 20) in an area of Farway-Sawtooth-Despair complex, 35 to 100 percent slopes, on a debris apron about 1 kilometer along Agnes Creek trail from High Bridge; North Cascades National Park Complex, Chelan County, Washington; 247 meters east and 460 meters south of the northwest corner of section 11, T. 33 N., R. 16 E.; McGregor Mountain, Washington, U.S. Geological Survey quadrangle; latitude 48 degrees, 22 minutes, 36 seconds north and

Figure 20.—Typical profile of a Farway soil. Numerals on tape indicate centimeters.

longitude 120 degrees, 50 minutes, 17 seconds west; UTM 660094 meters E., 5360427 meters N., zone 11; NAD 83.

Oe—0 to 3 centimeters; moderately decomposed plant material; diffuse wavy boundary.

Bw1—3 to 45 centimeters; dark yellowish brown (10YR 4/4) ashy fine sandy loam, light yellowish brown (10YR 6/4) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; 5 percent fine gravel; diffuse wavy boundary.

Bw2—45 to 78 centimeters; dark yellowish brown (10YR 4/4) cobbly ashy sandy loam, light yellowish brown (10YR 6/4) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; 5 percent fine gravel and 10 percent cobbles; diffuse wavy boundary.

Bw3—78 to 90 centimeters; dark yellowish brown (10YR 4/4) cobbly ashy sandy loam, light yellowish brown (10YR 6/4) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few fine and very fine roots; 5 percent fine gravel, 5 percent medium and coarse gravel, and 20 percent cobbles; abrupt wavy boundary.

2BC—90 to 150 centimeters; dark yellowish brown (10YR 3/6) very cobbly sandy loam, yellowish brown (10YR 5/6) dry; weak fine subangular blocky structure; soft,

very friable, nonsticky and nonplastic; few very fine roots; 10 percent fine gravel, 10 percent medium and coarse gravel, and 15 percent cobbles.

Range in Characteristics

Mean annual soil temperature: 3 to 8 degrees C
Moisture control section: Dry for 60 to 90 consecutive days following the summer solstice
Rock fragment roundness classes: Subrounded and subangular
Thickness of volcanic ash mantle: 36 to 85 centimeters

Bw horizon
Hue—10YR
Value—3 to 5 moist, 4 to 6 dry
Chroma—3 or 4 moist or dry
Fine-earth texture—ashy sandy loam or ashy fine sandy loam
Rock fragment content—0 to 35 percent total, with 0 to 30 percent fine to coarse gravel, 0 to 20 percent cobbles, and 0 to 5 percent stones
Clay content—2 to 10 percent
Volcanic glass content—30 to 60 percent
Reaction—strongly acid to neutral
Thickness—25 to 70 centimeters

2BC horizon
Hue—10YR or 2.5Y
Value—3 to 5 moist, 4 to 6 dry
Chroma—3 or 6 moist or dry
Fine-earth texture—coarse sandy loam, sandy loam, or loamy coarse sand
Rock fragment content—35 to 80 percent total, with 25 to 60 percent fine to coarse gravel, 5 to 35 percent cobbles, and 0 to 10 percent stones
Clay content—2 to 10 percent
Volcanic glass content—0 to 15 percent
Reaction—moderately acid to neutral

Forbidden Series

Depth class: Very deep (more than 150 centimeters)
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high
Landscape: Mountains
Landform: Valley walls of mountain slopes
Parent material: Volcanic ash mixed with reworked glacial drift over glacial drift
Slope range: 15 to 100 percent
Elevation: 325 to 2,350 meters
Mean annual precipitation: 1,800 to 3,300 millimeters
Mean annual air temperature: 3 to 7 degrees C
Frost-free period: 30 to 60 days

Taxonomic class: Sandy-skeletal, isotic Andic Dystrocryepts

Typical Pedon

Forbidden ashy sandy loam in an area of Stetattle-Forbidden-Triumph complex, 15 to 65 percent slopes, on a valley wall; North Cascades National Park Complex, Skagit County, Washington; 306 meters south and 748 meters east of the northwest corner of section 29, T. 36 N., R. 14 E.; Forbidden Peak, Washington, U.S. Geological Survey quadrangle; latitude 48 degrees, 34 minutes,

54 seconds north and longitude 121 degrees, 0 minutes, 52 seconds west; UTM 646433 meters E., 5382845 meters N., zone 10; NAD 83.

Oi—0 to 4 centimeters; slightly decomposed plant material; few fine roots throughout; abrupt smooth boundary.
Oe—4 to 14 centimeters; moderately decomposed plant material; common very fine, fine, and medium roots throughout; abrupt wavy boundary.
E—14 to 16 centimeters; dark grayish brown (10YR 4/2) ashy sandy loam, light brownish gray (10YR 6/2) dry; weak medium granular structure; very friable, soft, nonsticky and nonplastic; common very fine, fine, and medium roots; strongly acid (pH 5.2); abrupt wavy boundary.
Bw—16 to 46 centimeters; dark yellowish brown (10YR 4/4) very gravelly ashy sandy loam, light yellowish brown (10YR 6/4) dry; weak fine subangular blocky structure; very friable, slightly hard, nonsticky and nonplastic; many very fine and fine and common medium and coarse roots; 10 percent fine gravel, 20 percent medium and coarse gravel, and 10 percent cobbles; slightly acid (pH 6.5); clear wavy boundary.
2BC1—46 to 68 centimeters; light olive brown (2.5Y 5/4) extremely gravelly loamy sand, light yellowish brown (2.5Y 6/4) dry; single grain; loose, nonsticky and nonplastic; many very fine, common fine, and few medium and coarse roots; 20 percent fine gravel, 30 percent medium and coarse gravel, 15 percent cobbles, and 10 percent stones; moderately acid (pH 6.0); abrupt smooth boundary.
2BC2—68 to 90 centimeters; olive brown (2.5Y 4/3) extremely gravelly loamy sand, light olive brown (2.5Y 5/4) dry; single grain; loose, nonsticky and nonplastic; common very fine and fine and few medium and coarse roots; 20 percent fine gravel, 35 percent medium and coarse gravel, 20 percent cobbles, and 10 percent stones; moderately acid (pH 6.0); abrupt smooth boundary.
2C—90 to 152 centimeters; variegated extremely gravelly coarse sand; single grain; loose, nonsticky and nonplastic; few fine and medium roots; 15 percent fine gravel, 35 percent medium and coarse gravel, 20 percent cobbles, and 5 percent stones; moderately acid (pH 6.0).

Range in Characteristics

Mean annual soil temperature: 4 to 8 degrees C
Moisture control section: Dry for less than 30 consecutive days from June to October
Thickness of volcanic ash mantle: 18 to 35 centimeters

E horizon
Hue—7.5YR or 10YR
Value—3 or 4 moist, 5 or 6 dry
Chroma—1 to 3 moist or dry
Fine-earth texture—ashy fine sandy loam, ashy sandy loam, or ashy loamy sand
Rock fragment content—0 to 35 percent total, with 0 to 35 percent fine to coarse gravel, 0 to 25 percent cobbles, and 0 to 10 percent stones
Clay content—1 to 8 percent
Volcanic glass content—15 to 50 percent
Reaction—very strongly acid or strongly acid
Thickness—0 to 4 centimeters

Bw horizon
Hue—7.5YR or 10YR
Value—3 or 4 moist, 4 to 6 dry
Chroma—2 or 4 moist or dry
Fine earth texture—ashy sandy loam or ashy loamy sand
Rock fragment content—35 to 75 percent total, with 25 to 65 percent fine to coarse gravel, 0 to 30 percent cobbles, 0 to 10 percent stones, and 0 to 5 percent boulders

Clay content—3 to 8 percent
Volcanic glass content—5 to 50 percent
Reaction—strongly acid to neutral
Thickness—18 to 35 centimeters

2BC horizon
Hue—2.5Y or 10YR
Value—3 to 5 moist, 4 to 6 moist
Chroma—3 or 4 moist or dry
Fine-earth texture—loamy sand or loamy coarse sand
Rock fragment content—35 to 85 percent total, with 20 to 65 percent fine to coarse gravel, 15 to 35 percent cobbles, and 0 to 15 percent stones
Clay content—0 to 5 percent
Volcanic glass content—0 to 10 percent
Reaction—strongly acid to slightly acid

2C horizon
Hue—2.5Y or variegated
Value—3 or 4 moist, 4 to 5 moist
Chroma—3 or 4 moist or dry
Fine earth texture—loamy sand, loamy coarse sand, coarse sand, or sand
Rock fragment content—50 to 90 percent total, with 25 to 60 percent fine to coarse gravel, 20 to 60 percent cobbles, and 0 to 10 percent stones
Clay content—0 to 3 percent
Volcanic glass content—0 to 5 percent
Reaction—strongly acid to slightly acid

Goode Series

Depth class: Very deep (more than 150 centimeters)
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high
Landscape: Mountains
Landform: Alluvial fans
Parent material: Volcanic ash mixed with colluvium and glacial drift over glacial drift
Slope range: 35 to 100 percent
Elevation: 270 to 2,055 meters
Mean annual precipitation: 600 to 1,600 millimeters
Mean annual air temperature: 5 to 10 degrees C
Frost-free period: 70 to 100 days

Taxonomic class: Loamy-skeletal, isotic, frigid Andic Dystroxerepts

Typical Pedon

Goode gravelly ashy fine sandy loam (fig. 21) in an area of Despair-Goode-Rock outcrop complex, 35 to 100 percent slopes, on an alluvial fan; North Cascades National Park Complex, Chelan County, Washington; 50 meters east and 580 meters south of the northwest corner of section 25, T. 33 N., R. 17 E.; Stehekin, Washington, U.S. Geological Survey quadrangle; latitude 48 degrees, 19 minutes, 58 seconds north and longitude 120 degrees, 41 minutes, 17 seconds west; UTM 671349 meters E., 5355868 meters N., zone 10; NAD 83.

Oi—0 to 2 centimeters; slightly decomposed plant material; abrupt smooth boundary.
A—2 to 23 centimeters; black (10YR 2/1) gravelly ashy fine sandy loam, dark grayish brown (10YR 4/2) dry; moderate medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common very fine to very coarse roots;

Figure 21.—Typical profile of a Goode soil. Numerals on tape indicate centimeters.

5 percent fine gravel, 10 percent medium and coarse gravel, and 5 percent cobbles; strongly acid (pH 5.1); clear wavy boundary.

Bw1—23 to 66 centimeters; dark yellowish brown (10YR 3/6) very gravelly ashy sandy loam, light yellowish brown (10YR 6/4) dry; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine and common medium, coarse, and very coarse roots; 5 percent fine gravel, 25 percent medium and coarse gravel, 10 percent cobbles, and 5 percent stones; moderately acid (pH 5.6); clear wavy boundary.

2Bw2—66 to 91 centimeters; dark yellowish brown (10YR 3/4) very gravelly coarse sandy loam, brown (10YR 5/3) dry; single grain; loose, nonsticky and nonplastic; few very fine and common fine and medium roots; 10 percent fine gravel, 25 percent medium and coarse gravel, 15 percent cobbles, and 5 percent stones; moderately acid (pH 5.8); clear wavy boundary.

2BC—91 to 152 centimeters; olive brown (2.5Y 4/4) extremely gravelly coarse sand, light yellowish brown (2.5Y 6/4) dry; loose, nonsticky and nonplastic; few very fine, fine, and medium roots; 20 percent fine gravel, 40 percent medium and coarse gravel, 5 percent cobbles, and 5 percent stones; moderately acid (pH 6.0).

Range in Characteristics

Mean annual soil temperature: 6 to 8 degrees C
Moisture control section: Dry for 60 to 90 consecutive days following the summer solstice
Thickness of andic feature: 18 to 35 centimeters
Rock fragment roundness classes: Rounded, subrounded, and subangular

A horizon
Hue—10YR or 7.5YR
Value—2 or 3 moist, 3 to 5 dry
Chroma—1 to 3 moist or dry
Fine-earth texture—ashy sandy loam or ashy fine sandy loam
Rock fragment content—10 to 55 percent total, with 10 to 30 percent fine to coarse gravel, 0 to 25 percent cobbles, and 0 to 10 percent stones
Clay content—2 to 8 percent
Volcanic glass content—15 to 40 percent
Reaction—very strongly acid or moderately acid
Thickness—0 to 25 centimeters (absent in some areas that support denser forests)

Bw horizon
Hue—10YR or 7.5YR
Value—2 or 3 moist, 4 or 5 dry
Chroma—2 to 4 moist or dry
Fine-earth texture—ashy sandy loam, ashy fine sandy loam, or ashy coarse sandy loam
Rock fragment content—20 to 65 percent total, with 10 to 40 percent fine to coarse gravel, 5 to 20 percent cobbles, and 0 to 10 percent stones
Clay content—2 to 8 percent
Volcanic glass content—5 to 20 percent
Reaction—strongly acid to slightly acid
Thickness—40 to 80 centimeters

2Bw horizon
Hue—10YR or 2.5Y
Value—3 to 5 moist, 4 to 6 dry
Chroma—3 to 6 moist or dry
Fine-earth texture—fine sandy loam, sandy loam, or coarse sandy loam
Rock fragment content—35 to 70 percent total, with 25 to 45 percent fine to coarse gravel, 10 to 25 percent cobbles, and 0 to 10 percent stones
Clay content—1 to 6 percent
Volcanic glass content—0 to 5 percent
Reaction—moderately acid or slightly acid
Thickness—0 to 30 centimeters

2BC horizon
Hue—10YR or 2.5Y
Value—3 to 5 moist, 4 to 6 dry
Chroma—3 to 5 moist or dry
Fine-earth texture—loamy coarse sand, loamy sand, or coarse sand
Rock fragment content—35 to 80 percent total, with 30 to 70 percent fine to coarse gravel, 5 to 25 percent cobbles, and 0 to 10 percent stones
Clay content—0 to 6 percent
Volcanic glass content—0 to 5 percent
Reaction—moderately acid or slightly acid

C horizon (where present)
Hue—2.5Y or variegated
Value—4 or 5 moist
Chroma—4 to 6 moist
Fine-earth texture—coarse sand, loamy sand, or loamy coarse sand
Reaction—moderately acid or slightly acid

Harlequin Series

Depth class: Shallow to lithic bedrock
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high
Landscape: Mountains
Landform: Cirques and mountain slopes
Parent material: Colluvium and glacial drift over residuum
Slope range: 15 to 100 percent
Elevation: 335 to 1,875 meters
Mean annual precipitation: 1,955 to 2,720 millimeters
Mean annual air temperature: 0 to 4 degrees C
Frost-free period: 30 to 60 days

Taxonomic class: Loamy, isotic Lithic Dystrocryepts

Typical Pedon

Harlequin sandy loam in an area of Rock outcrop-Glaciers-Harlequin complex, 25 to 100 percent slopes, on a valley wall about 30 kilometers northwest of the town of Newhalem, along the Copper Ridge trail; North Cascades National Park Complex, Whatcom County, Washington; 40 meters east and 735 meters north of the southwest corner of section 2, T. 39 N., R. 10 E.; Copper Mountain, Washington, U.S. Geological Survey quadrangle; latitude 48 degrees, 53 minutes, 47 seconds north and longitude 121 degrees, 28 minutes, 35 seconds west; UTM 611677 meters E., 5417048 meters N., zone 10; NAD 83.

Oi—0 to 6 centimeters; slightly decomposed plant material; few fine and medium roots; abrupt wavy boundary.
A—6 to 24 centimeters; dark grayish brown (10YR 4/2) sandy loam, light brownish gray (10YR 6/2) dry; moderate coarse subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; few very fine and common fine to coarse roots; common medium irregular pores; 5 percent gravel and 5 percent cobbles; very strongly acid (pH 4.5); clear irregular boundary.
Bw—24 to 46 centimeters; dark brown (7.5YR 3/3) sandy loam, brown (7.5YR 5/3) dry; weak fine subangular blocky structure; loose, nonsticky and nonplastic; few fine and medium roots; common medium irregular pores; 10 percent gravel; very strongly acid (pH 5.0); clear wavy boundary.
2R—46 to 71 centimeters; indurated granite.

Range in Characteristics

Mean annual soil temperature: 0 to 4 degrees C
Moisture control section: Dry less than 30 consecutive days
Particle-size control section:
Clay content—4 to 15 percent
Rock fragment content—10 to 15 percent total, with 0 to 15 percent gravel and 0 to 5 percent cobbles
Depth to lithic contact: 25 to 50 centimeters

A horizon
Hue—10YR or 7.5YR
Value—3 or 4 moist, 4 to 6 dry
Chroma—1 or 2 moist or dry
Fine-earth texture—sandy loam or fine sandy loam
Rock fragment content—0 to 15 percent total, with 0 to 15 percent gravel and 0 to 5 percent cobbles
Reaction—extremely acid or very strongly acid
Thickness—0 to 18 centimeters (absent in some pedons)

Bw horizon
Hue—7.5YR or 10YR
Value—3 or 4 moist, 5 or 6 dry
Chroma—3 or 4 moist or dry
Fine-earth texture—sandy loam or fine sandy loam
Rock fragment content—0 to 15 percent total, with 0 to 15 percent gravel and 0 to 5 percent cobbles
Reaction—very strongly acid or strongly acid
Thickness—20 to 25 centimeters

Inspiration Series

Depth class: Very deep (more than 150 centimeters)
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high
Landscape: Mountains
Landform: Debris aprons on mountain slopes
Parent material: Volcanic ash over glacial drift
Slope range: 15 to 100 percent
Elevation: 215 to 1,790 meters
Mean annual precipitation: 600 to 1,700 millimeters
Mean annual air temperature: 5 to 10 degrees C
Frost-free period: 70 to 100 days

Taxonomic class: Ashy-skeletal over loamy-skeletal, glassy over isotic, frigid Humic Vitrixerands

Typical Pedon

Inspiration very gravelly ashy sandy loam (fig. 22) in an area of Mesahchie-Inspiration-Lyall complex, 15 to 65 percent slopes, on a debris apron; North Cascades National Park Complex, Chelan County, Washington; 460 meters east and 377 meters south of the northwest corner of section 8, T. 34 E., R. 17 E.; McGregor Mountain, Washington, U.S. Geological Survey quadrangle; latitude 48 degrees, 27 minutes, 56 seconds north and longitude 120 degrees, 46 minutes, 7 seconds west; UTM 664941 meters E., 5370442 meters N., zone 10; NAD 83.

Oi—0 to 2 centimeters; slightly decomposed plant material; clear smooth boundary.
Oe—2 to 9 centimeters; moderately decomposed plant material; clear smooth boundary.
Oa—9 to 15 centimeters; highly decomposed plant material; abrupt wavy boundary.
A1—15 to 25 centimeters; very dark brown (10YR 2/2) very gravelly ashy sandy loam, grayish brown (10YR 5/2) dry; moderate medium subangular blocky structure; friable, slightly hard, nonsticky and nonplastic; common very fine, fine, and coarse

Figure 22.—Typical profile of an Inspiration soil. Numerals on tape indicate centimeters.

and many medium roots; 10 percent fine gravel, 20 percent medium and coarse gravel, and 10 percent cobbles; very strongly acid (pH 4.6); clear wavy boundary.

A2—25 to 37 centimeters; very dark brown (10YR 2/2) extremely cobbly ashy sandy loam, grayish brown (10YR 5/2) dry; weak medium subangular blocky structure; friable, slightly hard, nonsticky and nonplastic; common very fine, fine, and coarse roots and many medium roots; 10 percent fine gravel, 20 percent medium and coarse gravel, and 35 percent cobbles; very strongly acid (pH 4.9); abrupt wavy boundary.

Bw—37 to 64 centimeters; dark yellowish brown (10YR 3/6) very gravelly ashy sandy loam, yellowish brown (10YR 5/6) dry; moderate medium subangular blocky structure; friable, slightly hard, nonsticky and nonplastic; few very fine, fine, medium, and coarse roots; 15 percent fine gravel, 10 percent medium and coarse gravel, and 10 percent cobbles; strongly acid (pH 5.1); abrupt wavy boundary.

2BC—64 to 150 centimeters; dark yellowish brown (10YR 4/6) extremely gravelly coarse sandy loam, brownish yellow (10YR 6/6) dry; single grain; loose, nonsticky and nonplastic; few medium roots; 10 percent fine gravel, 30 percent medium and coarse gravel, and 25 percent cobbles; moderately acid (pH 5.8).

Range in Characteristics

Mean annual soil temperature: 6 to 8 degrees C
Moisture control section: Dry for 60 to 90 consecutive days from June to October
Thickness of volcanic ash mantle: 40 to 80 centimeters
Particle-size control section: Contrasting

A horizon
Hue—10YR
Value—2 to 3 moist, 4 to 5 dry
Chroma—1 or 2 moist or dry
Fine-earth texture—ashy fine sandy loam or ashy sandy loam
Rock fragment content—35 to 70 percent total, with 10 to 35 percent fine to coarse gravel, 10 to 40 percent cobbles, and 0 to 10 percent stones
Clay content—3 to 6 percent
Volcanic glass content—15 to 50 percent
Reaction—very strongly acid or strongly acid
Thickness—19 to 40 centimeters

Bw horizon
Hue—10YR or 7.5YR
Value—2 to 4 moist, 4 to 6 moist
Chroma—2 to 6 moist or dry
Fine-earth texture—ashy fine sandy loam or ashy sandy loam
Rock fragment content—25 to 50 percent total, with 10 to 45 percent fine to coarse gravel, 5 to 30 percent cobbles, and 0 to 20 percent stones
Clay content—2 to 7 percent
Volcanic glass content—15 to 50 percent
Reaction—strongly acid or moderately acid
Thickness—20 to 60 centimeters

2BC horizon
Hue—10YR or 2.5Y
Value—3 to 5 moist, 4 to 6 moist
Chroma—3 to 6 moist or dry
Fine-earth texture—sandy loam or coarse sandy loam
Rock fragment content—35 to 75 percent total, with 25 to 50 percent fine to coarse gravel, 10 to 30 percent cobbles, and 0 to 20 percent stones
Clay content—1 to 5 percent
Volcanic glass content—5 to 15 percent
Reaction—strongly acid to slightly acid
Thickness—0 to 40 centimeters

C horizon (where present)
Hue—2.5Y or 10YR
Value—3 or 4 moist
Chroma—2 or 3 moist
Texture—coarse sandy loam, sandy loam, or loamy sand
Clay content—1 to 3 percent
Rock fragment content—25 to 80 percent gravel and 0 to 15 percent cobbles
Reaction—strongly acid to slightly acid

Kettling Series

Depth class: Very deep (more than 150 centimeters)
Drainage class: Moderately well drained
Capacity to transmit water (Ksat): High or very high
Landscape: Mountains
Landform: Debris aprons on mountain slopes, fan terraces on mountain slopes, and terraces
Parent material: Volcanic ash and alluvium over glacial drift
Slope range: 0 to 15 percent
Elevation: 335 to 980 meters
Mean annual precipitation: 1,700 to 2,500 millimeters
Mean annual air temperature: 5 to 10 degrees C
Frost-free period: 60 to 90 days

Taxonomic class: Coarse-loamy, isotic, frigid Fluventic Humixerepts

Typical Pedon

Kettling sandy loam (fig. 23) in an area of Sandalee-Kettling-Torment complex, 0 to 15 percent slopes, on an alluvial terrace about 2 kilometers northwest of the town of Stehekin; North Cascades National Park Complex, Chelan County, Washington;

Figure 23.—Typical profile of a Kettling soil. Numerals on tape indicate centimeters.

320 meters east and 650 meters south of the northwest corner of section 36, T. 33 N., R. 17 E.; Stehekin, Washington, U.S. Geological Survey quadrangle; latitude 48 degrees, 19 minutes, 3 seconds north and longitude 120 degrees, 41 minutes, 3 seconds west; UTM 671680 meters E., 5354185 meters N., zone 10; NAD 83.

Oi—0 to 2 centimeters; slightly decomposed leaves and twigs; abrupt smooth boundary.

Oe—2 to 5 centimeters; dark brown (7.5YR 3/3) moderately decomposed leaves and twigs, brown (7.5YR 5/3) dry; few very fine and fine and common medium roots; abrupt smooth boundary.

A—5 to 13 centimeters; black (10YR 2/1) sandy loam, very dark gray (10YR 3/1) dry; weak fine subangular blocky structure parting to moderate fine granular; soft, very friable, nonsticky and nonplastic; few very fine, fine, and coarse and common medium roots; common fine and medium dendritic tubular pores; strongly acid (pH 5.4); abrupt wavy boundary.

Bw1—13 to 25 centimeters; very dark grayish brown (10YR 3/2) loam, dark grayish brown (10YR 4/2) dry; moderate coarse granular structure; slightly hard, friable, nonsticky and nonplastic; few very fine to coarse roots; common fine and medium dendritic tubular pores; strongly acid (pH 5.5); clear wavy boundary.

Bw2—25 to 60 centimeters; dark grayish brown (10YR 4/2) fine sandy loam, grayish brown (10YR 5/2) dry; moderate medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine and medium roots; common fine and medium irregular pores; moderately acid (pH 5.8); abrupt wavy boundary.

C1—60 to 90 centimeters; dark grayish brown (2.5Y 4/2) coarse sand, light brownish gray (2.5Y 6/2) dry; single grain; loose, nonsticky and nonplastic; few very fine and fine roots; common fine and medium interstitial pores; 5 percent gravel; moderately acid (pH 6.0); abrupt wavy boundary.

C2—90 to 152 centimeters; very dark grayish brown (2.5Y 3/2) sandy loam, grayish brown (2.5Y 5/2) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; common very fine and fine irregular pores; 5 percent medium faint irregular yellowish brown (10YR 5/4) masses of oxidized iron with diffuse boundaries throughout; 5 percent gravel; slightly acid (pH 6.2).

Range in Characteristics

Mean annual soil temperature: 4 to 8 degrees C

Moisture control section: Dry 60 to 90 consecutive days

Other features: A thin (2 to 10 centimeters thick) C horizon of freshly deposited flood sediment with texture of sandy loam, fine sandy loam, or loamy fine sand may be present in some pedons.

A horizon

Hue—10YR or 7.5YR

Value—2 to 3 moist, 3 to 5 dry

Chroma—1 to 3 moist or dry

Fine-earth texture—sandy loam

Clay content—0 to 8 percent

Rock fragment content—0 to 10 percent total, with 0 to 10 percent fine to coarse gravel and 0 to 5 percent cobbles

Thickness—5 to 20 centimeters

Bw horizon

Hue—10YR or 2.5Y

Value—3 or 4 moist, 4 to 6 dry

Chroma—2 to 4 moist or dry
Fine-earth texture—loam, sandy loam, or fine sandy loam
Clay content—0 to 10 percent
Rock fragment content—0 to 30 percent total, with 0 to 30 percent fine to coarse gravel and 0 to 10 percent cobbles
Combined thickness—35 to 60 centimeters

C1 horizon
Hue—2.5Y or variegated
Value—3 to 5 moist, 4 to 6 dry
Chroma—2 to 4 moist or dry
Fine-earth texture—coarse sand, loamy coarse sand, or loamy sand
Clay content—0 to 5 percent
Rock fragment content—5 to 55 percent total, with 5 to 50 percent fine to coarse gravel, 5 to 25 percent cobbles, and 0 to 5 percent stones
Thickness—0 to 30 centimeters (horizon with this rock fragment content absent in some pedons)

C2 horizon
Hue—2.5Y or variegated
Value—3 to 5 moist, 4 to 6 dry
Chroma—2 to 4 moist or dry
Fine-earth texture—sandy loam, fine sandy loam, loamy fine sand, or loamy coarse sand
Clay content—0 to 8 percent
Rock fragment content—5 to 35 percent total, with 5 to 35 percent fine to coarse gravel, 0 to 15 percent cobbles, and 0 to 5 percent stones

Kimtah Series

Depth class: Very deep (more than 150 centimeters)
Drainage class: Moderately well drained
Capacity to transmit water (Ksat): Moderately high or high
Landscape: Mountains
Landform: Debris aprons on mountain slopes, valley bottoms of mountain slopes, and valley walls of mountain slopes
Parent material: Mixed volcanic ash over glacial drift and colluvium
Slope range: 5 to 35 percent
Elevation: 290 to 2,200 meters
Mean annual precipitation: 2,000 to 3,300 millimeters
Mean annual air temperature: 2 to 6 degrees C
Frost-free period: 30 to 60 days

Taxonomic class: Ashy over loamy, amorphic over isotic Aquandic Haplocryods

Typical Pedon

Kimtah ashy fine sandy loam (fig. 24) in an area of Chilliwack-Tepeh-Kimtah complex, 15 to 65 percent slopes, on a valley wall about 22 kilometers north of the town of Newhalem, near Beaver Pass; North Cascades National Park Complex, Whatcom County, Washington; 451 meters west and 563 meters south of the northeast corner of section 16, T. 39 N., R. 12 E.; Mount Prophet, Washington, U.S. Geological Survey quadrangle; latitude 48 degrees, 52 minutes, 4 seconds north and longitude 121 degrees, 14 minutes, 39 seconds west; UTM 628772 meters E., 5414234 meters N., zone 10; NAD 83.

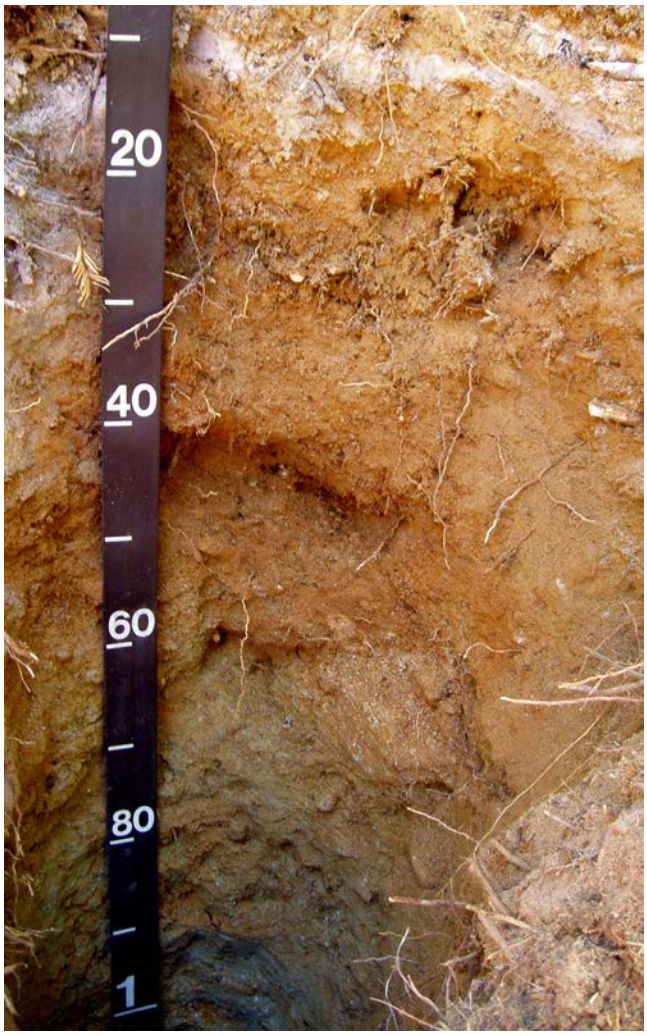


Figure 24.—Typical profile of a Kimtah soil. Numerals on tape indicate centimeters.

Oi—0 to 2 centimeters; slightly decomposed plant material; abrupt wavy boundary.

Oe—2 to 7 centimeters; moderately decomposed plant material; few very fine and medium roots; common fine irregular pores; extremely acid (pH 4.0); abrupt wavy boundary.

E—7 to 12 centimeters; very dark gray (10YR 3/1) ashy fine sandy loam, gray (10YR 5/1) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine to very coarse roots; common fine irregular pores; 10 percent gravel; extremely acid (pH 4.4); abrupt irregular boundary.

Bs1—12 to 33 centimeters; brown (7.5YR 4/6) ashy sandy loam, reddish yellow (7.5YR 6/6) dry; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and few medium and coarse roots; common fine and medium irregular pores; 5 percent cobbles; strongly acid (pH 5.5); gradual irregular boundary.

Bs2—33 to 51 centimeters; dark brown (7.5YR 3/4) ashy sandy loam, light brown (7.5YR 6/4) dry; moderate medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; common fine and medium

irregular pores; 5 percent cobbles; moderately acid (pH 5.6); abrupt irregular boundary.

2Bg—51 to 90 centimeters; very dark grayish brown (2.5Y 3/2) gravelly sandy loam, grayish brown (2.5Y 5/2) dry; moderate medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; common medium interstitial pores; 40 percent brown (7.5YR 4/4) iron-manganese concretions and 60 percent very dark grayish brown (2.5Y 3/2) iron depletions; 25 percent gravel and 5 percent cobbles; moderately acid (pH 5.8); gradual wavy boundary.

2Cg—90 to 152 centimeters; very dark grayish brown (2.5Y 3/2) gravelly sandy loam, grayish brown (2.5Y 5/2) dry; moderate medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; 40 percent strong brown (7.5YR 4/6) iron-manganese concretions and 60 percent very dark grayish brown (2.5Y 3/2) iron depletions; 25 percent gravel and 5 percent cobbles; moderately acid (pH 6.0).

Range in Characteristics

Mean annual soil temperature: 2 to 6 degrees C
Moisture control section: Dry less than 30 consecutive days
Particle-size control section: Contrasting
Clay content: 2 to 16 percent
Thickness of volcanic ash mantle (ashy textural modifier): 25 to 65 centimeters
Rock fragment content (ashy part): 5 to 30 percent total, with 5 to 25 percent gravel and 0 to 10 percent cobbles
Rock fragment content (loamy part): 0 to 30 percent total, with 0 to 30 percent gravel and 0 to 10 percent cobbles

E horizon
Hue—10YR or 7.5YR
Value—3 to 5 moist, 4 to 7 dry
Chroma—1 or 2 moist or dry
Fine-earth texture—ashy fine sandy loam or ashy sandy loam
Rock fragments—0 to 30 percent total, with 0 to 20 percent gravel and 0 to 10 percent cobbles
Clay content—2 to 12 percent
Volcanic glass content—15 to 50 percent
Reaction—extremely acid or very strongly acid
Thickness—3 to 13 centimeters

Bs horizon
Hue—7.5YR or 10YR
Value—2 to 4 moist, 4 to 6 dry
Chroma—2 or 6 moist or dry
Fine-earth texture—ashy sandy loam, ashy fine sandy loam, or ashy loamy sand
Rock fragment content—5 to 25 percent total, with 5 to 25 percent gravel and 0 to 10 percent cobbles
Clay content—4 to 14 percent
Volcanic glass content—15 to 50 percent
Reaction—strongly acid or moderately acid
Thickness—10 to 40 centimeters

2Bg horizon
Hue—2.5Y or 10YR
Value—3 to 5 moist, 5 to 7 dry
Chroma—2 or 4 moist or dry
Fine-earth texture—sandy loam, coarse sandy loam, or loamy fine sand

Rock fragment content—0 to 30 percent total, with 0 to 30 percent gravel and 0 to 10 percent cobbles
Clay content—5 to 15 percent
Reaction—strongly acid to slightly acid
Thickness—30 to 60 centimeters

2Cg horizon
Hue—2.5Y, 5Y, or 10YR
Value—3 or 4 moist, 5 or 6 dry
Chroma—2 or 6 moist or dry
Fine-earth texture—sandy loam, coarse sandy loam, or loamy fine sand
Rock fragment content—5 to 35 percent total, with 5 to 30 percent gravel and 0 to 10 percent cobbles
Clay content—2 to 15 percent
Reaction—strongly acid to slightly acid

Ledeir Series

Depth class: Very deep (more than 150 centimeters)
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high
Landscape: Mountains
Landform: Valley walls, debris aprons, and terraces of mountains and mountain valleys
Parent material: Volcanic ash over alluvium
Slope range: 15 to 35 percent
Elevation: 110 to 1,530 meters
Mean annual precipitation: 1,700 to 2,500 millimeters
Mean annual air temperature: 5 to 10 degrees C
Frost-free period: 60 to 90 days

Taxonomic class: Ashy over sandy or sandy-skeletal, amorphic over isotic, frigid Andic Haplorthods

Typical Pedon

Ledeir ashy sandy loam (fig. 25) in an area of Thorton-Ragged-Ledeir complex, 15 to 65 percent slopes, on a terrace west of Flat Creek Camp; North Cascades National Park Complex, Chelan County, Washington; 580 meters west and 522 meters north of the southeast corner of section 13, T. 34 N., R. 14 E.; Stehekin, Washington, U.S. Geological Survey quadrangle; latitude 48 degrees, 25 minutes, 52 seconds north and longitude 120 degrees, 55 minutes, 29 seconds west; UTM 653517 meters E., 5366306 meters N., zone 10; NAD 83.

Oi—0 to 2 centimeters; slightly decomposed plant material; few very fine and fine roots throughout; abrupt smooth boundary.
Oe—2 to 12 centimeters; moderately decomposed plant material; few very fine and fine roots and common medium and coarse roots throughout; abrupt wavy boundary.
E—12 to 20 centimeters; dark gray (10YR 4/1) ashy sandy loam, light gray (10YR 7/1) dry; moderate fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, medium, and coarse roots throughout; 5 percent fine gravel; very strongly acid (pH 4.6); clear irregular boundary.
Bs1—20 to 50 centimeters; strong brown (7.5YR 4/6) ashy sandy loam, reddish yellow (7.5YR 6/6) dry; moderate medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine to very coarse roots throughout;

Figure 25.—Typical profile of a Ledeir soil. Numerals on tape indicate centimeters.

5 percent fine gravel and 5 percent medium and coarse gravel; strongly acid (pH 5.4); clear wavy boundary.

Bs2—50 to 82 centimeters; dark yellowish brown (10YR 4/4) ashy fine sandy loam, light yellowish brown (10YR 6/4) dry; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine to coarse roots throughout; 5 percent fine gravel; strongly acid (pH 5.5); clear wavy boundary.

2C—82 to 152 centimeters; dark yellowish brown (10YR 4/4) very gravelly loamy sand, light yellowish brown (10YR 6/4) dry; single grain; loose, nonsticky and nonplastic; few very fine roots throughout; 20 percent fine gravel and 15 percent medium and coarse gravel; moderately acid (pH 5.8).

Range in Characteristics

Mean annual soil temperature: 6 to 8 degrees C

Moisture control section: Dry for less than 45 consecutive days from June through October

Thickness of volcanic ash mantle: 25 to 80 centimeters

Particle-size control section: Contrasting

E horizon

Hue—7.5YR or 10YR

Value—4 to 6 moist, 5 to 7 dry

Chroma—1 or 2 moist or dry

Fine-earth texture—ashy fine sandy loam or ashy sandy loam
Rock fragment content—0 to 30 percent total, with 0 to 20 percent fine or coarse gravel, 0 to 15 percent cobbles, and 0 to 5 percent stones
Clay content—1 to 6 percent
Volcanic glass content—15 to 50 percent
Reaction—extremely acid to strongly acid
Thickness—1 to 10 centimeters

Bhs horizon (where present)
Hue—7.5YR or 5YR
Value—2 to 4 moist
Chroma—3 or 4 moist
Texture—ashy sandy loam or ashy fine sandy loam
Reaction—very strongly acid or strongly acid
Thickness—1 to 6 centimeters

Bs horizon
Hue—5YR or 7.5YR in upper part; 7.5YR or 10YR in lower part
Value—3 to 5 moist, 4 to 6 dry
Chroma—3 to 6 moist or dry
Fine-earth texture—ashy fine sandy loam or ashy sandy loam
Rock fragment content—0 to 30 percent total, with 0 to 35 percent fine or coarse gravel, 0 to 20 percent cobbles, and 0 to 5 percent stones
Clay content—3 to 10 percent
Volcanic glass content—15 to 50 percent
Reaction—strongly acid or moderately acid
Thickness—30 to 70 centimeters

2BC horizon (where present)
Hue—10YR or 2.5Y
Value—3 to 5 moist
Chroma—4 to 6 moist
Texture—coarse sandy loam, loamy coarse sand, or loamy sand
Reaction—strongly acid to slightly acid
Thickness—as much as 30 centimeters

2C horizon
Hue—2.5Y or variegated
Value—4 or 5 moist, 5 or 6 dry
Chroma—3 or 4 moist or dry
Fine-earth texture—loamy sand, loamy coarse sand, or sand
Rock fragment content—30 to 70 percent total, with 30 to 50 percent fine or coarse gravel, 0 to 20 percent cobbles, and 0 to 10 percent stones
Clay content—0 to 6 percent
Volcanic glass content—0 to 10 percent
Reaction—strongly acid to slightly acid

Lyall Series

Depth class: Very deep (more than 150 centimeters)
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high
Landscape: Mountains
Landform: Valley walls of mountain slopes
Parent material: Minor amount of volcanic ash mixed with alluvium and glacial drift

Slope range: 5 to 65 percent
Elevation: 215 to 2,055 meters
Mean annual precipitation: 600 to 1,650 millimeters
Mean annual air temperature: 6 to 8 degrees C
Frost-free period: 70 to 100 days

Taxonomic class: Sandy-skeletal, isotic, frigid Vitrandic Dystroxerepts

Typical Pedon

Lyall gravelly ashy coarse sandy loam (fig. 26) in an area of Mesahchie-Inspiration-Lyall complex, 15 to 65 percent slopes, on a valley wall about 100 meters up bank of Ross Lake, on Desolation Peak Trail; North Cascades National Park Complex, Whatcom County, Washington; 345 meters west and 430 meters south of the northeast corner of section 1, T. 39 N., R. 13 E.; Hozomeen Mountain, Washington, U.S. Geological Survey quadrangle; latitude 48 degrees, 53 minutes, 50 seconds north and longitude 121 degrees, 2 minutes, 46 seconds west; UTM 643189 meters E., 5417873 meters N., zone 10; NAD 83.

Oi—0 to 4 centimeters; slightly decomposed plant material; abrupt smooth boundary.
Oe—4 to 7 centimeters; moderately decomposed plant material; abrupt wavy boundary.
A—7 to 19 centimeters; very dark brown (10YR 2/2) gravelly ashy coarse sandy loam, dark grayish brown (10YR 4/2) dry; weak fine granular structure; soft, very friable,

Figure 26.—Typical profile of a Lyall soil. Numerals on tape indicate centimeters.

nonsticky and nonplastic; common very fine to coarse roots throughout; 5 percent fine gravel and 15 percent medium and coarse gravel; strongly acid (pH 5.5); clear wavy boundary.

Bw1—19 to 44 centimeters; dark yellowish brown (10YR 4/4) very gravelly ashy coarse sandy loam, yellowish brown (10YR 5/4) dry; single grain; loose, nonsticky and nonplastic; common very fine to coarse roots; 10 percent fine gravel, 30 percent medium and coarse gravel, and 5 percent cobbles; moderately acid (pH 5.7); clear wavy boundary.

Bw2—44 to 75 centimeters; dark yellowish brown (10YR 3/6) very gravelly loamy sand, yellowish brown (10YR 5/6) dry; single grain; loose, nonsticky and nonplastic; common very fine and fine and few medium and coarse roots; 10 percent fine gravel, 35 percent medium and coarse gravel, and 5 percent cobbles; moderately acid (pH 5.8); gradual wavy boundary.

Bw3—75 to 120 centimeters; dark yellowish brown (10YR 4/4) very gravelly loamy sand, yellowish brown (10YR 5/4) dry; single grain; loose, nonsticky and nonplastic; few very fine and fine roots; 5 percent fine gravel, 40 percent medium and coarse gravel, and 5 percent cobbles; moderately acid (pH 5.9); abrupt wavy boundary.

2C—120 to 150 centimeters; olive brown (2.5Y 4/3) extremely gravelly loamy sand, light olive brown (2.5Y 5/3) dry; single grain; loose, nonsticky and nonplastic; few very fine roots; 10 percent fine gravel, 40 percent medium and coarse gravel, and 10 percent cobbles; moderately acid (pH 6.0).

Range in Characteristics

Mean annual soil temperature: 6 to 8 degrees C

Moisture control section: Dry for 60 to 90 consecutive days from June through October

A horizon

Hue—7.5YR or 10YR

Value—2 or 3 moist, 3 to 5 dry

Chroma—1 or 2 moist or dry

Fine-earth texture—ashy fine sandy loam, ashy sandy loam, or ashy coarse sandy loam

Rock fragments—10 to 45 percent total, with 10 to 25 percent fine to coarse gravel, 0 to 15 percent cobbles, and 0 to 5 percent stones

Clay content—2 to 8 percent

Volcanic glass content—5 to 15 percent

Reaction—very strongly acid or moderately acid

Thickness—1 to 14 centimeters

Bw horizon

Hue—10YR or 2.5Y

Value—3 to 5 moist, 4 to 6 dry

Chroma—2 to 6 moist or dry

Fine-earth texture—ashy coarse sandy loam, ashy fine sandy loam, or ashy sandy loam in the upper part and loamy sand or ashy loamy sand in the lower part

Rock fragment content—25 to 80 percent total, with 20 to 55 percent fine to coarse gravel, 5 to 30 percent cobbles, and 0 to 5 percent stones

Clay content—2 to 8 percent

Volcanic glass content—5 to 15 percent in the upper part and 0 to 10 percent in the lower part

Reaction—strongly acid to slightly acid

Thickness—100 to 150 centimeters

2C horizon
Hue—2.5Y, 10YR, or variegated
Value—3 or 4 moist, 4 to 6 moist
Chroma—2 to 4 moist or dry
Fine earth texture—coarse sand, loamy coarse sand, or loamy sand
Rock fragment content—35 to 80 percent total, with 30 to 55 percent fine to coarse gravel, 5 to 30 percent cobbles, and 0 to 5 percent stones
Clay content—0 to 5 percent
Volcanic glass content—0 to 5 percent
Reaction—strongly acid or moderately acid

Maggib Series

Depth class: Moderately deep to lithic bedrock
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high
Landscape: Mountains
Landform: Valley walls of mountain slopes
Parent material: Volcanic ash over glacial drift
Slope range: 15 to 65 percent
Elevation: 265 to 2,200 meters
Mean annual precipitation: 1,800 to 3,300 millimeters
Mean annual air temperature: 1 to 6 degrees C
Frost-free period: 30 to 60 days

Taxonomic class: Medial over sandy or sandy-skeletal, amorphic over isotic Andic Haplocryods

Typical Pedon

Maggib stony medial fine sandy loam (fig. 27) in an area of Spickard-Tepeh-Maggib complex, 15 to 100 percent slopes, on a valley wall cirque basin on the north side of McAlester Mountain; North Cascades National Park Complex, Chelan County, Washington; 507 meters west and 669 meters south of northeast corner of section 31, T. 34 N., R. 18 E.; McAlester Mountain, Washington, U.S. Geological Survey quadrangle; latitude 48 degrees, 24 minutes, 18 seconds north and longitude 120 degrees, 39 minutes, 9 seconds west; UTM 673737 meters E., 5363975 meters N., zone 10; NAD 83.

Oe—0 to 2 centimeters; moderately decomposed plant material; many very fine and common fine roots; abrupt smooth boundary.
Oa—2 to 5 centimeters; highly decomposed plant material; many very fine and fine and few medium and coarse roots; abrupt smooth boundary.
E—5 to 9 centimeters; very dark gray (10YR 3/1) stony medial fine sandy loam, gray (10YR 6/1) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine and fine roots and common medium and coarse roots; 5 percent medium and coarse gravel, 5 percent cobbles, and 5 percent stones; extremely acid (pH 4.4); clear irregular boundary.
Bs1—9 to 27 centimeters; strong brown (7.5YR 4/6) gravelly medial fine sandy loam, reddish yellow (7.5YR 7/6) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine to very coarse roots; 5 percent fine gravel, 10 percent medium and coarse gravel, and 5 percent cobbles; strongly acid (pH 5.2); clear wavy boundary.
Bs2—27 to 64 centimeters; dark brown (7.5YR 3/4) gravelly medial sandy loam, strong brown (7.5YR 5/6) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots and few

Figure 27.—Typical profile of a Maggib soil. Numerals on tape indicate centimeters.

coarse roots; 5 percent fine gravel, 20 percent medium and coarse gravel, and 5 percent cobbles; strongly acid (pH 5.4); clear wavy boundary.

2BC—64 to 80 centimeters; dark yellowish brown (10YR 3/4) extremely cobbly loamy sand, yellowish brown (10YR 5/4) dry; single grain; loose, nonsticky and nonplastic; few very fine and fine and common medium and coarse roots; 15 percent fine gravel, 30 percent medium and coarse gravel, and 35 percent cobbles; moderately acid (pH 5.8); abrupt wavy boundary.

R—80 to 110 centimeters; orthogneiss rock.

Range in Characteristics

Mean annual soil temperature: 1 to 6 degrees C

Moisture control section: Dry for less than 30 consecutive days from June through October

Thickness of volcanic ash mantle: 35 to 90 centimeters

Depth to bedrock (lithic contact): 50 to 100 centimeters from the mineral soil surface

Particle-size control section: Contrasting

E horizon

Hue—7.5YR or 10YR

Value—3 to 5 moist, 5 to 7 dry

Chroma—1 or 2 moist or dry
Fine-earth texture—medial fine sandy loam, medial sandy loam, or ashy loamy sand
Rock fragment content—0 to 30 percent total, with 0 to 15 percent fine to coarse gravel, 0 to 15 percent cobbles, and 0 to 10 percent stones
Clay content—1 to 6 percent
Volcanic glass content—15 to 50 percent
Reaction—extremely acid to strongly acid
Thickness—2 to 10 centimeters

Bhs horizon (where present)
Hue—7.5YR or 5YR
Value—2 to 4 moist
Chroma—3 or 4 moist
Thickness—1 to 9 centimeters
Texture—medial sandy loam or medial fine sandy loam
Reaction—very strongly acid or strongly acid
Thickness—as much as 30 centimeters

Bs horizon
Hue—5YR or 7.5YR
Value—3 to 5 moist, 5 to 7 dry
Chroma—2 to 6 moist or dry
Fine-earth texture—medial fine sandy loam, medial sandy loam, or medial loam
Rock fragment content—5 to 35 percent total, with 5 to 25 percent fine to coarse gravel, 0 to 10 percent cobbles, and 0 to 10 percent stones
Clay content—3 to 10 percent
Volcanic glass content—15 to 50 percent
Reaction—strongly acid or moderately acid
Thickness—33 to 65 centimeters

2BC horizon
Hue—10YR or 2.5Y
Value—3 to 5 moist, 4 to 6 dry
Chroma—3 to 5 moist or dry
Fine-earth texture—sandy loam, loamy sand, or loamy coarse sand in the upper part and loamy sand or loamy coarse sand in the lower part
Rock fragment content—35 to 80 percent total, with 25 to 45 percent fine to coarse gravel, 10 to 35 percent cobbles, and 0 to 10 percent stones
Clay content—1 to 8 percent
Volcanic glass content—5 to 15 percent
Reaction—strongly acid to slightly acid
Thickness—15 to 65 centimeters

Manlywham Series

Depth class: Very deep (more than 150 centimeters)
Drainage class: Poorly drained
Capacity to transmit water (Ksat): High or very high
Landscape: Mountains
Landform: Depressions, flood plains
Parent material: Alluvium
Slope range: 0 to 3 percent
Elevation: 100 to 980 meters
Mean annual precipitation: 1,750 to 2,300 millimeters
Mean annual air temperature: 5 to 8 degrees C
Frost-free period: 60 to 90 days

Taxonomic class: Coarse-loamy over sandy or sandy-skeletal, isotic, acid, frigid Typic Humaquepts

Typical Pedon

Manlywham mucky fine sandy loam in an area of Manlywham-Nohokomeen-Roland complex, 0 to 5 percent slopes, on a flood plain along the Big Beaver Creek trail about 18 kilometers northeast of the town of Newhalem; North Cascades National Park Complex, Whatcom County, Washington; 85 meters east and 125 meters south of the northwest corner of section 10, T. 38 N., R. 13 E.; Pumpkin Mountain, Washington, U.S. Geological Survey quadrangle; latitude 48 degrees, 47 minutes, 56 seconds north and longitude 121 degrees, 6 minutes, 20 seconds west; UTM 639111 meters E., 5406833 meters N., zone 10; NAD 83.

A1—0 to 6 centimeters; black (10YR 2/1) mucky fine sandy loam, dark gray (10YR 4/1) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; moderately acid (pH 6.0); clear smooth boundary.

A2—6 to 24 centimeters; very dark gray (5Y 3/1) sandy loam, gray (5Y 5/1) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; 2 percent dark reddish brown (5YR 3/3) masses of oxidized iron; 5 percent fine gravel; moderately acid (pH 6.0); clear smooth boundary.

Cg1—24 to 60 centimeters; dark yellowish brown (10YR 4/4) gravelly sandy loam, light yellowish brown (10YR 6/4) dry; single grain; loose, nonsticky and nonplastic; few very fine to coarse roots; 15 percent distinct strong brown (7.5YR 5/8) masses of oxidized iron on surfaces along root channels and 15 percent distinct grayish brown (10YR 5/2) iron depletions in matrix; 10 percent fine gravel and 5 percent medium and coarse gravel; strongly acid (pH 5.5); gradual wavy boundary.

Cg2—60 to 104 centimeters; olive brown (2.5Y 4/3) cobbly loamy coarse sand, light yellowish brown (2.5Y 6/3) dry; single grain; loose, nonsticky and nonplastic; few very fine and fine roots; 15 percent distinct strong brown (7.5YR 4/6) masses of oxidized iron on surfaces along root channels and 15 percent distinct grayish brown (10YR 5/2) iron depletions in matrix; 5 percent fine gravel, 10 percent medium and coarse gravel, and 15 percent cobbles; very strongly acid (pH 5.0); gradual wavy boundary.

Cg3—104 to 150 centimeters; olive brown (2.5Y 4/3) very cobbly loamy coarse sand, light yellowish brown (2.5Y 6/3) dry; single grain; loose, nonsticky and nonplastic; 15 percent distinct light yellowish brown (2.5Y 6/3) iron depletions in matrix; 5 percent fine gravel, 15 percent medium and coarse gravel, and 15 percent cobbles; very strongly acid (pH 5.0).

Range in Characteristics

Mean annual soil temperature: 6 to 8 degrees C

Moisture control section: Seasonal high water table at the soil surface for more than 30 consecutive days

Particle-size control section: Contrasting

Clay content: 0 to 5 percent

Rock fragment content (coarse-loamy part): 5 to 30 percent gravel

Rock fragment content (sandy or sandy-skeletal part): 15 to 35 percent total, with 15 to 25 percent fine to coarse gravel and 5 to 15 percent cobbles

A1 horizon

Hue—10YR or 2.5Y

Value—2 to 4 moist, 4 to 6 dry

Chroma—1 or 2 moist or dry

Fine-earth texture—mucky fine sandy loam, mucky sandy loam, or sandy loam
Rock fragment content—0 to 10 percent gravel
Reaction—moderately acid or slightly acid
Thickness—5 to 15 centimeters

A2 horizon
Hue—5Y, 2.5Y, or 10YR
Value—3 or 4 moist, 5 or 6 dry
Chroma—1 or 2 moist or dry
Fine-earth texture—sandy loam, fine sandy loam, or loamy sand
Rock fragment content—5 to 30 percent total, with 5 to 30 percent gravel and 0 to 15 percent cobbles
Reaction—moderately acid or slightly acid
Thickness—5 to 20 centimeters

Cg1 horizon
Hue—10YR or 2.5Y
Value—3 to 5 moist, 5 to 7 dry
Chroma—2 to 4 moist or dry
Fine-earth texture—sandy loam, loamy coarse sand, coarse sand, or sand
Rock fragment content—15 to 35 percent total, with 10 to 30 percent fine to coarse gravel and 0 to 10 percent cobbles
Reaction—strongly acid or moderately acid
Thickness—30 to 65 centimeters

Cg2 horizon
Hue—2.5Y or 10YR
Value—3 to 5 moist, 5 to 7 dry
Chroma—2 to 4 moist or dry
Fine-earth texture—loamy coarse sand, sandy loam, coarse sand, or sand
Rock fragment content—15 to 35 percent total, with 10 to 30 percent fine to coarse gravel and 0 to 15 percent cobbles
Reaction—very strongly acid or strongly acid
Thickness—30 to 65 centimeters

Cg3 horizon
Hue—2.5Y or 10YR
Value—3 to 5 moist, 5 to 7 dry
Chroma—2 to 4 moist or dry
Fine-earth texture—loamy coarse sand, sandy loam, coarse sand, or sand
Rock fragment content—15 to 35 percent total, with 15 to 25 percent fine to coarse gravel and 0 to 15 percent cobbles
Reaction—very strongly acid or strongly acid
Thickness—30 to 65 centimeters

Mesahchie Series

Depth class: Very deep (more than 150 centimeters)
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high
Landscape: Mountains
Landform: Valley walls of mountain slopes
Parent material: Volcanic ash mixed with glacial drift over glacial drift
Slope range: 15 to 100 percent
Elevation: 215 to 2,055 meters
Mean annual precipitation: 600 to 1,600 millimeters

Mean annual air temperature: 5 to 10 degrees C
Frost-free period: 70 to 100 days

Taxonomic class: Loamy-skeletal, isotic, frigid Andic Humixerepts

Typical Pedon

Mesahchie gravelly ashy fine sandy loam (fig. 28) in an area of Inspiration-Mesahchie-Sawtooth complex, 35 to 100 percent slopes, on a valley wall near Flat Creek; North Cascades National Park Complex, Chelan County, Washington; 761 meters east and 374 meters north of the southwest corner of section 13, T. 34 N., R. 14 E.; Goode Mountain, Washington, U.S. Geological Survey quadrangle; latitude 48 degrees, 35 minutes, 48 seconds north and longitude 120 degrees, 55 minutes, 41 seconds west; UTM 653260 meters E., 5366155 meters N., zone 10; NAD 83.

Oi—0 to 2 centimeters; slightly decomposed plant material; abrupt wavy boundary.
A1—2 to 20 centimeters; very dark brown (10YR 2/2) gravelly ashy fine sandy loam, dark grayish brown (10YR 4/2) dry; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots and

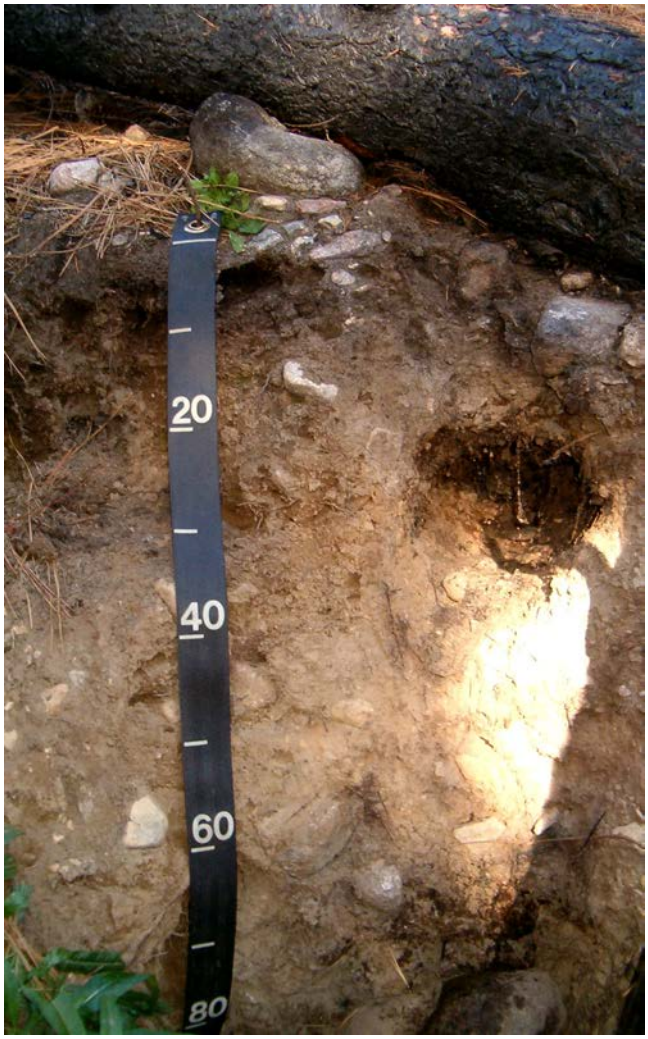


Figure 28.—Typical profile of a Mesahchie soil. Numerals on tape indicate centimeters.

few medium roots throughout; 5 percent fine gravel, 10 percent medium and coarse gravel, and 5 percent cobbles; very strongly acid (pH 5.0); clear wavy boundary.

A2—20 to 44 centimeters; very dark brown (10YR 2/2) gravelly ashy sandy loam, dark grayish brown (10YR 4/2) dry; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots and few coarse roots throughout; 5 percent fine gravel, 10 percent medium and coarse gravel, and 5 percent cobbles; strongly acid (pH 5.3); clear wavy boundary.

A3—44 to 74 centimeters; very dark brown (10YR 2/2) very cobbly ashy sandy loam, dark grayish brown (10YR 4/2) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and few fine, medium, and coarse roots throughout; 10 percent fine gravel, 15 percent medium and coarse gravel, and 20 percent cobbles; strongly acid (pH 5.5); abrupt wavy boundary.

2BC—74 to 96 centimeters; dark olive brown (2.5Y 3/3) very gravelly sandy loam, light olive brown (2.5Y 5/3) dry; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; 10 percent fine gravel, 15 percent medium and coarse gravel, and 10 percent cobbles; moderately acid (pH 5.8); clear wavy boundary.

2C—96 to 152 centimeters; very dark grayish brown (2.5Y 3/2) very gravelly loamy sand, grayish brown (2.5Y 5/2) dry; single grain; loose, nonsticky and nonplastic; 15 percent fine gravel, 15 percent medium and coarse gravel, and 15 percent cobbles; moderately acid (pH 6.0).

Range in Characteristics

Mean annual soil temperature: 6 to 8 degrees C

Moisture control section: Dry for 60 to 90 consecutive days from June through October

Thickness of volcanic ash mantle: 18 to 35 centimeters

Rock fragment roundness classes: Rounded, subrounded, and subangular

A horizon

Hue—10YR

Value—2 to 3 moist, 3 to 5 dry

Chroma—1 to 3 moist or dry

Fine-earth texture—ashy fine sandy loam, ashy sandy loam, or ashy coarse sandy loam

Rock fragment content—10 to 60 percent total, with 5 to 35 percent fine to coarse gravel, 5 to 20 percent cobbles, and 0 to 30 percent stones

Clay content—3 to 8 percent

Volcanic glass content—5 to 30 percent

Reaction—very strongly acid or moderately acid

Thickness—25 to 85 centimeters

Bw horizon (where present)

Hue—10YR

Value—3 or 4 moist

Chroma—3 or 4 moist

Texture—ashy sandy loam or ashy coarse sandy loam

Reaction—strongly acid or moderately acid

Thickness—as much as 50 centimeters

2BC horizon

Hue—2.5Y or 10YR

Value—3 to 5 moist, 4 to 6 dry

Chroma—2 to 4 moist or dry

Fine-earth texture—sandy loam, coarse sandy loam, or loamy sand
Rock fragment content—35 to 60 percent total, with 25 to 40 percent fine to coarse gravel, 10 to 20 percent cobbles, and 0 to 10 percent stones
Clay content—1 to 6 percent
Volcanic glass content—0 to 20 percent
Reaction—strongly acid to slightly acid
Thickness—20 to 70 centimeters

2C horizon
Hue—2.5Y or variegated
Value—3 to 5 moist, 5 or 6 dry
Chroma—2 to 4 moist or dry
Fine-earth texture—loamy sand or loamy coarse sand
Rock fragment content—30 to 65 percent total, with 25 to 45 percent fine to coarse gravel, 10 to 30 percent cobbles, and 0 to 10 percent stones
Clay content—0 to 6 percent
Volcanic glass content—0 to 20 percent
Reaction—moderately acid or slightly acid

Mox Series

Depth class: Very deep (more than 150 centimeters)
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high
Landscape: Mountains
Landform: Debris aprons on mountain slopes
Parent material: Volcanic ash over glacial drift
Slope range: 35 to 100 percent
Elevation: 290 to 2,200 meters
Mean annual precipitation: 1,800 to 3,000 millimeters
Mean annual air temperature: 2 to 6 degrees C
Frost-free period: 30 to 60 days

Taxonomic class: Medial over loamy-skeletal, amorphic over isotic Andic Humicryods

Typical Pedon

Mox ashy sandy loam (fig. 29) in an area of Mox-Doubtful-Perfect complex, 35 to 100 percent slopes, on a Pleistocene moraine about 6 kilometers northwest of Whatcom Pass; North Cascades National Park Complex, Whatcom County, Washington; 540 meters east and 430 meters north of the southeast corner of section 31, T. 31 N., R. 11 E.; Copper Mountain, Washington, U.S. Geological Survey quadrangle; latitude 48 degrees, 54 minutes, 30 seconds north and longitude 121 degrees, 25 minutes, 34 seconds west; UTM 615310 meters E., 5418480 meters N., zone 10; NAD 83.

Oi—0 to 4 centimeters; slightly decomposed leaves, needles, and twigs; common very fine and fine roots; abrupt wavy boundary.
Oe—4 to 16 centimeters; moderately decomposed needles and twigs; common very fine and fine and many medium and coarse roots; common fine and medium irregular pores; abrupt wavy boundary.
E—16 to 27 centimeters; grayish brown (10YR 5/2) ashy sandy loam, light gray (10YR 7/1) dry; weak medium subangular blocky structure; soft, friable, nonsticky and nonplastic; few very fine and common fine to coarse roots; common fine and medium irregular pores; 5 percent gravel and 5 percent stones; extremely acid (pH 4.4); abrupt irregular boundary.

Figure 29.—Typical profile of a Mox soil. Numerals on tape indicate centimeters.

Bs—27 to 49 centimeters; dark reddish brown (5YR 3/4) cobbly medial sandy loam, reddish brown (5YR 5/4) dry; moderate medium subangular blocky structure; soft, friable, nonsticky and nonplastic; common fine and medium and few very fine and coarse roots; common fine and medium irregular pores; 5 percent fine gravel, 10 percent medium and coarse gravel, 10 percent cobbles, and 5 percent stones; strongly acid (pH 5.1); abrupt irregular boundary.

Bhs—49 to 76 centimeters; dark reddish brown (5YR 2.5/2) cobbly medial sandy loam, dark reddish brown (5YR 3/2) dry; moderate medium subangular blocky structure; soft, friable, slightly sticky and slightly plastic; few fine and medium roots; common fine and medium irregular pores; 5 percent fine gravel, 10 percent medium and coarse gravel, and 15 percent cobbles; strongly acid (pH 5.2); clear wavy boundary.

2BC—76 to 94 centimeters; dark reddish brown (5YR 3/4) very gravelly coarse sandy loam, reddish brown (5YR 5/4) dry; moderate medium subangular blocky structure; soft, friable, nonsticky and nonplastic; few fine roots; few fine and medium irregular pores; 10 percent fine gravel, 25 percent medium and coarse gravel, and 20 percent cobbles; strongly acid (pH 5.5); abrupt wavy boundary.

2C—94 to 152 centimeters; olive brown (2.5Y 4/3) very gravelly sandy loam, light yellowish brown (2.5Y 6/3) dry; single grain; loose, very friable, nonsticky and nonplastic; common medium interstitial pores; 10 percent fine gravel, 25 percent medium and coarse gravel, 10 percent cobbles, and 5 percent stones; moderately acid (pH 5.7).

Range in Characteristics

Mean annual soil temperature: 4 to 8 degrees C
Moisture control section: Dry less than 30 consecutive days
Particle-size control section: Contrasting
Clay content: 0 to 10 percent
Rock fragment content (medial part): 5 to 30 percent total, with 5 to 30 percent fine to coarse gravel, 0 to 15 percent cobbles, and 0 to 5 percent stones
Rock fragment content (loamy-skeletal part): 35 to 70 percent total, with 25 to 50 percent fine to coarse gravel, 15 to 50 percent cobbles, and 0 to 10 percent stones
Thickness of volcanic ash mantle (ashy and medial textural modifiers): 30 to 75 centimeters

E horizon
Hue—10YR or 7.5YR
Value—4 to 6 moist, 5 to 7 dry
Chroma—1 or 2 moist or dry
Fine-earth texture—ashy sandy loam or ashy fine sandy loam
Rock fragment content—0 to 15 percent total, with 0 to 15 percent gravel, 0 to 5 percent cobbles, and 0 to 5 percent stones
Volcanic glass content—35 to 80 percent
Reaction—extremely acid or very strongly acid
Thickness—2 to 15 centimeters

Bs horizon
Hue—5YR to 7.5YR
Value—2 to 3 moist, 4 to 6 dry
Chroma—2 to 4 moist or dry
Fine-earth texture—medial sandy loam or medial fine sandy loam
Rock fragment content—5 to 30 percent total, with 5 to 30 percent gravel, 0 to 15 percent cobbles, and 0 to 5 percent stones
Volcanic glass content—15 to 70 percent
Reaction—very strongly acid or strongly acid
Thickness—15 to 30 centimeters

Bhs horizon
Hue—5YR to 7.5YR
Value—2 to 3 moist, 4 to 6 dry
Chroma—2 to 3 moist or dry
Fine-earth texture—medial sandy loam or medial fine sandy loam
Rock fragment content—5 to 30 percent total, with 5 to 30 percent gravel, 0 to 15 percent cobbles, and 0 to 5 percent stones
Volcanic glass content—15 to 70 percent
Reaction—very strongly acid or strongly acid
Thickness—15 to 45 centimeters

2BC horizon
Hue—5YR to 10YR
Value—3 to 5 moist, 5 or 6 dry
Chroma—3 to 6 moist or dry
Fine-earth texture—coarse sandy loam or sandy loam

Rock fragment content—35 to 70 percent total, with 25 to 50 percent fine to coarse gravel, 15 to 50 percent cobbles, and 0 to 10 percent stones
Volcanic glass content—5 to 15 percent
Reaction—strongly acid or moderately acid
Thickness—15 to 40 centimeters

2C horizon
Hue—2.5Y or 10YR
Value—3 to 5 moist, 5 or 6 dry
Chroma—2 to 4 moist or dry
Fine-earth texture—sandy loam, coarse sandy loam, or loamy sand
Rock fragment content—35 to 90 percent total, with 30 to 50 percent fine to coarse gravel, 10 to 60 percent cobbles, and 0 to 10 percent stones
Reaction—moderately acid or strongly acid

Noca Series

Depth class: Very deep (more than 150 centimeters)
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high
Landscape: Mountains
Landform: Valley walls of mountain slopes
Parent material: Volcanic ash over glacial drift
Slope range: 15 to 100 percent
Elevation: 550 to 2,150 meters
Mean annual precipitation: 1,800 to 3,300 millimeters
Mean annual air temperature: 2 to 6 degrees C
Frost-free period: 30 to 60 days

Taxonomic class: Ashy over sandy or sandy-skeletal, amorphic over isotic Spodic Vitricryands

Typical Pedon

Noca gravelly ashy sandy loam (fig. 30) in an area of Primus-Noca-Stehekin complex, 15 to 65 percent slopes, on a valley wall northwest of McAlester Lake; North Cascades National Park Complex, Chelan County, Washington; 410 meters east and 442 meters north of the southwest corner of section 24, T. 34 N., R. 17 E.; McAlester Mountain, Washington, U.S. Geological Survey quadrangle; latitude 48 degrees, 25 minutes, 46 seconds north and longitude 120 degrees, 40 minutes, 58 seconds west; UTM 671407 meters E., 5366631 meters N., zone 11; NAD 83.

Oe—0 to 2 centimeters; moderately decomposed plant material; common very fine and very coarse and few medium roots throughout; abrupt wavy boundary.
E—2 to 5 centimeters; dark gray (10YR 4/1) gravelly ashy sandy loam, gray (10YR 5/1) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine to very coarse roots throughout; 5 percent fine gravel, 5 percent medium and coarse gravel, and 5 percent cobbles; very strongly acid (pH 5.0); abrupt irregular boundary.
Bw1—5 to 29 centimeters; dark yellowish brown (10YR 3/4) stony ashy sandy loam, yellowish brown (10YR 5/4) dry; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and many medium, coarse, and very coarse roots throughout; 5 percent fine gravel, 10 percent medium and coarse gravel, 5 percent cobbles, and 5 percent stones; moderately acid (pH 5.6); clear wavy boundary.
Bw2—29 to 51 centimeters; dark yellowish brown (10YR 4/6) gravelly ashy sandy loam, yellowish brown (10YR 5/6) dry; weak medium subangular blocky structure;

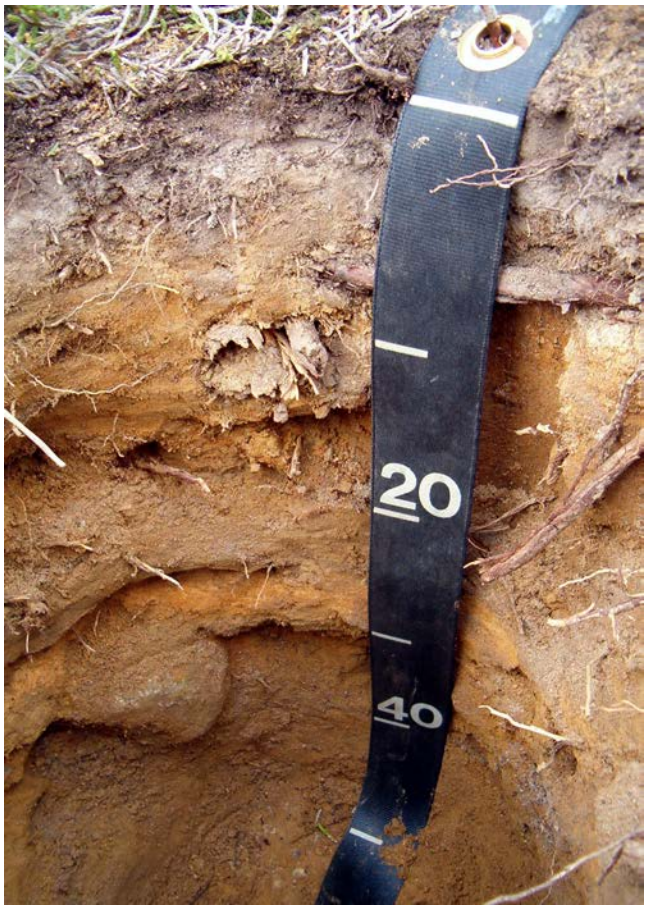


Figure 30.—Typical profile of a Noca soil. Numerals on tape indicate centimeters.

soft, very friable, nonsticky and nonplastic; common very fine and fine, many medium and coarse, and few very coarse roots throughout; 5 percent fine gravel, 20 percent medium and coarse gravel, and 5 percent cobbles; moderately acid (pH 5.7); abrupt wavy boundary.

2BC—51 to 77 centimeters; light olive brown (2.5Y 5/4) very gravelly loamy sand, light yellowish brown (2.5Y 6/4) dry; single grain; loose, nonsticky and nonplastic; few very fine to very coarse roots; 5 percent fine gravel, 35 percent medium and coarse gravel, and 10 percent cobbles; moderately acid (pH 6.0); abrupt wavy boundary.

2C—77 to 150 centimeters; light olive brown (2.5Y 5/3) extremely gravelly loamy sand, light yellowish brown (2.5Y 6/3) dry; single grain; loose, nonsticky and nonplastic; few very fine, fine, and medium roots throughout; 10 percent fine gravel, 40 percent medium and coarse gravel, and 10 percent cobbles; slightly acid (pH 6.1).

Range in Characteristics

Mean annual soil temperature: 4 to 8 degrees C

Moisture control section: Dry for less than 30 consecutive days from June through October

Thickness of volcanic ash mantle: 40 to 70 centimeters

Particle-size control section: Contrasting

E horizon
Hue—7.5YR or 10YR
Value—3 to 5 moist, 5 to 7 dry
Chroma—1 or 2 moist or dry
Fine-earth texture—ashy fine sandy loam, ashy sandy loam, or ashy coarse sandy loam
Rock fragment content—0 to 30 percent total, with 0 to 20 percent fine to coarse gravel, 0 to 10 percent cobbles, and 0 to 5 percent stones
Clay content—2 to 8 percent
Volcanic glass content—15 to 50 percent
Reaction—extremely acid to strongly acid
Thickness—2 to 8 centimeters

Bw horizon
Hue—10YR or 7.5YR
Value—3 to 5 moist, 4 to 6 moist
Chroma—4 to 6 moist or dry
Fine-earth texture—ashy fine sandy loam, ashy coarse sandy loam, or ashy sandy loam
Rock fragment content—5 to 35 percent total, with 5 to 35 percent fine to coarse gravel, 0 to 20 percent cobbles, and 0 to 10 percent stones
Clay content—3 to 8 percent
Volcanic glass content—15 to 50 percent
Reaction—strongly acid or moderately acid
Thickness—35 to 70 centimeters

2BC horizon
Hue—10YR or 2.5Y
Value—3 to 5 moist, 4 to 6 moist
Chroma—3 to 5 moist or dry
Fine-earth texture—loamy sand or loamy coarse sand
Rock fragment content—35 to 75 percent total, with 25 to 65 percent fine to coarse gravel, 10 to 20 percent cobbles, and 0 to 5 percent stones
Clay content—1 to 6 percent
Volcanic glass content—0 to 15 percent
Reaction—strongly acid to slightly acid
Thickness—10 to 30 centimeters

2C horizon
Hue—2.5Y or variegated
Value—3 to 5 moist, 5 or 6 moist
Chroma—3 or 4 moist or dry
Fine-earth texture—loamy sand or loamy coarse sand
Rock fragment content—40 to 85 percent total, with 20 to 65 percent fine to coarse gravel, 10 to 50 percent cobbles, and 0 to 10 percent stones
Clay content—0 to 3 percent
Volcanic glass content—0 to 10 percent
Reaction—strongly acid to slightly acid

Nohokomeen Series

Depth class: Very deep (more than 150 centimeters)
Drainage class: Somewhat poorly drained
Capacity to transmit water (Ksat): High or very high
Landscape: Mountains

Landform: Debris aprons on mountain slopes, fan terraces on mountain slopes, and terraces
Parent material: Volcanic ash and alluvium over glacial drift
Slope range: 0 to 65 percent
Elevation: 110 to 1,490 meters
Mean annual precipitation: 1,700 to 2,500 millimeters
Mean annual air temperature: 5 to 10 degrees C
Frost-free period: 60 to 90 days

Taxonomic class: Coarse-loamy, isotic, frigid Aquandic Dystrudepts

Typical Pedon

Nohokomeen ashy sandy loam (fig. 31) in an area of Manlywham-Nohokomeen-Roland complex, 0 to 5 percent slopes, on a debris apron; North Cascades National Park Complex, Whatcom County, Washington; 560 meters west and 707 meters north of the southeast corner of section 29, T. 34 N., R. 12 E.; Mount Triumph, Washington, U.S. Geological Survey quadrangle; latitude 48 degrees, 39 minutes, 43 seconds north and longitude 121 degrees, 15 minutes, 58 seconds west; UTM 627668 meters E., 5391321 meters N., zone 10; NAD 83.

Figure 31.—Typical profile of a Nohokomeen soil. Numerals on tape indicate centimeters.

Oi—0 to 3 centimeters; slightly decomposed plant material; abrupt smooth boundary.
Oe—3 to 7 centimeters; moderately decomposed plant material; abrupt wavy boundary.
Bw—7 to 30 centimeters; dark brown (7.5YR 3/4) ashy sandy loam, brown (7.5YR 5/4) dry; weak fine subangular blocky structure; very friable, soft, nonsticky and nonplastic; common very fine to coarse roots throughout; 5 percent fine gravel and 5 percent medium and coarse gravel; strongly acid (pH 5.5); clear smooth boundary.
Bg1—30 to 73 centimeters; dark brown (7.5YR 3/4) ashy sandy loam, brown (7.5YR 5/3) dry; moderate medium subangular blocky structure; very friable, soft, nonsticky and nonplastic; common fine and medium and few very fine and coarse roots throughout; common distinct medium strong brown (7.5YR 4/6) masses of oxidized iron with clear boundaries in matrix and many distinct medium grayish brown (10YR 5/2) iron depletions with clear boundaries in matrix; moderately acid (pH 5.8); abrupt smooth boundary.
Bg2—73 to 108 centimeters; brown (7.5YR 4/4) very fine sandy loam, brown (7.5YR 5/4) dry; moderate medium subangular blocky structure; very friable, soft, nonsticky and nonplastic; few fine roots throughout; common distinct medium grayish brown (10YR 5/2) iron depletions with diffuse boundaries in matrix and common distinct medium strong brown (7.5YR 4/6) masses of oxidized iron with diffuse boundaries in matrix; moderately acid (pH 5.9); abrupt wavy boundary.
2BC—108 to 150 centimeters; olive brown (2.5Y 4/3) very gravelly loamy sand, light yellowish brown (2.5Y 6/3) dry; single grain; loose, nonsticky and nonplastic; few very fine roots throughout; 10 percent fine gravel, 20 percent medium and coarse gravel, and 10 percent cobbles; moderately acid (pH 6.0).

Range in Characteristics

Mean annual soil temperature: 6 to 8 degrees C
Moisture control section: Dry for less than 45 consecutive days from June through October

A horizon (where present)
Hue—10YR
Value—2 or 3 moist
Chroma—1 or 2 moist
Texture—ashy sandy loam or ashy fine sandy loam
Reaction—very strongly acid or strongly acid
Thickness—0 to 10 centimeters

E horizon (where present)
Thickness—0 to 3 centimeters
Texture—ashy sandy loam or ashy fine sandy loam
Reaction—very strongly acid or strongly acid
Hue—10YR
Thickness—0 to 10 centimeters
Value—4 to 6 moist
Chroma—1 or 2 moist

Bw horizon
Hue—10YR or 7.5YR
Value—3 to 5 moist, 4 to 6 dry
Chroma—3 or 4 moist or dry
Fine-earth texture—ashy sandy loam, ashy fine sandy loam, or ashy very fine sandy loam

Rock fragment content—0 to 30 percent total, with 0 to 20 percent fine to coarse gravel, 0 to 15 percent cobbles, and 0 to 5 percent stones
Clay content—3 to 8 percent
Volcanic glass content—5 to 35 percent
Reaction—strongly acid or moderately acid
Thickness—15 to 40 centimeters

Bg horizon
Hue—10YR or 2.5Y
Value—3 to 5 moist, 4 to 6 dry
Chroma—3 or 4 moist or dry
Fine-earth texture—sandy loam, fine sandy loam, or silt loam and is ashy in the upper part in some pedons
Rock fragment content—0 to 30 percent total, with 0 to 25 percent fine to coarse gravel, 0 to 10 percent cobbles, and 0 to 5 percent stones
Clay content—3 to 10 percent
Volcanic glass content—0 to 15 percent
Reaction—moderately acid or slightly acid
Thickness—40 to 80 centimeters

2BC horizon
Hue—2.5Y or variegated
Value—3 to 5 moist, 4 to 6 dry
Chroma—3 or 4 moist or dry
Fine-earth texture—sandy loam, loamy sand, or coarse sand
Rock fragment content—35 to 85 percent total, with 25 to 50 percent fine to coarse gravel, 10 to 35 percent cobbles, and 0 to 10 percent stones
Clay content—0 to 6 percent
Volcanic glass content—0 to 5 percent
Reaction—moderately acid or slightly acid

Perfect Series

Depth class: Very deep (more than 150 centimeters)
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high
Landscape: Mountains
Landform: Debris cones and valley walls on mountain slopes
Parent material: Minor amount of volcanic ash mixed with colluvium and reworked glacial drift
Slope range: 5 to 100 percent
Elevation: 265 to 2,310 meters
Mean annual precipitation: 1,750 to 3,300 millimeters
Mean annual air temperature: 2 to 6 degrees C
Frost-free period: 30 to 60 days

Taxonomic class: Sandy-skeletal, isotic Vitrandic Dystrocryepts

Typical Pedon

Perfect ashy sandy loam (fig. 32) in an area of Chilliwack-Perfect-Terror complex, 15 to 65 percent slopes, on a valley wall about 0.5 mile past Panther Camp; North Cascades National Park Complex, Whatcom County, Washington; 88 meters west and 115 meters south of the northeast corner of section 20, T. 37 N., R. 14 E.; Crater Mountain, Washington, U.S. Geological Survey quadrangle; latitude 48 degrees,

Figure 32.—Typical profile of a Perfect soil. Numerals on tape indicate centimeters.

40 minutes, 59 seconds north and longitude 120 degrees, 59 minutes, 57 seconds west; UTM 647265 meters E., 5394168 meters N., zone 10; NAD 83.

Oi—0 to 3 centimeters; slightly decomposed plant material; abrupt wavy boundary.

Oe—3 to 4 centimeters; moderately decomposed plant material; many very fine roots and common fine, medium, and coarse roots throughout; abrupt irregular boundary.

Bw—4 to 7 centimeters; dark yellowish brown (10YR 3/4) ashy sandy loam, yellowish brown (10YR 5/4) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine, many fine and medium, and few coarse and very coarse roots throughout; 5 percent fine gravel and 5 percent medium and coarse gravel; moderately acid (pH 5.7); abrupt irregular boundary.

Oeb—7 to 11 centimeters; moderately decomposed plant material; common very fine, fine, and medium roots and few coarse roots throughout; abrupt irregular boundary.

Eb—11 to 13 centimeters; dark gray (10YR 4/1) ashy sandy loam, gray (10YR 5/1) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and few medium and coarse roots throughout; 5 percent fine gravel and 5 percent medium and coarse gravel; strongly acid (pH 5.4); abrupt irregular boundary.

Bwb—13 to 39 centimeters; dark yellowish brown (10YR 3/4) ashy gravelly sandy loam, dark yellowish brown (10YR 4/4) dry; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine to very coarse roots throughout; 5 percent fine gravel, 5 percent medium and coarse gravel, and 5 percent cobbles; moderately acid (pH 5.7); clear wavy boundary.
2BCb1—39 to 73 centimeters; olive brown (2.5Y 4/4) extremely cobbly loamy sand, light olive brown (2.5Y 5/4) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; 20 percent fine gravel, 20 percent medium and coarse gravel, 25 percent cobbles, and 5 percent stones; slightly acid (pH 6.1); abrupt smooth boundary.
2BCb2—73 to 150 centimeters; olive brown (2.5Y 4/3) extremely gravelly loamy sand, light olive brown (2.5Y 5/3) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; 20 percent fine gravel, 20 percent medium and coarse gravel, and 25 percent cobbles; slightly acid (pH 6.3).

Range in Characteristics

Mean annual soil temperature: 4 to 8 degrees C
Moisture control section: Dry for less than 30 consecutive days from June through October

Bw and Bwb horizons
Hue—10YR
Value—3 or 4 moist, 4 to 6 dry
Chroma—2 to 4 moist or dry
Fine-earth texture—ashy loamy sand, ashy sandy loam, or ashy coarse sandy loam
Rock fragment content—0 to 65 percent total, with 0 to 45 percent fine to coarse gravel, 0 to 20 percent cobbles, and 0 to 10 percent stones
Clay content—1 to 8 percent
Volcanic glass content—0 to 5 percent
Reaction—strongly acid to slightly acid
Thickness—50 to 80 centimeters

E and Eb horizons (where present)
Hue—10YR
Value—4 to 6 moist
Chroma—1 to 3 moist
Texture—ashy sandy loam, ashy fine sandy loam, or loamy sand
Reaction—very strongly acid to moderately acid
Thickness—2 to 5 centimeters

2BC horizon (where present) and 2BCb horizon
Hue—2.5Y or 10YR
Value—3 or 4 moist, 5 or 6 dry
Chroma—2 to 4 moist or dry
Fine-earth texture—loamy sand, loamy coarse sand, or loamy fine sand
Rock fragment content—35 to 85 percent total, with 35 to 50 percent fine to coarse gravel, 0 to 35 percent cobbles, and 0 to 10 percent stones
Clay content—0 to 5 percent
Volcanic glass content—0 to 5 percent
Reaction—moderately acid or slightly acid

Primus Series

Depth class: Very deep (more than 150 centimeters)
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high

Landscape: Mountains
Landform: Fan terraces on mountain valleys
Parent material: Volcanic ash and reworked glacial drift over alluvium and glacial drift
Slope range: 5 to 100 percent
Elevation: 530 to 2,210 meters
Mean annual precipitation: 700 to 1,600 millimeters
Mean annual air temperature: 2 to 6 degrees C
Frost-free period: 40 to 77 days

Taxonomic class: Ashy over sandy or sandy-skeletal, glassy over isotic Xeric Vitricryands

Typical Pedon

Primus gravelly ashy fine sandy loam (fig. 33) in an area of Stehekin-Primus-Stetattle complex, 35 to 100 percent slopes, on a fan terrace; North Cascades National Park Complex, Chelan County, Washington; 226 meters east and 318 meters north of the southwest corner of section 19, T. 34 N., R. 16 E.; Goode Mountain, Washington, U.S. Geological Survey quadrangle; latitude 48 degrees, 25 minutes, 43 seconds north and longitude 120 degrees, 54 minutes, 49 seconds west; UTM 654329 meters E., 5366039 meters N., zone 10; NAD 83.

Figure 33.—Typical profile of a Primus soil. Numerals on tape indicate centimeters.

Oi—0 to 1 centimeter; slightly decomposed plant material; abrupt smooth boundary.
Oe—1 to 3 centimeters; moderately decomposed plant material; abrupt smooth boundary.
Bw1—3 to 34 centimeters; dark yellowish brown (10YR 3/4) gravelly ashy fine sandy loam, yellowish brown (10YR 5/4) dry; moderate medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine and many medium and coarse roots throughout; 10 percent fine gravel, 15 percent medium and coarse gravel, and 5 percent cobbles; strongly acid (pH 5.5); clear wavy boundary.
Bw2—34 to 60 centimeters; dark yellowish brown (10YR 3/4) gravelly ashy fine sandy loam, yellowish brown (10YR 5/4) dry; moderate coarse subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine, fine, medium, and coarse roots throughout; 10 percent fine gravel, 15 percent medium and coarse gravel, and 5 percent cobbles; moderately acid (pH 5.7); clear wavy boundary.
2BC—60 to 84 centimeters; dark yellowish brown (10YR 3/4) extremely cobbly ashy sandy loam, yellowish brown (10YR 5/4) dry; single grain; loose, nonsticky and nonplastic; common very fine to coarse roots throughout; 15 percent fine gravel, 30 percent medium and coarse gravel, 25 percent cobbles, and 10 percent stones; moderately acid (pH 5.9); clear wavy boundary.
2C—84 to 150 centimeters; olive brown (2.5Y 4/4) extremely gravelly loamy sand, light olive brown (2.5Y 5/4) dry; single grain; loose, nonsticky and nonplastic; few very fine and fine roots throughout; 15 percent fine gravel, 35 percent medium and coarse gravel, 20 percent cobbles, and 5 percent stones; slightly acid (pH 6.1).

Range in Characteristics

Mean annual soil temperature: 4 to 8 degrees C
Moisture control section: Dry for 45 to 60 consecutive days from June through October
Thickness of volcanic ash mantle: 40 to 80 centimeters
Particle-size control section: Contrasting

A horizon (where present)
Hue—7.5YR or 10YR
Value—2 to 3 moist
Chroma—1 or 2 moist
Texture—ashy sandy loam or ashy fine sandy loam
Reaction—very strongly acid or strongly acid
Thickness—1 to 10 centimeters

Bw horizon
Hue—10YR
Value—3 to 5 moist, 4 to 6 dry
Chroma—3 or 4 moist or dry
Fine-earth texture—ashy fine sandy loam, ashy coarse sandy loam, or ashy sandy loam
Rock fragment content—0 to 30 percent total, with 0 to 30 percent fine to coarse gravel, 0 to 15 percent cobbles, and 0 to 5 percent stones
Clay content—3 to 8 percent
Volcanic glass content—20 to 60 percent
Reaction—strongly acid or moderately acid
Thickness—35 to 70 centimeters

2BC horizon
Hue—10YR
Value—3 to 5 moist, 4 to 6 dry

Chroma—3 or 4 moist or dry
Fine-earth texture—ashy loamy sand or ashy sandy loam
Rock fragment content—25 to 85 percent total, with 15 to 45 percent fine to coarse gravel, 10 to 60 percent cobbles, and 0 to 15 percent stones
Clay content—1 to 6 percent
Volcanic glass content—5 to 30 percent
Reaction—moderately acid or slightly acid
Thickness—10 to 30 centimeters

2C horizon
Hue—2.5Y or variegated
Value—3 to 5 moist, 5 or 6 dry
Chroma—3 or 4 moist or dry
Fine-earth texture—loamy sand or loamy coarse sand
Rock fragment content—35 to 85 percent total, with 15 to 60 percent fine to coarse gravel, 10 to 60 percent cobbles, and 0 to 10 percent stones
Clay content—0 to 6 percent
Volcanic glass content—0 to 20 percent
Reaction—moderately acid or slightly acid

Purple Series

Depth class: Very deep (more than 150 centimeters)
Drainage class: Very poorly drained
Capacity to transmit water (Ksat): High or very high
Landscape: Valleys
Landform: Depressions and flood plains
Parent material: Highly decomposed plant material over alluvium
Slope range: 0 to 5 percent
Elevation: 510 to 2,110 meters
Mean annual precipitation: 1,400 to 2,700 millimeters
Mean annual air temperature: 3 to 6 degrees C
Frost-free period: 30 to 60 days

Taxonomic class: Coarse-loamy over sandy or sandy-skeletal, isotic, acid Histic Cryaquepts

Typical Pedon

Purple mucky loam (fig. 34) in an area of Beaverpass-Purple-Bacon complex, 0 to 15 percent slopes, on a flood plain in Perry Creek Valley about 30 kilometers north of the town of Newhalem; North Cascades National Park Complex, Whatcom County, Washington; 350 meters west and 780 meters north of the southeast corner of section 24, T. 40 N., R. 12 E.; Mount Spickard, Washington, U.S. Geological Survey quadrangle; latitude 48 degrees, 56 minutes, 14 seconds north and longitude 121 degrees, 10 minutes, 39 seconds west; UTM 633471 meters E., 5422066 meters N., zone 10; NAD 83.

Oa—0 to 25 centimeters; highly decomposed plant material; common very fine and fine roots; gradual wavy boundary.
A1—25 to 45 centimeters; very dark brown (10YR 2/2) mucky loam, dark grayish brown (10YR 4/2) dry; moderate coarse subangular blocky structure; moderately hard, firm, slightly sticky and slightly plastic; common very fine and fine roots; 15 percent distinct strong brown (7.5YR 4/6) iron-manganese masses; very strongly acid (pH 5.0); clear wavy boundary.
A2—45 to 58 centimeters; very dark brown (10YR 2/2) mucky loam, dark grayish brown (10YR 4/2) dry; massive; moderately hard, firm, slightly sticky and

Figure 34.—Typical profile of a Purple soil. Numerals on tape indicate centimeters.

slightly plastic; few fine roots; 15 percent distinct strong brown (7.5YR 4/6) iron-manganese masses on faces of peds; very strongly acid (pH 5.0); clear wavy boundary.

C1—58 to 96 centimeters; dark gray (10YR 4/1) sandy loam, gray (10YR 6/1) dry; massive; moderately hard, firm, slightly sticky and slightly plastic; few fine roots; 25 percent distinct strong brown (7.5YR 4/6) iron-manganese masses and 25 percent distinct grayish brown (2.5Y 5/2) iron depletions; very strongly acid (pH 5.0); clear wavy boundary.

C2—96 to 150 centimeters; dark gray (10YR 4/1) loamy sand, gray (10YR 6/1) dry; massive; moderately hard, firm, slightly sticky and slightly plastic; few fine roots; 25 percent distinct strong brown (7.5YR 4/6) iron-manganese masses and 25 percent distinct grayish brown (2.5Y 5/2) iron depletions; very strongly acid (pH 5.0).

Range in Characteristics

Mean annual soil temperature: 4 to 7 degrees C

Moisture control section: Seasonal high water table at the soil surface for more than 30 consecutive days

Particle-size control section: Contrasting
Clay content: 0 to 15 percent
Rock fragment content (coarse-loamy part): 0 to 15 percent total, with 0 to 10 percent fine to coarse gravel and 0 to 5 percent cobbles
Rock fragment content (sandy or sandy-skeletal part): 0 to 60 percent total, with 0 to 30 percent fine to coarse gravel, 0 to 25 percent cobbles, and 0 to 10 percent stones

Oa horizon
Thickness—20 to 35 centimeters

A1 horizon
Hue—10YR or 2.5Y
Value—2 to 5 moist, 4 to 7 dry
Chroma—1 to 4 moist or dry
Fine-earth texture—mucky loam, mucky sandy loam, or mucky fine sandy loam
Rock fragment content—0 to 15 percent total, with 0 to 10 percent fine to coarse gravel and 0 to 5 percent cobbles
Reaction—very strongly acid or strongly acid
Thickness—10 to 35 centimeters

A2 horizon
Hue—10YR or 2.5Y
Value—2 to 5 moist, 4 to 7 dry
Chroma—1 to 4 moist or dry
Fine-earth texture—mucky loam, mucky sandy loam, or mucky fine sandy loam
Rock fragment content—0 to 20 percent total, with 0 to 15 percent fine to coarse gravel and 0 to 5 percent cobbles
Reaction—very strongly acid or strongly acid
Thickness—10 to 35 centimeters

C horizon
Hue—10YR or 2.5Y
Value—3 to 5 moist, 5 to 7 dry
Chroma—1 to 3 moist or dry
Fine-earth texture—sandy loam, loamy sand, or sand
Rock fragment content—0 to 60 percent total, with 0 to 30 percent fine to coarse gravel, 0 to 25 percent cobbles, and 0 to 10 percent stones
Reaction—very strongly acid or strongly acid
Combined thickness—45 to 110 centimeters

Ragged Series

Depth class: Very deep (more than 150 centimeters)
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high
Landscape: Mountains
Landform: Debris cones on mountain slopes
Parent material: Volcanic ash mixed with alluvium
Slope range: 0 to 100 percent
Elevation: 100 to 1,970 meters
Mean annual precipitation: 1,500 to 2,540 millimeters
Mean annual air temperature: 6 to 10 degrees C
Frost-free period: 60 to 90 days

Taxonomic class: Sandy-skeletal, isotic, frigid Vitrandic Dystrudepts

Typical Pedon

Ragged gravelly ashy loamy sand (fig. 35) in an area of Thorton-Ragged-Ledeir complex, 15 to 65 percent slopes, on a debris cone west of 39 Mile hiker camp; North Cascades National Park Complex, Whatcom County, Washington; section 5, T. 38 N., R. 13 E.; Mount Prophet, Washington, U.S. Geological Survey quadrangle; latitude 48 degrees, 48 minutes, 15 seconds north and longitude 121 degrees, 8 minutes, 41 seconds west; UTM 636232 meters E., 5407352 meters N., zone 10; NAD 83.

Oi—0 to 2 centimeters; slightly decomposed plant material; abrupt wavy boundary.
Oe—2 to 5 centimeters; moderately decomposed plant material; many very fine, fine, and medium and common coarse roots; abrupt wavy boundary.
Bw1—5 to 20 centimeters; dark brown (10YR 3/3) gravelly ashy loamy sand, brown (10YR 5/3) dry; single grain; loose, nonsticky and nonplastic; many very fine to coarse roots; 5 percent fine gravel and 10 percent medium and coarse gravel; strongly acid (pH 5.5); abrupt wavy boundary.
Bw2—20 to 34 centimeters; dark yellowish brown (10YR 3/4) ashy sandy loam, brown (10YR 5/3) dry; moderate fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine to coarse and few very coarse roots; 5 percent fine gravel; strongly acid (pH 5.5); clear irregular boundary.

Figure 35.—Typical profile of a Ragged soil. Numerals on tape indicate centimeters.

2C—34 to 150 centimeters; variegated extremely cobbly sand; single grain; loose, nonsticky and nonplastic; few very fine to coarse roots; 15 percent fine gravel, 15 percent medium and coarse gravel, 25 percent cobbles, and 15 percent stones; moderately acid (pH 6.0).

Range in Characteristics

Mean annual soil temperature: 6 to 8 degrees C
Moisture control section: Dry for less than 45 consecutive days from June through October
Reaction: Very strongly acid to slightly acid
Depth to lithologic discontinuity: 30 to 100 centimeters

Bw horizon
Hue—10YR, 7.5YR, or 2.5Y
Value—2 to 4 moist, 3 to 5 dry
Chroma—2 to 4 moist or dry
Fine-earth texture—sandy loam, coarse sandy loam, or loamy sand
Rock fragment content—5 to 60 percent total, with 0 to 25 percent fine gravel, 5 to 25 percent medium and coarse gravel, 0 to 20 percent cobbles, and 0 to 10 percent stones
Clay content—2 to 10 percent
Volcanic glass content—5 to 15 percent
Thickness—30 to 100 centimeters

BC horizon (where present)
Note—represents more gradual transition to the lithologic discontinuity
Hue—10YR or 2.5Y
Value—3 to 5 moist
Chroma—3 to 6 moist
Texture—sandy loam, coarse sandy loam, or loamy sand
Reaction—strongly acid or moderately acid
Thickness—30 to 50 centimeters

2C horizon
Hue—2.5Y or variegated
Value—3 to 5 moist, 4 to 6 dry
Chroma—3 to 6 moist or dry
Texture—loamy coarse sand or sand
Rock fragment content—35 to 80 percent total, with 10 to 30 percent fine gravel, 10 to 30 percent medium and coarse gravel, 10 to 35 percent cobbles, and 0 to 15 percent stones
Clay content—0 to 5 percent
Volcanic glass content—0 to 5 percent

Roland Series

Depth class: Very deep (more than 150 centimeters)
Drainage class: Somewhat poorly drained
Capacity to transmit water (Ksat): High or very high
Landscape: Mountains
Landform: Debris aprons on mountain slopes, fan terraces on mountain slopes, and terraces
Parent material: Volcanic ash and alluvium over glacial drift
Slope range: 0 to 25 percent
Elevation: 100 to 935 meters
Mean annual precipitation: 1,700 to 2,500 millimeters

Mean annual air temperature: 5 to 10 degrees C
Frost-free period: 60 to 90 days

Taxonomic class: Coarse-loamy, isotic, frigid Fluvaquentic Dystrudepts

Typical Pedon

Roland fine sandy loam (fig. 36) in an area of Roland-Skymo-Deerlick complex, 0 to 25 percent slopes; on a terrace about 3 kilometers southwest of the town of Newhalem; North Cascades National Park Complex, Whatcom County, Washington; 205 meters west and 520 meters south of the northeast corner of section 30, T. 37 N., R. 12 E.; Mount Triumph, Washington, U.S. Geological Survey quadrangle; latitude 48 degrees, 39 minutes, 54 seconds north and longitude 121 degrees, 17 minutes, 1 second west; UTM 626370 meters E., 5391655 meters N., zone 10; NAD 83.

Oe—0 to 3 centimeters; moderately decomposed leaves, twigs, and needles; few fine and medium roots; common fine and medium irregular pores; strongly acid (pH 5.5); abrupt smooth boundary.

A—3 to 17 centimeters; very dark brown (10YR 2/2) fine sandy loam, very dark grayish brown (10YR 3/2) dry; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and common fine and medium roots;

Figure 36.—Typical profile of a Roland soil. Numerals on tape indicate centimeters.

common fine and medium irregular pores; moderately acid (pH 5.6); abrupt wavy boundary.

Bg1—17 to 42 centimeters; dark yellowish brown (10YR 3/4) fine sandy loam, yellowish brown (10YR 5/4) dry; moderate medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and medium and few coarse roots; common fine and medium irregular pores; 10 percent medium faint irregular gray (10YR 6/1) iron depletions with clear boundaries in matrix and 20 percent medium faint irregular brown (7.5YR 4/4) masses of oxidized iron with clear boundaries in matrix; moderately acid (pH 5.7); clear smooth boundary.

Bg2—42 to 78 centimeters; brown (10YR 4/3) very fine sandy loam, brown (10YR 5/3) dry; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine and common fine and medium roots; common fine irregular pores; 25 percent medium faint irregular gray (10YR 6/1) iron depletions with clear boundaries in matrix and 35 percent medium faint irregular brown (7.5YR 4/4) masses of oxidized iron with clear boundaries in matrix; moderately acid (pH 5.8); abrupt smooth boundary.

Bg3—78 to 137 centimeters; grayish brown (2.5Y 5/2) loamy sand, light brownish gray (2.5Y 6/2) dry; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine and medium roots; common medium interstitial pores; 20 percent coarse distinct irregular gray (10YR 6/1) iron depletions with clear boundaries in matrix and 40 percent coarse distinct irregular brown (7.5YR 4/4) masses of oxidized iron with clear boundaries in matrix; moderately acid (pH 6.0); abrupt smooth boundary.

Bg4—137 to 152 centimeters; gray (10YR 6/1) sand, light gray (10YR 7/1) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few fine roots; common medium interstitial pores; 30 percent medium prominent irregular weakly cemented brown (7.5YR 4/4) masses of oxidized iron with diffuse boundaries in matrix and 70 percent medium distinct irregular gray (10YR 6/1) reduced matrix with diffuse boundaries throughout; moderately acid (pH 6.0).

Range in Characteristics

Mean annual soil temperature: 5 to 8 degrees C
Moisture control section: Dry 30 to 45 consecutive days
Depth to redoximorphic features: 20 to 46 centimeters from the mineral soil surface
Clay content: 0 to 10 percent
Rock fragment content: 0 to 30 percent total, with 0 to 30 percent fine to coarse gravel and 0 to 25 percent cobbles

A horizon
Hue—10YR or 7.5YR
Value—2 to 3 moist, 4 to 6 dry
Chroma—1 or 2 moist or dry
Fine-earth texture—fine sandy loam or sandy loam
Rock fragment content—0 to 15 percent fine to coarse gravel
Reaction—moderately acid or strongly acid
Thickness—5 to 20 centimeters

Bg horizon
Hue—10YR, 7.5YR, or 2.5Y
Value—3 to 6 moist, 4 to 7 dry
Chroma—2 to 4 moist or dry
Fine-earth texture—fine sandy loam, sandy loam, very fine sandy loam, sand, loamy sand, or coarse sandy loam
Rock fragment content—0 to 30 percent total, with 0 to 30 percent fine to coarse gravel and 0 to 25 percent cobbles

Reaction—moderately acid or strongly acid
Combined thickness—50 to 100 centimeters

Cg horizon (where present in lower part of profile)
Hue—2.5Y or variegated
Value—4 to 5 moist, 5 or 6 dry
Chroma—2 to 4 moist or dry
Fine-earth texture—sandy loam, coarse sandy loam, or loamy fine sand
Rock fragment content—0 to 30 percent total, with 0 to 30 percent fine to coarse gravel and 0 to 25 percent cobbles
Reaction—moderately acid or slightly acid

Sandalee Series

Depth class: Very deep (more than 150 centimeters)
Drainage class: Somewhat poorly drained
Capacity to transmit water (Ksat): High or very high
Landscape: River valleys
Landform: Stable flood plains and young terraces
Parent material: Alluvium
Slope range: 0 to 15 percent
Elevation: 215 to 1,400 meters
Mean annual precipitation: 600 to 1,200 millimeters
Mean annual air temperature: 5 to 10 degrees C
Frost-free period: 70 to 100 days

Taxonomic class: Coarse-loamy, isotic, frigid Fluvaquentic Dystroxerepts

Typical Pedon

Sandalee sandy loam (fig. 37) in an area of Sandalee-Kettling-Torment complex, 0 to 15 percent slopes, on a flood plain west of the Stehekin airstrip; North Cascades National Park Complex, Chelan County, Washington; 690 meters west and 535 meters north of the southeast corner of section 22, T. 33 N., R. 17 E.; Stehekin, Washington, U.S. Geological Survey quadrangle; latitude 48 degrees, 20 minutes, 34 seconds north and longitude 120 degrees, 43 minutes, 12 seconds west; UTM 668937 meters E., 5356910 meters N., zone 10; NAD 83.

Oi—0 to 2 centimeters; slightly decomposed plant material; abrupt wavy boundary.
A—2 to 11 centimeters; black (10YR 2/1) sandy loam, dark grayish brown (10YR 4/2) dry; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots throughout; very strongly acid (pH 5.0); abrupt wavy boundary.
Bw—11 to 40 centimeters; olive brown (2.5Y 4/3) fine sandy loam, light yellowish brown (2.5Y 6/3) dry; weak medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; few very fine, fine, and medium roots throughout; 5 percent fine gravel; strongly acid (pH 5.5); clear wavy boundary.
Bg1—40 to 56 centimeters; dark grayish brown (10YR 4/2) fine sandy loam, light brownish gray (10YR 6/2) dry; weak medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; few very fine to coarse roots throughout; many distinct medium gray (2.5Y 6/1) iron depletions with clear boundaries in matrix and many distinct medium dark yellowish brown (10YR 4/4) masses of oxidized iron with clear boundaries in matrix; 5 percent fine gravel; moderately acid (pH 5.7); clear wavy boundary.
Bg2—56 to 80 centimeters; dark grayish brown (10YR 4/2) fine sandy loam, light brownish gray (10YR 6/2) dry; weak medium subangular blocky structure; soft,

Figure 37.—Typical profile of a Sandalee soil. Numerals on tape indicate centimeters.

very friable, slightly sticky and slightly plastic; few very fine, fine, and medium roots throughout; common distinct medium gray (2.5Y 6/1) iron depletions with clear boundaries in matrix and many distinct medium dark yellowish brown (10YR 4/4) masses of oxidized iron with clear boundaries in matrix; 5 percent fine gravel; moderately acid (pH 5.8); clear wavy boundary.

Cg—80 to 150 centimeters; variegated loamy coarse sand; single grain; loose, nonsticky and nonplastic; common faint medium dark yellowish brown (10YR 4/4) masses of oxidized iron with diffuse boundaries in matrix and many faint medium dark grayish brown (2.5Y 4/2) iron depletions with diffuse boundaries in matrix; moderately acid (pH 5.9); 5 percent fine gravel.

Range in Characteristics

Mean annual soil temperature: 6 to 8 degrees C

Moisture control section: Dry for 60 to 90 consecutive days from June through October

A horizon

Hue—10YR or 7.5YR

Value—2 or 3 moist, 4 or 5 dry

Chroma—1 to 3 moist or dry

Fine-earth texture—sandy loam or fine sandy loam

Rock fragment content—0 to 10 percent total, with 0 to 10 percent fine to coarse gravel and 0 to 5 percent cobbles
Clay content—3 to 8 percent
Volcanic glass content—0 to 5 percent
Reaction—very strongly acid or strongly acid
Thickness—0 to 40 centimeters

Bw horizon
Hue—10YR or 2.5YR
Value—3 to 5 moist, 4 to 6 dry
Chroma—2 to 4 moist or dry
Fine-earth texture—sandy loam, fine sandy loam, or very fine sandy loam
Rock fragment content—0 to 15 percent total, with 0 to 10 percent fine to coarse gravel and 0 to 10 percent cobbles
Clay content—3 to 8 percent
Volcanic glass content—0 to 5 percent
Reaction—strongly acid or moderately acid
Thickness—0 to 40 centimeters

Bg horizon
Hue—10YR or 2.5Y
Value—3 to 5 moist, 4 to 6 dry
Chroma—2 to 4 moist or dry
Fine-earth texture—sandy loam, fine sandy loam, or loamy fine sand
Rock fragment content—0 to 15 percent total, with 0 to 10 percent fine to coarse gravel and 0 to 10 percent cobbles
Clay content—2 to 8 percent
Volcanic glass content—0 to 5 percent
Reaction—strongly acid to slightly acid
Thickness—30 to 100 centimeters

Cg horizon
Hue—2.5Y or variegated
Value—3 to 5 moist, 4 to 6 dry
Chroma—3 or 4 moist or dry
Fine-earth texture—loamy coarse sand, loamy sand, or coarse sand
Rock fragment content—0 to 35 percent total, with 0 to 25 percent fine to coarse gravel, 0 to 10 percent cobbles, and 0 to 5 percent stones
Clay content—0 to 6 percent
Volcanic glass content—0 to 5 percent
Reaction—moderately acid or slightly acid
Depth to restrictive feature—more than 150 centimeters

Sawtooth Series

Depth class: Moderately deep to lithic bedrock
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high
Landscape: Mountains
Landform: Bedrock benches on mountain slopes
Parent material: Volcanic ash over glacial drift
Slope range: 35 to 100 percent
Elevation: 335 to 1,900 meters
Mean annual precipitation: 1,700 to 2,500 millimeters
Mean annual air temperature: 5 to 10 degrees C
Frost-free period: 60 to 90 days

Taxonomic class: Loamy-skeletal, isotic, frigid Andic Dystroxerepts

Typical Pedon

Sawtooth gravelly ashy sandy loam (fig. 38) in an area of Farway-Sawtooth-Despair complex, 35 to 100 percent slopes; on a debris apron about 20 kilometers northeast of the town of Diablo; North Cascades National Park Complex, Whatcom County, Washington; 180 meters west and 720 meters north of the southeast corner of section 7, T. 39 N., R. 14 E.; Hozomeen Mountain, Washington, U.S. Geological Survey quadrangle; latitude 48 degrees, 52 minutes, 42 seconds north and longitude 121 degrees, 1 minute, 20 seconds west; UTM 645005 meters E., 5415840 meters N., zone 10; NAD 83.

Oi—0 to 3 centimeters; slightly decomposed plant material; common medium interstitial pores; abrupt wavy boundary.

A—3 to 15 centimeters; very dark brown (10YR 2/2) gravelly ashy sandy loam, dark yellowish brown (10YR 3/4) dry; weak coarse granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine and common medium and coarse roots; common fine and medium irregular pores; 5 percent fine gravel, 20 percent medium and coarse gravel, and 5 percent cobbles; strongly acid (pH 5.5); clear irregular boundary.

Figure 38.—Typical profile of a Sawtooth soil. Numerals on tape indicate centimeters.

Bw1—15 to 35 centimeters; dark yellowish brown (10YR 3/4) gravelly ashy sandy loam, dark yellowish brown (10YR 4/6) dry; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine to coarse roots; common fine and medium irregular pores; 5 percent fine gravel, 20 percent medium and coarse gravel, and 5 percent cobbles; moderately acid (pH 5.8); clear irregular boundary.

2Bw2—35 to 45 centimeters; dark yellowish brown (10YR 3/6) gravelly sandy loam, dark yellowish brown (10YR 4/6) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine to coarse roots; common fine and medium irregular pores; 5 percent fine gravel, 15 percent medium and coarse gravel, and 10 percent cobbles; moderately acid (pH 6.0); clear wavy boundary.

2BC—45 to 60 centimeters; dark olive brown (2.5Y 3/3) very cobbly loamy sand, light olive brown (2.5Y 5/4) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine and medium roots; common fine and medium interstitial pores; 10 percent fine gravel, 15 percent medium and coarse gravel, and 30 percent cobbles; slightly acid (pH 6.1); abrupt irregular boundary.

2R—60 to 85 centimeters; metavolcanic rock.

Range in Characteristics

Mean annual soil temperature: 5 to 8 degrees C

Moisture control section: Dry 60 to 90 consecutive days

Clay content: 0 to 10 percent

Rock fragment content: 35 to 55 percent total, with 15 to 45 percent fine to coarse gravel, 5 to 35 percent cobbles, and 0 to 15 percent stones

Thickness of volcanic ash mantle (ashy textural modifier): 18 to 35 centimeters

Depth to bedrock (lithic contact): 50 to 100 centimeters from the mineral soil surface

A horizon

Hue—10YR or 7.5YR

Value—2 to 3 moist, 3 or 4 dry

Chroma—1 to 4 moist or dry

Fine-earth texture—ashy sandy loam or ashy fine sandy loam

Rock fragment content—0 to 30 percent total, with 0 to 30 percent fine to coarse gravel and 0 to 15 percent cobbles

Volcanic glass content—35 to 80 percent

Reaction—strongly acid or moderately acid

Thickness—5 to 20 centimeters

Bw horizon

Hue—10YR or 7.5YR

Value—3 to 5 moist, 4 to 6 dry

Chroma—3 to 6 moist or dry

Fine-earth texture—ashy sandy loam or ashy fine sandy loam

Rock fragment content—0 to 30 percent total, with 0 to 30 percent fine to coarse gravel and 0 to 15 percent cobbles

Volcanic glass content—15 to 70 percent

Reaction—moderately acid or strongly acid

Thickness—15 to 30 centimeters

2Bw horizon

Hue—10YR or 7.5YR

Value—3 or 4 moist, 4 to 5 dry

Chroma—3 to 6 moist or dry

Fine-earth texture—sandy loam, coarse sandy loam, or fine sandy loam

Rock fragment content—30 to 60 percent total, with 15 to 45 percent gravel, 5 to 35 percent cobbles, and 0 to 15 percent stones
Volcanic glass content—5 to 15 percent
Reaction—moderately acid or strongly acid
Thickness—15 to 35 centimeters

2BC horizon
Hue—2.5Y or 10YR
Value—3 or 4 moist, 4 to 5 dry
Chroma—2 to 4 moist or dry
Fine-earth texture—loamy sand, coarse sandy loam, sandy loam, or loamy fine sand
Rock fragment content—35 to 60 percent total, with 15 to 50 percent fine to coarse gravel, 5 to 35 percent cobbles, and 0 to 15 percent stones
Volcanic glass content—5 to 15 percent
Reaction—slightly acid or moderately acid

Skymo Series

Depth class: Very deep (more than 150 centimeters)
Drainage class: Moderately well drained
Capacity to transmit water (Ksat): High or very high
Landscape: Mountains
Landform: Debris cones on mountain slopes
Parent material: Volcanic ash mixed with alluvium
Slope range: 0 to 25 percent
Elevation: 100 to 935 meters
Mean annual precipitation: 1,500 to 2,540 millimeters
Mean annual air temperature: 6 to 10 degrees C
Frost-free period: 60 to 90 days

Taxonomic class: Sandy, isotic, frigid Oxyaquic Udifluvents

Typical Pedon

Skymo coarse sand (fig. 39) in an area of Roland-Skymo-Deerlick complex, 0 to 25 percent slopes; on a flood plain about 8 kilometers southwest of the town of Newhalem; North Cascades National Park Complex, Skagit County, Washington; 290 meters west and 25 meters south of the northeast corner of section 11, T. 36 N., R. 11 E.; Mount Triumph, Washington, U.S. Geological Survey quadrangle; latitude 48 degrees, 37 minutes, 39 seconds north and longitude 121 degrees, 19 minutes, 57 seconds west; UTM 622865 meters E., 5387420 meters N., zone 10; NAD 83.

Oi—0 to 2 centimeters; slightly decomposed leaves, twigs, and needles; common medium irregular pores; abrupt wavy boundary.
C—2 to 10 centimeters; grayish brown (2.5Y 5/2) coarse sand, light brownish gray (2.5Y 6/2) dry; single grain; loose, nonsticky and nonplastic; few very fine and medium roots; many fine and medium interstitial pores; strongly acid (pH 5.5); abrupt wavy boundary.
Ab—10 to 16 centimeters; dark grayish brown (10YR 4/2) loamy sand, grayish brown (10YR 5/2) dry; weak fine subangular blocky structure; loose, nonsticky and nonplastic; many very fine and common fine to coarse roots; common fine and medium irregular pores; strongly acid (pH 5.1); abrupt wavy boundary.
C′—16 to 34 centimeters; light olive brown (2.5Y 5/3) sand, light yellowish brown (2.5Y 6/3) dry; single grain; loose, nonsticky and nonplastic; many very fine and fine and common medium and coarse roots; common fine and medium interstitial pores; strongly acid (pH 5.2); abrupt irregular boundary.

Figure 39.—Typical profile of a Skymo soil. Numerals on tape indicate centimeters.

Ab′—34 to 40 centimeters; very dark grayish brown (10YR 3/2) sandy loam, grayish brown (10YR 5/2) dry; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine and common fine to coarse roots; common fine and medium irregular pores; strongly acid (pH 5.1); abrupt wavy boundary.

Bwb1—40 to 45 centimeters; dark olive brown (2.5Y 3/3) loamy sand, light olive brown (2.5Y 5/3) dry; weak fine subangular blocky structure; loose, nonsticky and nonplastic; few very fine and fine and common medium and coarse roots; many fine and medium interstitial pores; strongly acid (pH 5.2); clear wavy boundary.

Bwb2—45 to 66 centimeters; very dark grayish brown (10YR 3/2) loamy sand, grayish brown (10YR 5/2) dry; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; few coarse and very fine and fine and common medium roots; common fine and medium irregular pores; strongly acid (pH 5.5); clear wavy boundary.

Bwb3—66 to 90 centimeters; very dark grayish brown (2.5Y 3/2) loamy sand, grayish brown (2.5Y 5/2) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine to coarse roots; common fine and medium irregular pores; 10 percent fine faint irregular grayish brown (2.5Y 5/2) iron

depletions with sharp boundaries in matrix and 20 percent medium faint irregular yellowish brown (10YR 5/4) masses of oxidized iron with clear boundaries in matrix; moderately acid (pH 5.6); clear irregular boundary.

C″—90 to 152 centimeters; dark olive brown (2.5Y 3/3) gravelly sand, light olive brown (2.5Y 5/3) dry; single grain; loose, nonsticky and nonplastic; few very fine and medium roots; common medium and coarse interstitial pores; 10 percent fine faint irregular grayish brown (2.5Y 5/2) iron depletions with sharp boundaries in matrix and 30 percent medium faint irregular yellowish brown (10YR 5/4) masses of oxidized iron with clear boundaries in matrix; 5 percent rounded fine gravel, 15 percent rounded medium and coarse gravel, and 10 percent rounded cobbles; slightly acid (pH 6.1).

Range in Characteristics

Mean annual soil temperature: 5 to 8 degrees C
Moisture control section: Dry 30 to 45 consecutive days
Depth to redoximorphic concentrations: 50 to 100 centimeters
Clay content: 0 to 8 percent
Rock fragment content: 0 to 30 percent total, with 0 to 30 percent fine to coarse gravel and 0 to 25 percent cobbles

C horizon
Hue—2.5Y, 10YR, or variegated
Value—3 to 5 moist, 4 to 6 dry
Chroma—2 to 4 moist or dry
Fine-earth texture—coarse sand or sand
Rock fragment content—0 to 10 percent fine gravel
Reaction—strongly acid or moderately acid
Thickness—5 to 15 centimeters (may be absent in some pedons)

Ab and Ab′ horizons
Hue—10YR or 7.5YR
Value—3 or 4 moist, 4 to 5 dry
Chroma—2 to 3 moist or dry
Fine-earth texture—sandy loam, loamy sand, sand, or loamy fine sand
Rock fragment content—0 to 30 percent total, with 0 to 30 percent fine to coarse gravel and 0 to 15 percent cobbles
Reaction—strongly acid or moderately acid
Thickness—2 to 15 centimeters

C′ and C″ horizons
Hue—2.5Y or variegated
Value—3 to 5 moist, 4 to 6 dry
Chroma—2 to 4 moist or dry
Fine-earth texture—sand, coarse sand, loamy sand, or loamy coarse sand
Rock fragment content—0 to 30 percent total, with 0 to 30 percent fine to coarse gravel and 0 to 15 percent cobbles
Reaction—strongly acid or moderately acid
Thickness—typically 5 to 25 centimeters, but ranges to 70 centimeters

Bwb horizon
Hue—10YR or 2.5Y
Value—3 to 5 moist, 4 to 6 dry
Chroma—2 to 4 moist or dry
Fine-earth texture—loamy sand, loamy coarse sand, coarse sand, or sand
Rock fragment content—0 to 30 percent total, with 0 to 30 percent fine to coarse gravel and 0 to 15 percent cobbles
Reaction—moderately acid or strongly acid

Spickard Series

Depth class: Very deep (more than 150 centimeters)
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high
Landscape: Mountains
Landform: Valley walls of mountain slopes
Parent material: Volcanic ash over glacial drift
Slope range: 5 to 100 percent
Elevation: 265 to 2,265 meters
Mean annual precipitation: 1,800 to 3,300 millimeters
Mean annual air temperature: 2 to 6 degrees C
Frost-free period: 30 to 60 days

Taxonomic class: Ashy over sandy or sandy-skeletal, amorphic over isotic Typic Vitricryands

Typical Pedon

Spickard ashy sandy loam (fig. 40) in an area of Spickard-Tepeh-Maggib complex, 15 to 100 percent slopes, on a debris apron about 21 kilometers southeast of the town of Newhalem; North Cascades National Park Complex, Skagit County, Washington; 550 meters east and 675 meters north of the southwest corner of section 28, T. 36 N., R. 14 E.; Mount Logan, Washington, U.S. Geological Survey quadrangle; latitude 48 degrees, 34 minutes, 34 seconds north and longitude 120 degrees, 59 minutes, 44 seconds west; UTM 647840 meters E., 5382280 meters N., zone 10; NAD 83.

Oi—0 to 3 centimeters; slightly decomposed leaves, needles, and twigs; abrupt smooth boundary.
Oe—3 to 10 centimeters; black (10YR 2/1) moderately decomposed needles and twigs, dark gray (10YR 4/1) dry; many very fine and fine roots; common fine irregular pores; extremely acid (pH 4.4); abrupt wavy boundary.
A—10 to 13 centimeters; very dark gray (10YR 3/1) ashy sandy loam, dark gray (10YR 4/1) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine and few medium roots; common fine irregular pores; 5 percent gravel; extremely acid (pH 4.4); abrupt wavy boundary.
Bw1—13 to 22 centimeters; dark brown (7.5YR 3/4) gravelly ashy sandy loam, brown (7.5YR 4/4) dry; moderate fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine and common medium and coarse roots; common fine and medium irregular pores; 20 percent gravel and 10 percent cobbles; strongly acid (pH 5.1); clear wavy boundary.
Bw2—22 to 44 centimeters; dark yellowish brown (10YR 4/4) gravelly ashy sandy loam, light yellowish brown (10YR 6/4) dry; moderate medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and few medium and coarse roots; common fine and medium irregular pores; 5 percent fine gravel, 15 percent medium and coarse gravel, and 10 percent cobbles; strongly acid (pH 5.2); clear irregular boundary.
Bw3—44 to 60 centimeters; dark yellowish brown (10YR 3/4) gravelly ashy sandy loam, yellowish brown (10YR 5/4) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine and medium roots; common fine and medium interstitial pores; 5 percent fine gravel, 15 percent medium and coarse gravel, and 10 percent cobbles; strongly acid (pH 5.5); gradual irregular boundary.
2BC—60 to 105 centimeters; dark olive brown (2.5Y 3/3) very cobbly loamy sand, light olive brown (2.5Y 5/3) dry; single grain; loose, nonsticky and nonplastic; few very fine and fine roots; common medium interstitial pores; 5 percent fine gravel,

Figure 40.—Typical profile of a Spickard soil. Numerals on tape indicate centimeters.

20 percent medium and coarse gravel, 20 percent cobbles, and 10 percent stones; moderately acid (pH 5.7); gradual irregular boundary.

2C—105 to 152 centimeters; dark grayish brown (2.5Y 4/2) very stony loamy sand, grayish brown (2.5Y 5/2) dry; single grain; loose, nonsticky and nonplastic; few fine roots; many coarse interstitial pores; 5 percent fine gravel, 20 percent medium and coarse gravel, 10 percent cobbles, and 20 percent stones; moderately acid (pH 6.0).

Range in Characteristics

Mean annual soil temperature: 4 to 8 degrees C
Moisture control section: Dry less than 30 consecutive days
Particle-size control section: Contrasting
Clay content: 0 to 10 percent throughout
Rock fragment content (ashy part): 5 to 30 percent total, with 5 to 30 percent fine to coarse gravel, 0 to 10 percent cobbles, and 0 to 5 percent stones
Rock fragment content (sandy-skeletal part): 35 to 55 percent total, with 15 to 50 percent fine to coarse gravel, 10 to 30 percent cobbles, and 0 to 30 percent stones
Thickness of volcanic ash mantle (ashy textural modifier): 36 to 75 centimeters

A horizon
Hue—10YR or 7.5YR
Value—2 to 3 moist, 4 to 5 dry
Chroma—1 to 3 moist or dry
Fine-earth texture—ashy sandy loam or ashy fine sandy loam
Rock fragment content—0 to 15 percent fine to coarse gravel
Volcanic glass content—35 to 80 percent
Reaction—extremely acid to strongly acid
Thickness—0 to 10 centimeters (absent in some pedons)

Bw horizon
Hue—7.5YR or 10YR
Value—3 to 5 moist, 4 to 6 dry
Chroma—3 to 6 moist or dry
Fine-earth texture—ashy sandy loam or ashy fine sandy loam
Rock fragment content—5 to 30 percent total, with 5 to 30 percent gravel, 0 to 15 percent cobbles, and 0 to 5 percent stones
Volcanic glass content—15 to 70 percent
Reaction—very strongly acid or strongly acid
Combined thickness—35 to 85 centimeters

2BC horizon
Hue—2.5Y or 10YR
Value—3 to 5 moist, 5 or 6 dry
Chroma—3 to 6 moist or dry
Fine-earth texture—loamy sand, loamy coarse sand, coarse sand, or sand
Rock fragment content—35 to 55 percent total, with 15 to 50 percent fine to coarse gravel, 10 to 30 percent cobbles, and 0 to 30 percent stones
Volcanic glass content—5 to 15 percent
Reaction—moderately acid or strongly acid
Thickness—15 to 50 centimeters

2C horizon
Hue—2.5Y or 10YR
Value—3 to 5 moist, 5 or 6 dry
Chroma—2 to 4 moist or dry
Fine-earth texture—loamy sand, loamy coarse sand, coarse sand, or sand
Rock fragment content—35 to 55 percent total, with 15 to 50 percent fine to coarse gravel, 10 to 30 percent cobbles, and 0 to 30 percent stones
Reaction—moderately acid or strongly acid

Stehekin Series

Depth class: Very deep (more than 150 centimeters)
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high
Landscape: Mountains
Landform: Debris aprons on mountain slopes, debris cones on mountain slopes, and valley walls of mountain slopes
Parent material: Mixed volcanic ash over colluvium and glacial drift
Slope range: 5 to 100 percent
Elevation: 530 to 2,210 meters
Mean annual precipitation: 1,000 to 1,700 millimeters
Mean annual air temperature: 4 to 6 degrees C
Frost-free period: 40 to 75 days

Taxonomic class: Loamy-skeletal, isotic Vitrixerandic Dystrocryepts

Typical Pedon

Stehekin ashy sandy loam (fig. 41) in an area of Stehekin-Primus-Stetattle complex, 35 to 100 percent slopes, on a debris apron of a valley wall below Goode Glacier; North Cascades National Park Complex, Chelan County, Washington; 615 meters west and 330 meters north of the southeast corner of section 29, T. 35 N., R. 16 E.; Goode Mountain, Washington, U.S. Geological Survey quadrangle; latitude 48 degrees, 30 minutes, 4 seconds north and longitude 120 degrees, 53 minutes, 31 seconds west; UTM 655726 meters E., 5374168 meters N., zone 10; NAD 83.

A—0 to 18 centimeters; dark yellowish brown (10YR 3/4) ashy sandy loam, yellowish brown (10YR 5/4) dry; moderate coarse subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common very fine and fine and few medium roots; common fine and medium irregular pores; 10 percent gravel; very strongly acid (pH 5.0); clear wavy boundary.

Bw—18 to 44 centimeters; dark yellowish brown (10YR 4/4) very cobbly sandy loam, light yellowish brown (10YR 6/4) dry; moderate fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common very fine and medium

Figure 41.—Typical profile of a Stehekin soil. Numerals on tape indicate centimeters.

roots; common fine and medium irregular pores; 15 percent gravel, 15 percent cobbles, and 10 percent stones; very strongly acid (pH 5.0); gradual wavy boundary.

BC—44 to 109 centimeters; dark yellowish brown (10YR 4/4) very stony sandy loam, light yellowish brown (10YR 6/4) dry; moderate fine subangular blocky structure; moderately hard, firm, nonsticky and nonplastic; few very fine and medium roots; common fine and medium irregular pores; 20 percent gravel, 10 percent cobbles, and 10 percent stones; strongly acid (pH 5.1); gradual wavy boundary.

C—109 to 152 centimeters; light olive brown (2.5Y 5/4) very stony sandy loam, light yellowish brown (2.5Y 6/4) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few fine roots; common fine and medium irregular pores; 20 percent gravel, 20 percent cobbles, and 10 percent stones; strongly acid (pH 5.4).

Range in Characteristics

Mean annual soil temperature: 4 to 7 degrees C
Moisture control section: Dry for 45 to 60 consecutive days
Clay content: 0 to 10 percent throughout
Rock fragment content: 35 to 75 percent total, with 15 to 50 percent gravel, 10 to 40 percent cobbles, and 0 to 30 percent stones

A horizon
Hue—10YR or 7.5YR
Value—2 to 4 moist, 4 to 6 dry
Chroma—1 to 3 moist or dry
Fine-earth texture—ashy sandy loam or ashy fine sandy loam
Rock fragments—10 to 35 percent total, with 5 to 25 percent gravel and 0 to 20 percent cobbles
Volcanic glass content—10 to 25 percent
Reaction—very strongly acid or strongly acid
Thickness—10 to 20 centimeters

E horizon (where present)
Hue—7.5YR or 10YR
Value—4 or 5 moist
Chroma—1 or 2 moist
Texture—ashy sandy loam or ashy coarse sandy loam
Reaction—very strongly acid or strongly acid
Thickness—1 to 8 centimeters

Bw horizon
Hue—10YR or 7.5YR
Value—3 to 5 moist, 4 to 6 dry
Chroma—3 to 6 moist or dry
Fine-earth texture—sandy loam, fine sandy loam, or coarse sandy loam
Rock fragment content—25 to 75 percent total, with 10 to 45 percent gravel, 5 to 40 percent cobbles, and 0 to 10 percent stones
Volcanic glass content—5 to 15 percent
Reaction—very strongly acid or strongly acid
Thickness—10 to 40 centimeters

BC horizon
Hue—10YR or 2.5Y
Value—3 to 5 moist, 4 to 6 dry
Chroma—3 or 4 moist or dry

Fine-earth texture—sandy loam, fine sandy loam, or coarse sandy loam
Rock fragment content—35 to 75 percent total, with 15 to 50 percent gravel, 5 to 40 percent cobbles, and 0 to 10 percent stones
Volcanic glass content—5 to 15 percent
Reaction—strongly acid or moderately acid
Thickness—20 to 70 centimeters

C horizon
Hue—2.5Y
Value—3 to 5 moist, 5 to 7 dry
Chroma—2 to 6 moist or dry
Fine earth texture—sandy loam, coarse sandy loam, or loamy sand
Rock fragment content—35 to 75 percent total, with 10 to 50 percent gravel, 5 to 40 percent cobbles, and 0 to 30 percent stones
Reaction—strongly acid or moderately acid

Stetattle Series

Depth class: Very deep (more than 150 centimeters)
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high
Landscape: Mountains
Landform: Valley walls and ridges on mountain slopes
Parent material: Volcanic ash mixed with glacial drift
Slope range: 5 to 100 percent
Elevation: 290 to 2,265 meters
Mean annual precipitation: 1,800 to 3,300 millimeters
Mean annual air temperature: 2 to 5 degrees C
Frost-free period: 30 to 60 days

Taxonomic class: Medial-skeletal, amorphic Pachic Fulvicryands

Typical Pedon

Stetattle very stony medial fine sandy loam (fig. 42) in an area of Stetattle-Doubtful-Arriva complex, 15 to 100 percent slopes, on a valley wall about 20 meters downslope of South Pass trail; North Cascades National Park Complex, Chelan County, Washington; section 30, T. 34 N., R. 18 E.; McAlester Mountain, Washington, U.S. Geological Survey quadrangle; latitude 48 degrees, 25 minutes, 16 seconds north and longitude 120 degrees, 39 minutes, 21 seconds west; UTM 673424 meters E., 5365772 meters N., zone 10; NAD 83.

A1—0 to 12 centimeters; black (10YR 2/1) very stony medial fine sandy loam, very dark brown (10YR 2/2) dry; weak medium granular structure; soft, very friable, nonsticky and nonplastic; many very fine to coarse roots; 5 percent fine gravel, 5 percent medium and coarse gravel, 10 percent cobbles, and 20 percent stones; extremely acid (pH 4.4); clear wavy boundary.
A2—12 to 30 centimeters; black (10YR 2/1) extremely stony medial fine sandy loam, dark brown (10YR 3/3) dry; moderate fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common very fine and fine, many medium, and few coarse roots; 15 percent fine gravel, 15 percent medium and coarse gravel, 10 percent cobbles, and 20 percent stones; very strongly acid (pH 4.8); clear wavy boundary.
A3—30 to 55 centimeters; black (10YR 2/1) extremely stony medial sandy loam, dark brown (10YR 3/3) dry; moderate medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common very fine and fine roots and few medium roots; 10 percent fine gravel, 25 percent medium and coarse gravel,

Figure 42.—Typical profile of a Stetattle soil. Numerals on tape indicate centimeters.

15 percent cobbles, and 35 percent stones; very strongly acid (pH 4.6); clear wavy boundary.

Bw—55 to 100 centimeters; very dark brown (10YR 2/2) extremely stony medial sandy loam, dark yellowish brown (10YR 4/4) dry; moderate medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots; 10 percent fine gravel, 20 percent medium and coarse gravel, 15 percent cobbles, and 40 percent stones; very strongly acid (pH 4.7); clear wavy boundary.

2C—100 to 150 centimeters; dark olive brown (2.5Y 3/3) fragmental material with sand in interstices between rock fragments, olive brown (2.5Y 4/3) dry; single grain; 15 percent fine gravel, 25 percent medium and coarse gravel, 30 percent cobbles, and 20 percent stones.

Range in Characteristics

Mean annual soil temperature: 4 to 7 degrees C

Moisture control section: Dry for less than 30 consecutive days from June through October

Thickness of material with andic soil properties: 90 to 120 centimeters

A horizon
Hue—7.5YR or 10YR
Value—2 to 3 moist, 3 or 4 dry
Chroma—1 to 3 moist or dry
Fine-earth texture—medial loam, medial fine sandy loam, or medial sandy loam
Rock fragment content—10 to 85 percent total, with 10 to 35 percent fine to coarse gravel, 5 to 25 percent cobbles, and 5 to 50 percent stones
Clay content—3 to 10 percent
Volcanic glass content—30 to 60 percent
Reaction—extremely acid to strongly acid
Thickness—50 to 120 centimeters

Bw horizon
Hue—7.5YR or 10YR
Value—2 to 4 moist, 4 to 5 dry
Chroma—2 to 6 moist or dry
Fine-earth texture—medial fine sandy loam, medial sandy loam, or loamy sand
Rock fragment content—40 to 85 percent total, with 10 to 35 percent fine to coarse gravel, 10 to 40 percent cobbles, and 5 to 50 percent stones
Clay content—1 to 8 percent
Volcanic glass content—5 to 50 percent
Reaction—very strongly acid or moderately acid
Thickness—0 to 70 centimeters

2C horizon
Hue—2.5Y or 10YR
Value—3 to 5 moist, 4 to 6 moist
Chroma—3 or 4 moist or dry
Fine-earth texture—loamy sand, loamy coarse sand, or sand
Rock fragment content—50 to 90 percent total, with 20 to 40 percent fine to coarse gravel, 15 to 40 percent cobbles, and 10 to 30 percent stones
Clay content—0 to 4 percent
Volcanic glass content—0 to 10 percent
Reaction—strongly acid to slightly acid

Tepeh Series

Depth class: Very deep (more than 150 centimeters)
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high
Landscape: Mountains
Landform: Valley walls of mountain slopes
Parent material: Volcanic ash over glacial drift
Slope range: 15 to 100 percent
Elevation: 265 to 2,165 meters
Mean annual precipitation: 1,800 to 3,300 millimeters
Mean annual air temperature: 3 to 7 degrees C
Frost-free period: 30 to 60 days

Taxonomic class: Loamy-skeletal, isotic Andic Dystrocryepts

Typical Pedon

Tepeh ashy sandy loam (fig. 43) in an area of Spickard-Tepeh-Maggib complex, 15 to 100 percent slopes, on a valley wall about 12 kilometers north of the town of Stehekin, below McAlester Pass; North Cascades National Park Complex, Chelan County, Washington; 15 meters west and 700 meters north of the southeast corner of

Figure 43.—Typical profile of a Tepeh soil. Numerals on tape indicate centimeters.

section 25, T. 34 N., R. 17 E.; McAlester Mountain, Washington, U.S. Geological Survey quadrangle; latitude 48 degrees, 25 minutes, 3 seconds north and longitude 120 degrees, 39 minutes, 58 seconds west; UTM 672670 meters E., 5365340 meters N., zone 10; NAD 83.

Oi—0 to 2 centimeters; slightly decomposed twigs, needles, and leaves; abrupt smooth boundary.

Oe—2 to 5 centimeters; dark brown (7.5YR 3/2) moderately decomposed twigs and needles, brown (7.5YR 5/2) dry; many very fine and fine and few medium and coarse roots; common medium interstitial pores; very strongly acid (pH 4.5); abrupt smooth boundary.

E—5 to 8 centimeters; very dark grayish brown (10YR 3/2) ashy sandy loam, grayish brown (10YR 5/2) dry; weak medium granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine, common medium, and few coarse roots at top of horizon; common fine interstitial pores; 5 percent gravel and 5 percent cobbles; very strongly acid (pH 4.5); abrupt wavy boundary.

Bw1—8 to 30 centimeters; dark yellowish brown (10YR 4/4) gravelly ashy sandy loam, light yellowish brown (10YR 6/4) dry; moderate medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine and medium and few coarse and very coarse roots; common fine and medium irregular pores; 10 percent fine gravel, 15 percent medium and coarse gravel, and 5 percent cobbles; very strongly acid (pH 4.8); clear wavy boundary.

2Bw2—30 to 70 centimeters; dark yellowish brown (10YR 3/4) very gravelly sandy loam, brown (10YR 4/3) dry; moderate medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few very fine and medium roots; common fine and medium irregular pores; 10 percent fine gravel, 25 percent medium and coarse gravel, 10 percent cobbles, and 5 percent stones; strongly acid (pH 5.1); clear wavy boundary.
2Bw3—70 to 92 centimeters; dark yellowish brown (10YR 3/4) very gravelly sandy loam, brown (10YR 4/3) dry; single grain; loose, nonsticky and nonplastic; few very fine and fine roots; common medium and coarse interstitial pores; 10 percent fine gravel, 25 percent medium and coarse gravel, 15 percent cobbles, and 5 percent stones; strongly acid (pH 5.2); abrupt wavy boundary.
2BC—92 to 152 centimeters; olive brown (2.5Y 4/3) extremely cobbly loamy sand, light yellowish brown (2.5Y 6/3) dry; single grain; loose, nonsticky and nonplastic; few fine roots; many coarse interstitial pores; 15 percent fine gravel, 30 percent medium and coarse gravel, 20 percent cobbles, and 10 percent stones; moderately acid (pH 5.8).

Range in Characteristics

Mean annual soil temperature: 4 to 8 degrees C
Moisture control section: Dry less than 30 consecutive days
Clay content: 0 to 10 percent
Rock fragment content: 35 to 75 percent total, with 15 to 65 percent fine to coarse gravel, 10 to 30 percent cobbles, and 0 to 30 percent stones
Thickness of volcanic ash mantle (ashy textural modifier): 18 to 35 centimeters

A horizon (where present instead of E or Bw horizon)
Hue—7.5YR or 10YR
Value—2 to 3 moist
Chroma—1 to 3 moist
Texture—ashy sandy loam or ashy fine sandy loam
Reaction—very strongly acid or strongly acid
Thickness—2 to 20 centimeters

E horizon
Hue—10YR or 7.5YR
Value—3 or 4 moist, 4 to 5 dry
Chroma—1 or 2 moist or dry
Fine-earth texture—ashy sandy loam or ashy fine sandy loam
Rock fragment content—0 to 15 percent fine to coarse gravel
Volcanic glass content—35 to 80 percent
Reaction—extremely acid or very strongly acid
Thickness—0 to 5 centimeters (absent in some pedons)

Bw horizon
Hue—10YR or 7.5YR
Value—3 to 5 moist, 4 to 6 dry
Chroma—2 to 4 moist or dry
Fine-earth texture—ashy sandy loam or ashy fine sandy loam
Rock fragment content—15 to 55 percent total, with 15 to 55 percent gravel, 0 to 15 percent cobbles, and 0 to 10 percent stones
Volcanic glass content—15 to 70 percent
Reaction—very strongly acid or strongly acid
Thickness—15 to 35 centimeters

2Bw horizon
Hue—10YR or 2.5Y
Value—3 to 5 moist, 4 to 6 dry

Chroma—2 to 4 moist or dry
Fine-earth texture—sandy loam, coarse sandy loam, or loamy fine sand
Rock fragment content—35 to 75 percent total, with 25 to 55 percent gravel, 10 to 25 percent cobbles, and 0 to 25 percent stones
Volcanic glass content—5 to 15 percent
Reaction—moderately acid or strongly acid
Combined thickness—30 to 80 centimeters

2BC horizon
Hue—2.5Y or 10YR
Value—4 to 5 moist, 5 or 6 dry
Chroma—2 to 4 moist or dry
Fine-earth texture—loamy sand, coarse sandy loam, sandy loam, or loamy fine sand
Rock fragment content—35 to 75 percent total, with 25 to 55 percent gravel, 10 to 25 percent cobbles, and 0 to 25 percent stones
Volcanic glass content—0 to 5 percent
Reaction—moderately acid or strongly acid
Depth to restrictive feature—more than 150 centimeters

Terror Series

Depth class: Very deep (more than 150 centimeters)
Drainage class: Moderately well drained
Capacity to transmit water (Ksat): High or very high
Landscape: Mountains
Landform: Flood plains, valley walls of mountain slopes, and terraces
Parent material: Mixed volcanic ash over glacial drift and colluvium
Slope range: 0 to 35 percent
Elevation: 265 to 2,310 meters
Mean annual precipitation: 1,400 to 2,500 millimeters
Mean annual air temperature: 2 to 7 degrees C
Frost-free period: 30 to 60 days

Taxonomic class: Ashy over loamy, amorphic over isotic Andic Dystrocryepts

Typical Pedon

Terror ashy sandy loam (fig. 44) in an area of Chilliwack-Perfect-Terror complex, 15 to 65 percent slopes, on a valley wall about 12 kilometers northwest of the town of Stehekin; North Cascades National Park Complex, Chelan County, Washington; 725 meters west and 710 meters north of the southeast corner of section 33, T. 34 N., R. 17 E.; McAlester Mountain, Washington, U.S. Geological Survey quadrangle; latitude 48 degrees, 24 minutes, 10 seconds north and longitude 120 degrees, 44 minutes, 31 seconds west; UTM 667126 meters E., 5363556 meters N., zone 10; NAD 83.

Oe—0 to 5 centimeters; moderately decomposed plant material; common very fine and fine and many medium roots; abrupt wavy boundary.
Oa—5 to 8 centimeters; highly decomposed plant material; common very fine and fine and many medium roots; abrupt wavy boundary.
A1—8 to 17 centimeters; very dark brown (10YR 2/2) ashy sandy loam, dark grayish brown (10YR 4/2) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and medium roots; very strongly acid (pH 5.0); clear wavy boundary.
A2—17 to 28 centimeters; black (10YR 2/1) ashy fine sandy loam, dark gray (10YR 4/1) dry; moderate medium subangular blocky structure; slightly hard, friable,

Figure 44.—Typical profile of a Terror soil. Numerals on tape indicate centimeters.

nonsticky and nonplastic; few very fine and medium roots; very strongly acid (pH 5.0); abrupt wavy boundary.

Bw1—28 to 36 centimeters; dark brown (10YR 3/3) ashy sandy loam, brown (10YR 5/3) dry; moderate medium subangular blocky structure; slightly hard, friable, nonsticky and slightly plastic; few very fine and fine roots; very strongly acid (pH 5.0); abrupt wavy boundary.

2Bw2—36 to 52 centimeters; very dark grayish brown (10YR 3/2) cobbly sandy loam, grayish brown (10YR 5/2) dry; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; 10 percent gravel and 10 percent cobbles; very strongly acid (pH 5.0); abrupt wavy boundary.

2Cg1—52 to 60 centimeters; light olive brown (2.5Y 5/3) gravelly coarse sandy loam, pale yellow (2.5Y 7/3) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine roots; 30 percent dark brown (7.5YR 3/3) masses of oxidized iron; 5 percent fine gravel, 20 percent medium and coarse gravel, and 5 percent cobbles; very strongly acid (pH 5.0); clear wavy boundary.

2Cg2—60 to 80 centimeters; light yellowish brown (2.5Y 6/4) gravelly coarse sandy loam, pale yellow (2.5Y 8/4) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; 15 percent brown (7.5YR 4/4) masses of oxidized iron; 5 percent fine gravel, 20 percent medium and coarse gravel, and 5 percent cobbles; very strongly acid (pH 5.0); clear wavy boundary.

2Cg3—80 to 150 centimeters; light yellowish brown (2.5Y 6/4) very gravelly coarse sandy loam, pale yellow (2.5Y 8/4) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; 15 percent brown (7.5YR 4/4) masses of oxidized iron; 10 percent fine gravel, 20 percent medium and coarse gravel, and 5 percent cobbles; very strongly acid (pH 5.0).

Range in Characteristics

Mean annual soil temperature: 3 to 8 degrees C
Moisture control section: Dry less than 30 consecutive days
Particle-size control section: Contrasting
Clay content: 0 to 10 percent throughout
Rock fragment content (ashy part): 0 to 30 percent total, with 0 to 25 percent gravel and 0 to 15 percent cobbles
Rock fragment content (loamy part): 0 to 35 percent total, with 0 to 35 percent gravel, 0 to 20 percent cobbles, and 0 to 10 percent stones
Thickness of volcanic ash mantle (ashy textural modifier): 18 to 35 centimeters

A1 horizon
Hue—10YR or 7.5YR
Value—2 to 4 moist, 4 to 6 dry
Chroma—1 or 2 moist or dry
Fine-earth texture—ashy sandy loam or ashy fine sandy loam
Rock fragment content—0 to 30 percent total, with 0 to 30 percent fine to coarse gravel and 0 to 15 percent cobbles
Volcanic glass content—35 to 80 percent
Reaction—very strongly acid or strongly acid
Thickness—5 to 20 centimeters

A2 horizon
Hue—10YR or 7.5YR
Value—2 to 4 moist, 4 to 6 dry
Chroma—1 or 2 moist or dry
Fine-earth texture—ashy fine sandy loam, ashy sandy loam, or ashy loam
Rock fragment content—0 to 30 percent total, with 0 to 30 percent fine to coarse gravel and 0 to 15 percent cobbles
Volcanic glass content—35 to 80 percent
Reaction—very strongly acid or strongly acid
Thickness—0 to 15 centimeters (absent in some pedons)

Bw1 horizon
Hue—10YR, 7.5YR, or 2.5Y
Value—2.5 to 5 moist, 4 to 7 dry
Chroma—1 to 4 moist or dry
Fine-earth texture—ashy sandy loam, ashy loam, or ashy fine sandy loam
Rock fragment content—0 to 30 percent total, with 0 to 30 percent fine to coarse gravel and 0 to 10 percent cobbles
Volcanic glass content—35 to 80 percent
Reaction—very strongly acid or strongly acid
Thickness—10 to 30 centimeters

2Bw2 horizon
Hue—10YR, 7.5YR, or 2.5Y
Value—3 to 5 moist, 5 to 7 dry
Chroma—2 to 6 moist or dry
Fine-earth texture—sandy loam, coarse sandy loam, or loamy sand
Rock fragment content—5 to 30 percent total, with 0 to 30 percent gravel, 0 to 15 percent cobbles, and 0 to 5 percent stones

Reaction—very strongly acid or strongly acid
Thickness—15 to 25 centimeters (may be absent in some pedons)

2Cg horizon
Hue—2.5Y or 10YR
Value—3 to 6 moist, 5 to 8 dry
Chroma—2 to 6 moist or dry
Fine-earth texture—coarse sandy loam, sandy loam, loamy sand, or loamy coarse sand
Rock fragment content—5 to 35 percent total, with 5 to 30 percent fine to coarse gravel, 5 to 15 percent cobbles, and 0 to 5 percent stones
Reaction—very strongly acid to moderately acid
Combined thickness—15 to 100 centimeters

Thorton Series

Depth class: Very deep (more than 150 centimeters)
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high
Landscape: Mountains
Landform: Debris aprons on mountain slopes
Parent material: Volcanic ash over glacial drift
Slope range: 15 to 100 percent
Elevation: 110 to 1,970 meters
Mean annual precipitation: 1,500 to 2,300 millimeters
Mean annual air temperature: 5 to 8 degrees C
Frost-free period: 60 to 90 days

Taxonomic class: Ashy over loamy-skeletal, amorphic over isotic, frigid Typic Udivitrands

Typical Pedon

Thorton ashy sandy loam (fig. 45) in an area of Thorton-Ragged-Ledeir complex, 15 to 65 percent slopes, on a debris apron; North Cascades National Park Complex, Whatcom County, Washington; section 19, T. 38 N., R. 14 E.; Pumpkin Mountain, Washington, U.S. Geological Survey quadrangle; latitude 48 degrees, 46 minutes, 15 seconds north and longitude 121 degrees, 1 minute, 59 seconds west; UTM 644516 meters E., 5403848 meters N., zone 10; NAD 83.

Oi—0 to 4 centimeters; slightly decomposed plant material; abrupt wavy boundary.
Oe—4 to 8 centimeters; moderately decomposed plant material; few very fine roots; abrupt wavy boundary.
E—8 to 12 centimeters; brown (10YR 4/3) ashy sandy loam, brown (10YR 5/3) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine to coarse roots; very strongly acid (pH 5.0); clear irregular boundary.
Bw1—12 to 30 centimeters; brown (7.5YR 4/4) gravelly ashy sandy loam, brown (7.5YR 5/4) dry; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and few medium and coarse roots; 10 percent fine gravel, 10 percent medium and coarse gravel, and 5 percent mixed cobbles; strongly acid (pH 5.5); clear irregular boundary.
Bw2—30 to 46 centimeters; dark yellowish brown (10YR 4/4) gravelly ashy sandy loam, yellowish brown (10YR 5/4) dry; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine to coarse roots; 15 percent fine gravel, 10 percent medium and coarse gravel, and 5 percent cobbles; strongly acid (pH 5.5); clear irregular boundary.

Figure 45.—Typical profile of a Thorton soil. Numerals on tape indicate centimeters.

2BC1—46 to 60 centimeters; olive brown (2.5Y 4/4) very gravelly sandy loam, light olive brown (2.5Y 5/4) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; 15 percent fine gravel, 25 percent medium and coarse gravel, and 10 percent cobbles; moderately acid (pH 6.0); clear irregular boundary.

2BC2—60 to 150 centimeters; olive brown (2.5Y 4/3) very gravelly sandy loam, light olive brown (2.5Y 5/3) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; 10 percent fine gravel, 20 percent medium and coarse gravel, and 10 percent cobbles; moderately acid (pH 6.0).

Range in Characteristics

Mean annual soil temperature: 6 to 8 degrees C

Moisture control section: Dry for less than 45 consecutive days from June through October

Thickness of volcanic ash mantle: 38 to 75 centimeters
Particle-size control section: Contrasting

A horizon (where present)
Hue—7.5YR or 10YR
Value—2 or 3 moist
Chroma—1 or 2 moist
Texture—sandy loam or coarse sandy loam
Reaction—very strongly acid or strongly acid
Thickness—0 to 12 centimeters

E horizon
Hue—10YR or 7.5YR
Value—3 or 4 moist, 5 or 6 dry
Chroma—2 or 3 moist or dry
Fine-earth texture—ashy fine sandy loam or ashy sandy loam
Rock fragment content—0 to 35 percent total, with 0 to 20 percent fine to coarse gravel, 0 to 10 percent cobbles, and 0 to 5 percent stones
Clay content—1 to 6 percent
Volcanic glass content—15 to 50 percent
Reaction—extremely acid to strongly acid
Thickness—0 to 7 centimeters

Bw horizon
Hue—10YR or 7.5YR
Value—3 to 5 moist, 4 to 6 dry
Chroma—3 to 6 moist or dry
Fine-earth texture—ashy fine sandy loam, ashy sandy loam, or ashy coarse sandy loam
Rock fragment content—10 to 35 percent total, with 10 to 30 percent fine to coarse gravel, 0 to 10 percent cobbles, and 0 to 10 percent stones
Clay content—2 to 10 percent
Volcanic glass content—20 to 50 percent
Reaction—strongly acid or moderately acid
Thickness—34 to 95 centimeters

2BC horizon
Hue—2.5Y or 5Y
Value—3 to 5 moist, 4 to 6 dry
Chroma—2 to 4 moist or dry
Fine-earth texture—sandy loam, loamy sand, or coarse sand
Rock fragment content—35 to 80 percent total, with 20 to 50 percent fine to coarse gravel, 5 to 30 percent cobbles, and 0 to 10 percent stones
Clay content—0 to 6 percent
Volcanic glass content—0 to 15 percent
Reaction—strongly acid to slightly acid

Torment Series

Depth class: Very deep (more than 150 centimeters)
Drainage class: Moderately well drained
Capacity to transmit water (Ksat): High or very high
Landscape: Mountains
Landform: Terraces and flood plains
Parent material: Minor amount of volcanic ash mixed with alluvium and glacial drift

Slope range: 0 to 10 percent
Elevation: 215 to 1,400 meters
Mean annual precipitation: 600 to 1,650 millimeters
Mean annual air temperature: 6 to 8 degrees C
Frost-free period: 70 to 100 days

Taxonomic class: Sandy-skeletal, isotic, frigid Oxyaquic Xerofluvents

Typical Pedon

Torment loamy sand (fig. 46) in an area of Sandalee-Kettling-Torment complex, 0 to 15 percent slopes, on a flood plain about 13 kilometers northwest of the town of Stehekin; North Cascades National Park Complex, Chelan County, Washington; 650 meters west and 420 meters south of the northeast corner of section 12, T. 33 N., R. 16 E.; McGregor Mountain, Washington, U.S. Geological Survey quadrangle; latitude 48 degrees, 22 minutes, 37 seconds north and longitude

Figure 46.—Typical profile of a Torment soil. Numerals on tape indicate centimeters.

120 degrees, 48 minutes, 23 seconds west; UTM 662415 meters E., 5360540 meters N., zone 10; NAD 83.

Oi—0 to 2 centimeters; slightly decomposed leaves, needles, and twigs; common fine interstitial pores; abrupt smooth boundary.

C1—2 to 15 centimeters; dark grayish brown (2.5Y 4/2) loamy sand, light brownish gray (2.5Y 6/2) dry; single grain; loose, nonsticky and nonplastic; many very fine to coarse roots; common fine and few medium irregular pores; strongly acid (pH 5.5); abrupt smooth boundary.

Oa—15 to 25 centimeters; dark brown (7.5YR 3/3) highly decomposed plant material, brown (7.5YR 5/3) dry; many very fine to coarse roots; few fine irregular pores; strongly acid (pH 5.4); abrupt smooth boundary.

C2—25 to 35 centimeters; dark olive brown (2.5Y 3/3) gravelly coarse sand, light olive brown (2.5Y 5/3) dry; single grain; loose, nonsticky and nonplastic; common very fine and medium and few coarse roots; common fine and medium irregular pores; 5 percent fine gravel and 15 percent medium and coarse gravel; strongly acid (pH 5.2); clear smooth boundary.

C3—35 to 70 centimeters; olive brown (2.5Y 4/4) very gravelly coarse sand, light yellowish brown (2.5Y 6/4) dry; single grain; loose, nonsticky and nonplastic; few very fine to coarse roots; many medium interstitial pores; 5 percent fine gravel, 20 percent medium and coarse gravel, and 10 percent cobbles; strongly acid (pH 5.5); clear wavy boundary.

C4—70 to 152 centimeters; dark grayish brown (2.5Y 4/2) very gravelly loamy sand, light brownish gray (2.5Y 6/2) dry; single grain; loose, nonsticky and nonplastic; few very fine and fine roots; many medium interstitial pores; 5 percent medium faint irregular yellowish brown (10YR 5/4) masses of oxidized iron with diffuse boundaries throughout; 5 percent fine gravel, 20 percent medium and coarse gravel, and 15 percent cobbles; slightly acid (pH 6.1).

Range in Characteristics

Mean annual soil temperature: 4 to 8 degrees C

Moisture control section: Dry 60 to 90 consecutive days

Clay content: 0 to 5 percent

Rock fragment content: 5 to 30 percent total, with 5 to 30 percent fine to coarse gravel, 0 to 25 percent cobbles, and 0 to 5 percent stones (at least one horizon in particle-size control section has 35 percent rock fragments or more)

C1 horizon

Hue—2.5Y or variegated

Value—3 or 4 moist, 4 to 5 dry

Chroma—2 to 3 moist or dry

Texture—loamy sand

Clay content—0 to 5 percent

Rock fragment content—0 to 10 percent total, with 0 to 10 percent fine to coarse gravel and 0 to 5 percent cobbles

Thickness—5 to 15 centimeters

C2 horizon

Hue—2.5Y or 10YR

Value—3 or 4 moist, 4 to 6 dry

Chroma—2 to 3 moist or dry

Fine-earth texture—coarse sand, loamy coarse sand, sand, or loamy sand

Clay content—0 to 5 percent

Rock fragment content—5 to 30 percent total, with 5 to 30 percent fine to coarse gravel and 0 to 15 percent cobbles

Thickness—10 to 30 centimeters

C3 horizon
Hue—2.5Y or variegated
Value—3 to 5 moist, 4 to 6 dry
Chroma—2 to 4 moist or dry
Fine-earth texture—coarse sand, loamy coarse sand, loamy sand, or sand
Clay content—0 to 5 percent
Rock fragment content—35 to 55 percent total, with 15 to 35 percent fine to coarse gravel, 10 to 25 percent cobbles, and 0 to 5 percent stones (horizon with this coarse fragments content may be absent)
Thickness—0 to 40 centimeters

C4 horizon
Hue—2.5Y or variegated
Value—3 or 4 moist, 4 to 6 dry
Chroma—2 to 3 moist or dry
Fine-earth texture—loamy sand, loamy fine sand, or loamy coarse sand
Clay content—0 to 5 percent
Rock fragment content—5 to 30 percent total, with 5 to 30 percent fine to coarse gravel, 0 to 15 percent cobbles, and 0 to 5 percent stones

Treen Series

Depth class: Shallow to lithic bedrock
Drainage class: Well drained
Capacity to transmit water (Ksat): High
Landscape: Mountains
Landform: Valley walls of mountain slopes
Parent material: Volcanic ash and colluvium
Slope range: 25 to 100 percent
Elevation: 365 to 2,350 meters
Mean annual precipitation: 1,500 to 3,500 millimeters
Mean annual air temperature: 0 to 7 degrees C
Frost-free period: 30 to 90 days

Taxonomic class: Medial, amorphic Lithic Haplocryands

Typical Pedon

Treen medial loam (fig. 47) in an area of Stetattle-Doubtful-Arriva complex, 15 to 100 percent slopes, on a valley wall within Easy Creek Watershed; North Cascades National Park Complex, Whatcom, County, Washington; section 12, T. 39 N., R. 10 E.; Copper Mountain, Washington, U.S. Geological Survey quadrangle; latitude 48 degrees, 52 minutes, 58 seconds north and longitude 120 degrees, 26 minutes, 13 seconds west; UTM 614599 meters E., 5415590 meters N., zone 10; NAD 83.

A1—0 to 10 centimeters; black (10YR 2/1) medial loam, dark gray (10YR 4/1) dry; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots and many medium roots throughout; clear smooth boundary.
A2—10 to 30 centimeters; black (10YR 2/1) medial sandy loam, dark gray (10YR 4/1) dry; moderate medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; clear smooth boundary.
Bw—30 to 40 centimeters; dark brown (10YR 3/3) cobbly medial sandy loam, brown (10YR 5/3) dry; moderate fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; 5 percent gravel and 10 percent cobbles; abrupt irregular boundary.
R—40 to 65 centimeters; unweathered bedrock.

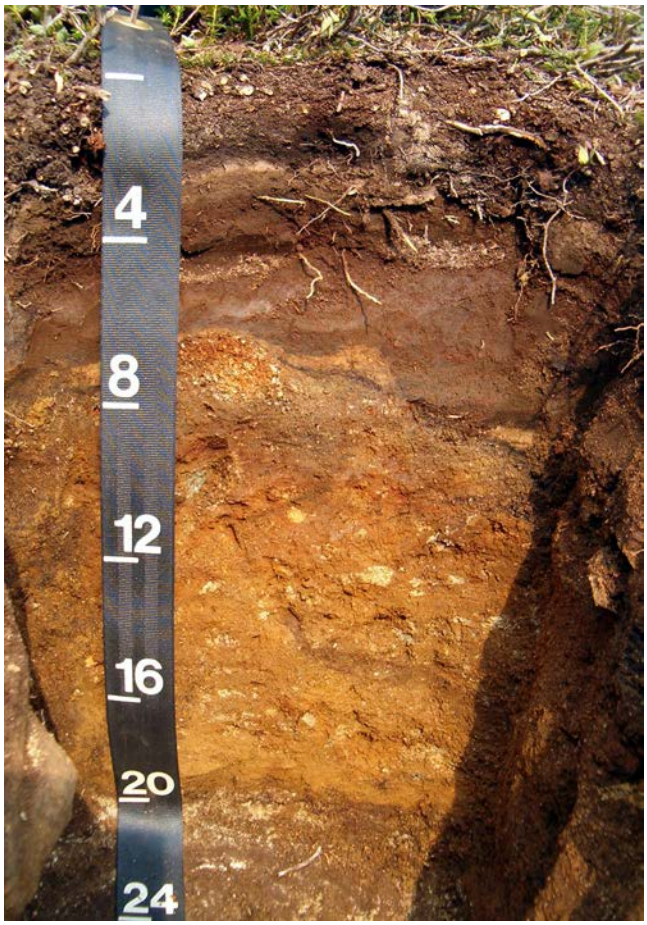


Figure 47.—Typical profile of a Treen soil. Numerals on tape indicate inches.

Range in Characteristics

Mean annual soil temperature: 1 to 8 degrees C
Moisture control section: Dry for less than 30 consecutive days following the summer solstice
Depth to a lithic contact: 25 to 50 centimeters from the mineral soil surface

A horizon
Hue—10YR or 7.5YR
Value—2 or 3 moist, 4 or 5 dry
Chroma—1 to 3 moist or dry
Fine-earth texture—medial sandy loam, medial fine sandy loam, or medial loam
Rock fragment content—0 to 30 percent total, with 0 to 15 percent fine to coarse gravel, 0 to 10 percent cobbles, and 0 to 5 percent stones
Clay content—2 to 10 percent
Thickness—20 to 40 centimeters
Reaction—slightly acid to strongly acid

Bw horizon
Hue—10YR, 7.5YR, or 2.5Y
Value—3 to 6 moist, 4 to 7 dry
Chroma—2 to 6 moist or dry
Fine-earth texture—medial sandy loam or medial fine sandy loam

Rock fragment content—0 to 40 percent total, with 0 to 25 percent fine to coarse gravel, 0 to 15 percent cobbles, and 0 to 5 percent stones
Clay content—2 to 10 percent
Thickness—5 to 30 centimeters
Reaction—slightly acid to strongly acid

Tricouni Series

Depth class: Very deep (more than 150 centimeters)
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high
Landscape: Mountains
Landform: Debris cones on mountain slopes
Parent material: Volcanic ash mixed with alluvium
Slope range: 0 to 100 percent
Elevation: 110 to 1,970 meters
Mean annual precipitation: 1,500 to 2,540 millimeters
Mean annual air temperature: 6 to 10 degrees C
Frost-free period: 60 to 90 days

Taxonomic class: Loamy-skeletal, isotic, frigid Andic Dystrudepts

Typical Pedon

Tricouni ashy sandy loam (fig. 48) in an area of Tricouni-Ragged-Easy complex, 5 to 50 percent slopes, on a valley wall along Sourdough Mountain Trail; North Cascades National Park Complex, Whatcom County, Washington; 120 meters west and 360 meters south of the northeast corner of section 25, T. 38 N., R. 13 E, Pumpkin Mountain, Washington, U.S. Geological Survey quadrangle; latitude 48 degrees, 45 minutes, 14 seconds north and longitude 121 degrees, 2 minutes, 34 seconds west; UTM 643856 meters E., 5401936 meters N., zone 10; NAD 83.

Oi—0 to 3 centimeters; slightly decomposed plant material from twigs, needles, and forbs; abrupt wavy boundary.
Oe—3 to 9 centimeters; moderately decomposed plant material; few fine and medium roots; abrupt irregular boundary.
E—9 to 10 centimeters; dark grayish brown (10YR 4/2) ashy sandy loam, grayish brown (10YR 5/2) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few fine and medium roots; many very fine interstitial pores; 5 percent fine gravel; strongly acid (pH 5.4); abrupt irregular boundary.
Bw1—10 to 28 centimeters; brown (10YR 4/3) gravelly ashy sandy loam, brown (10YR 5/3) dry; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine and fine and common medium and coarse roots; many very fine interstitial pores; 10 percent fine gravel, 10 percent medium and coarse gravel, and 10 percent cobbles; strongly acid (pH 5.5); gradual wavy boundary.
2Bw2—28 to 60 centimeters; dark yellowish brown (10YR 4/4) very gravelly sandy loam, yellowish brown (10YR 5/4) dry; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium and few coarse and very coarse roots; many very fine interstitial pores; 15 percent fine gravel, 10 percent medium and coarse gravel, and 10 percent cobbles; moderately acid (pH 5.6); abrupt wavy boundary.
2BC—60 to 104 centimeters; light olive brown (2.5Y 5/3) very gravelly sandy loam, light yellowish brown (2.5Y 6/3) dry; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine to coarse roots;

Figure 48.—Typical profile of a Tricouni soil. Numerals on tape indicate centimeters.

10 percent fine gravel, 15 percent medium and coarse gravel, and 15 percent cobbles; moderately acid (pH 5.8); gradual wavy boundary.

2C—104 to 152 centimeters; olive brown (2.5Y 4/4) very gravelly loamy sand, light yellowish brown (2.5Y 6/4) dry; single grain; loose, nonsticky and nonplastic; few very fine, fine, and medium roots; 10 percent fine gravel, 40 percent medium and coarse gravel, and 5 percent cobbles; moderately acid (pH 5.9).

Range in Characteristics

Mean annual soil temperature: 6 to 8 degrees C
Moisture control section: Dry for 30 to 45 consecutive days following the summer solstice
Reaction: Moderately acid or strongly acid throughout
Clay content: 2 to 10 percent throughout
Thickness of volcanic ash mantle: 18 to 35 centimeters

E horizon (where present)

This horizon typically does not meet the albic criteria.

Hue—10YR or 7.5YR
Value—4 or 5 moist, 5 or 6 dry
Chroma—2 or 3 moist or dry
Fine-earth texture—ashy sandy loam
Rock fragment content—0 to 10 percent fine gravel

Volcanic glass content—15 to 50 percent
Thickness—0 to 2 centimeters

Bw1 horizon
Hue—10YR, 7.5YR, or 2.5Y
Value—3 or 4 moist, 4 or 5 dry
Chroma—3 to 6 moist or dry
Fine-earth texture—ashy sandy loam or ashy fine sandy loam
Rock fragment content—5 to 60 percent total, with 0 to 15 percent fine gravel, 5 to 35 percent medium and coarse gravel, and 0 to 15 percent cobbles
Volcanic glass content—20 to 50 percent
Thickness—18 to 35 centimeters

2Bw2 horizon
Hue—10YR, 7.5YR, or 2.5Y
Value—3 or 4 moist, 4 or 5 dry
Chroma—3 to 6 moist or dry
Fine-earth texture—sandy loam or coarse sandy loam
Rock fragment content—5 to 60 percent total, with 0 to 20 percent fine gravel, 5 to 40 percent medium and coarse gravel, 0 to 20 percent cobbles, and 0 to 5 percent stones
Volcanic glass content—0 to 5 percent
Thickness—30 to 50 centimeters

2BC horizon
Hue—2.5Y or 10YR
Value—3 to 5 moist, 4 to 6 dry
Chroma—3 to 6 moist or dry
Fine-earth texture—sandy loam, coarse sandy loam, or loamy sand
Rock fragment content—20 to 60 percent total, with 10 to 20 percent fine gravel, 15 to 50 percent medium and coarse gravel, 5 to 20 percent cobbles, and 0 to 5 percent stones
Volcanic glass content—0 to 5 percent
Thickness—40 to 60 centimeters

2C horizon
Hue—2.5Y, 10YR, or variegated
Value—3 to 5 moist, 4 to 6 dry
Chroma—3 to 6 moist or dry
Fine-earth texture—loamy sand, coarse sandy loam, or sandy loam
Rock fragment content—20 to 60 percent total, with 10 to 20 percent fine gravel, 15 to 50 percent gravel, 5 to 20 percent cobbles, and 0 to 5 percent stones

Triumph Series

Depth class: Deep to paralithic bedrock
Drainage class: Well drained
Capacity to transmit water (Ksat): High
Landscape: Mountains
Landform: Valley walls of mountain slopes
Parent material: Minor amount of volcanic ash mixed with colluvium and residuum
Slope range: 15 to 100 percent
Elevation: 325 to 2,350 meters
Mean annual precipitation: 1,800 to 3,300 millimeters
Mean annual air temperature: 2 to 6 degrees C
Frost-free period: 30 to 60 days

Taxonomic class: Loamy-skeletal, isotic Vitrandic Humicryepts

Typical Pedon

Triumph gravelly ashy sandy loam (fig. 49) in an area of Doubtful-Triumph-Perfect complex, 35 to 100 percent slopes, on a valley wall on the Mineral Creek side of Easy Ridge; North Cascades National Park Complex, Whatcom County, Washington; 638 meters west and 141 meters north of southeast corner of section 18, T. 39 N., R. 11 E.; Mount Blum, Washington, U.S. Geological Survey quadrangle; latitude 48 degrees, 51 minutes, 40 seconds north and longitude 121 degrees, 25 minutes, 19 seconds west; UTM 615752 meters E., 5413201 meters N., zone 10; NAD 83.

A1—0 to 15 centimeters; very dark brown (7.5YR 2.5/2) gravelly ashy sandy loam, brown (7.5YR 5/2) dry; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many fine and common very fine and medium roots throughout; 10 percent fine gravel, 10 percent medium and coarse gravel, and 5 percent cobbles; strongly acid (pH 5.2); abrupt wavy boundary.

A2—15 to 50 centimeters; black (7.5YR 2.5/1) very cobbly ashy sandy loam, gray (7.5YR 5/1) dry; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and few medium roots throughout; 10 percent fine gravel, 20 percent medium and coarse gravel, and 25 percent cobbles; moderately acid (pH 5.6); clear wavy boundary.

Figure 49.—Typical profile of a Triumph soil. Numerals on tape indicate centimeters.

A3—50 to 120 centimeters; black (7.5YR 2.5/1) extremely cobbly ashy sandy loam, gray (7.5YR 5/1) dry; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine and medium roots throughout; 5 percent fine gravel, 15 percent medium and coarse gravel, and 60 percent cobbles; moderately acid (pH 5.8); diffuse wavy boundary.
Cr—120 to 152 centimeters; weathered granite or metasedimentary rock.

Range in Characteristics

Mean annual soil temperature: 4 to 8 degrees C
Moisture control section: Dry for less than 30 consecutive days from June through October
Depth to a paralithic contact with weathered bedrock: 100 to 150 centimeters
Thickness of vitrandic feature: 40 to 75 centimeters
Thickness of umbric epipedon: 60 to 120 centimeters
Particle-size control section (25 to 100 centimeters): Averages 35 to 85 percent Rock fragment content (weighted average)

A horizon
Hue—7.5YR or 10YR
Value—2 to 3 moist, 3 to 5 dry
Chroma—1 to 3 moist or dry
Fine-earth texture—ashy fine sandy loam or ashy sandy loam
Rock fragment content—15 to 85 percent total (typically increases with depth), with 10 to 50 percent fine to coarse gravel, 5 to 60 percent cobbles, and 0 to 5 percent stones
Clay content—3 to 10 percent
Volcanic glass content—0 to 15 percent
Reaction—extremely acid to strongly acid

Bw horizon (where present)
Hue—7.5YR or 10YR
Value—2 to 4 moist
Chroma—3 to 5 moist
Texture—fine sandy loam, sandy loam, or loamy sand
Reaction—strongly acid or moderately acid
Thickness—as much as 40 centimeters

Yawning Series

Depth class: Very deep (more than 150 centimeters)
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high
Landscape: Mountains
Landform: Mountain slopes and terraces
Parent material: Thin volcanic ash over glacial drift and colluvium
Slope range: 0 to 35 percent
Elevation: 415 to 2,110 meters
Mean annual precipitation: 1,450 to 2,200 millimeters
Mean annual air temperature: 3 to 7 degrees C
Frost-free period: 30 to 60 days

Taxonomic class: Loamy-skeletal, isotic Typic Haplocryods

Typical Pedon

Yawning ashy sandy loam (fig. 50) in an area of Kimtah-Bacon-Yawning complex, 0 to 35 percent slopes, on a valley wall along Easy Ridge, about

27 kilometers northwest of the town of Newhalem; North Cascades National Park Complex, Whatcom County, Washington; 785 meters west and 675 meters north of the southwest corner of section 12, T. 39 N., R. 10 E.; Copper Mountain, Washington, U.S. Geological Survey quadrangle; latitude 48 degrees, 52 minutes, 53 seconds north and longitude 121 degrees, 26 minutes, 38 seconds west; UTM 614090 meters E., 5415030 meters N., zone 10; NAD 83.

Oi—0 to 2 centimeters; slightly decomposed plant material; few very fine and fine roots; abrupt smooth boundary.

Oa—2 to 8 centimeters; highly decomposed plant material; common very fine to coarse roots; common fine irregular pores; extremely acid (pH 4.0); abrupt wavy boundary.

E—8 to 14 centimeters; grayish brown (10YR 5/2) ashy sandy loam, light gray (10YR 7/2) dry; weak fine subangular blocky structure; loose, very friable, nonsticky and nonplastic; common very fine and fine roots and few medium roots; common fine irregular pores; 5 percent fine gravel; extremely acid (pH 4.1); abrupt irregular boundary.

Figure 50.—Typical profile of a Yawning soil. Numerals on tape indicate centimeters.

Bs—14 to 32 centimeters; dark reddish brown (5YR 3/4) very gravelly ashy sandy loam, reddish brown (5YR 5/4) dry; weak fine subangular blocky structure; loose, very friable, nonsticky and nonplastic; common very fine to coarse roots; common fine and medium irregular pores; 10 percent fine gravel and 30 percent medium and coarse gravel; strongly acid (pH 5.3); clear irregular boundary.

2BC—32 to 50 centimeters; dark yellowish brown (10YR 4/4) extremely cobbly sandy loam, light yellowish brown (10YR 6/4) dry; weak fine subangular blocky structure; loose, very friable, nonsticky and nonplastic; few very fine and fine roots and common medium and coarse roots; common medium interstitial pores; 10 percent fine gravel, 30 percent medium and coarse gravel, and 40 percent cobbles; strongly acid (pH 5.5); gradual irregular boundary.

2C1—50 to 100 centimeters; dark yellowish brown (10YR 4/6) extremely cobbly sandy loam, brownish yellow (10YR 6/6) dry; single grain; loose, nonsticky and nonplastic; few very fine to coarse roots; many coarse interstitial pores; 10 percent fine gravel, 25 percent medium and coarse gravel, 30 percent cobbles, and 20 percent stones; strongly acid (pH 5.5); gradual irregular boundary.

2C2—100 to 150 centimeters; dark yellowish brown (10YR 4/6) extremely cobbly sandy loam, brownish yellow (10YR 6/6) dry; single grain; loose, nonsticky and nonplastic; few fine and medium roots; many coarse interstitial pores; 10 percent fine gravel, 25 percent medium and coarse gravel, 30 percent cobbles, and 20 percent stones; strongly acid (pH 5.5).

Range in Characteristics

Mean annual soil temperature: 4 to 8 degrees C
Moisture control section: Dry less than 30 consecutive days
Thickness of volcanic ash mantle: Less than 25 centimeters
Particle size control section:
Clay content—2 to 13 percent
Rock fragment content—35 to 85 percent

Total thickness of all the organic horizons ranges from 3 to 15 centimeters. An Oe horizon is in some pedons, and it ranges from 3 to 13 centimeters thick.

E horizon
Hue—10YR or 7.5YR
Value—3 to 5 moist, 5 to 7 dry
Chroma—1 or 2 moist or dry
Fine-earth texture—ashy sandy loam or ashy fine sandy loam
Rock fragment content—0 to 15 percent fine to coarse gravel
Clay content—1 to 8 percent
Volcanic glass content—5 to 50 percent
Reaction—extremely acid or very strongly acid
Thickness—4 to 13 centimeters

Bs horizon
Hue—5YR, 7.5YR, or 10YR
Value—2 to 4 moist, 4 to 5 dry
Chroma—2 or 4 moist, 2 to 6 dry
Fine-earth texture—ashy sandy loam, ashy fine sandy loam, or ashy loam
Rock fragment content—20 to 55 percent total, with 15 to 50 percent fine to coarse gravel, 5 to 20 percent cobbles, and 0 to 5 percent stones
Clay content—2 to 13 percent
Volcanic glass content—25 to 60 percent
Reaction—very strongly acid or strongly acid
Thickness—11 to 20 centimeters

2BC horizon
Hue—10YR or 2.5Y
Value—3 to 5 moist, 5 to 7 dry
Chroma—3 or 6 moist or dry
Fine-earth texture—sandy loam or coarse sandy loam
Rock fragment content—35 to 80 percent total, with 10 to 45 percent fine to coarse gravel, 5 to 40 percent cobbles, and 0 to 10 percent stones
Clay content—2 to 4 percent
Reaction—strongly acid or moderately acid
Thickness—18 to 44 centimeters

2C horizon
Hue—10YR or 2.5Y
Value—3 to 5 moist, 5 to 7 dry
Chroma—4 to 6 moist or dry
Fine-earth texture—sandy loam, coarse sandy loam, or coarse sand
Rock fragment content—35 to 85 percent total, with 15 to 55 percent fine to coarse gravel, 0 to 30 percent cobbles, and 0 to 10 percent stones
Clay content—0 to 6 percent
Reaction—strongly acid to slightly acid

General Soil Map Units

The general soil map in this publication shows broad areas that have a distinctive pattern of soils, relief, drainage, and vegetative cover. 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 (figs. 51, 52, and 53).

The general soil map can be used to compare the nature of large areas for their general interpretive and scientific value. 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 planning, managing, or 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 interpretative ratings, soil properties, and ecological classification.

The general soil map unit delineations for this survey area were created by aggregating detailed soil map unit delineations. Aggregation decisions were based primarily on landscape and soil climatic zones. In general, the lower landscape positions that consist dominantly of landforms such as debris cones, debris aprons, and terraces were separated out from the upper landscape positions such as valley walls, cirques, bedrock benches, and ridges. The soil climate zones in the area generally are split west and east of the Cascade Crest. At the lower elevations west of the crest is the frigid/udic soil climate zone with cool, wet winters and cool, dry summers. At the higher elevations is the cryic/udic soil climate zone with cold, wet winters and cool summers. This zone crosses over the crest, which receives the highest amount of precipitation in the survey area. Moving east from the crest, the amount of precipitation received declines steadily. At the lower elevations east of the crest is the frigid/xeric soil climate zone that has cooler and drier winters than does the western part and warm, dry summers. The soil series named in the general soil map units refer to the most abundant soil types in the delineations based on the detailed soil map unit delineations and the respective component percentages.

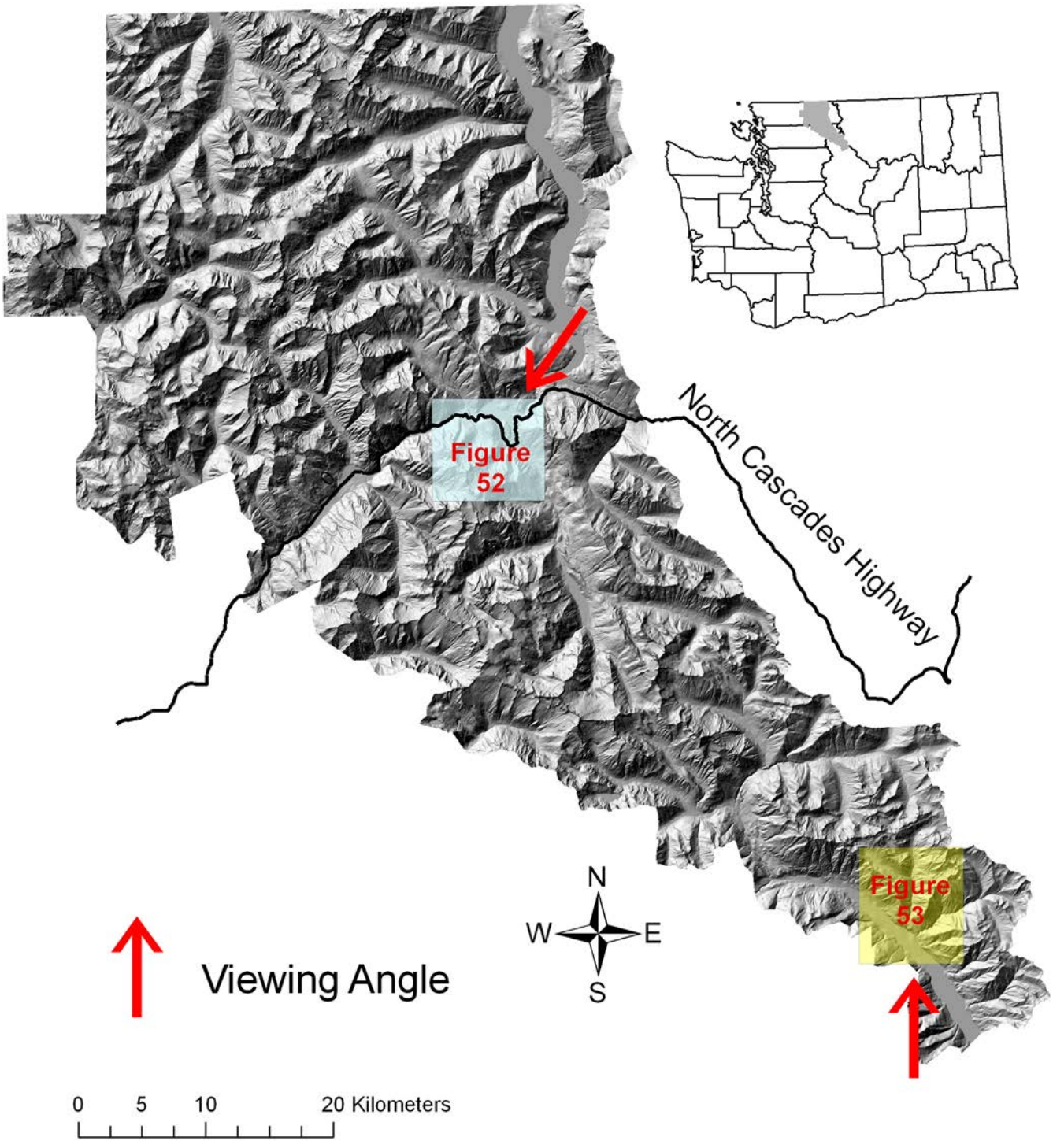


Figure 51.—Index for general soil map unit block diagrams for the North Cascades National Park Complex (see figures 52 and 53).

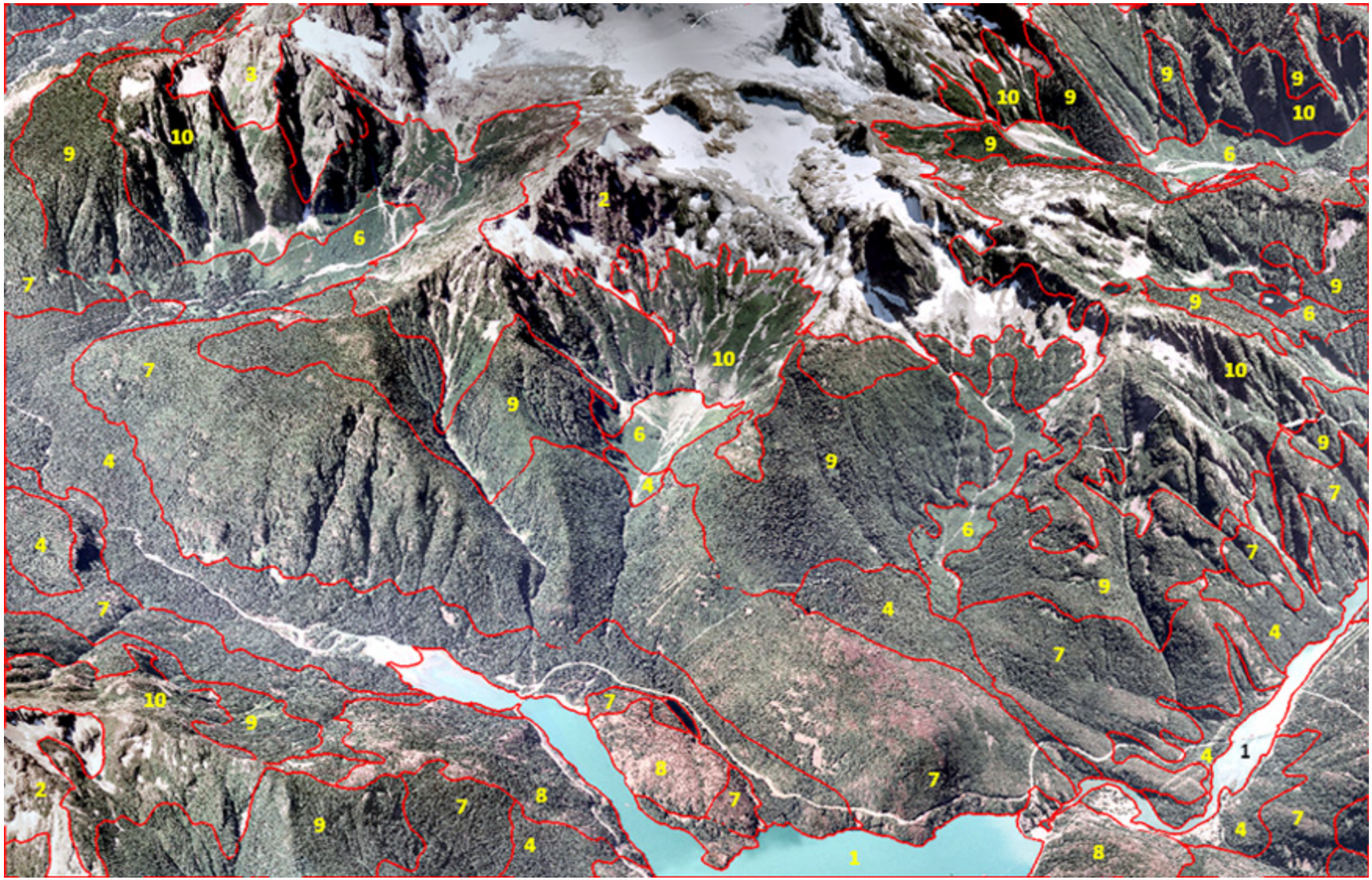


Figure 52.—General soil map unit delineations and numbers draped over 2006 National Agriculture Image Program photograph, generated in ESRI® ArcScene™ 9.2, looking over State Route 20 and Diablo Lake (map unit 1) to Colonial and Neve Glaciers (map unit 2). The delineations establish broad landscape segments based on soil climate and geomorphology. Map unit 4 represents frigid/udic valley floor areas, and map unit 7 represents frigid/udic upland slopes areas. Map units 6 (valley floors), 9 (intermediate upland slopes), and 10 (high upland slopes) represent the transitional areas to the cryic/udic soil climate regime. Map unit 8 represents the frigid/xeric areas in isolated pockets along the State Route 20 corridor, where the southerly aspect results in a drier soil climate regime.

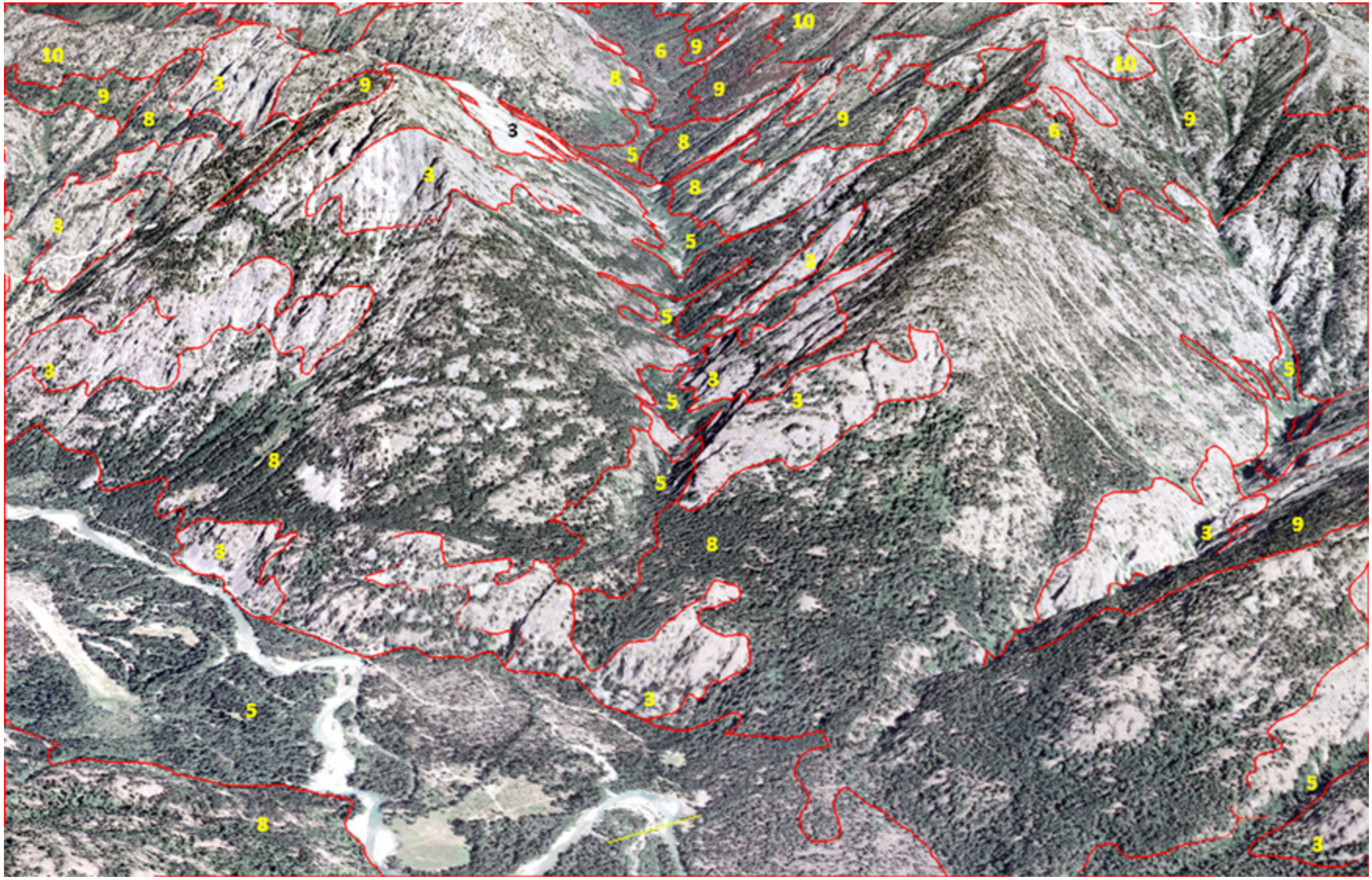


Figure 53.—General soil map unit delineations and numbers draped over 2006 National Agriculture Image Program photograph, generated in ESRI® ArcScene™ 9.2, looking over the Stehekin Valley up the Rainbow Creek drainage to the north. The delineations establish broad landscape segments based on soil climate and geomorphology, transitioning from the frigid/xeric soil climate zone to the cryic/udic soil climate zone. Map unit 5 represents the frigid/xeric valley floor areas, and map unit 8 represents the upland slopes areas. At the higher elevations are map units 6, (valley floors), 9 (intermediate upland slopes), and 10 (high upland slopes) that are in the cryic/udic soil climate regime. Map unit 3 is dominantly Rock outcrop.

Areas Dominated by Miscellaneous Land Types and Shallow Soils

Number of map units: 3
Percentage of survey area: About 26 percent

1. Water

Description of areas: Mostly small bodies of water at all elevations throughout the survey area. The largest bodies are Ross Lake in the northeast corner and Lake Chelan in the southeast corner.
Percentage of survey area: About 2.5 percent
Elevation: 130 to 2,185 meters
Detailed soil map unit aggregated in delineations: 9999

2. Rock outcrop-Glaciers-Harlequin

Steep valley walls, ridges, cirques, and arêtes throughout the survey area, generally at higher elevations above the annual snow accumulation zone

Percentage of survey area: About 21 percent
Elevation: 1,500 to 2,800 meters
Detailed soil map unit aggregated in delineations: 9998

Rock outcrop
Description of areas: Bedrock exposed at surface that supports very sparse or no vegetation

Glaciers
Description of areas: Masses of ice mixed with rock debris

Harlequin soils
Depth: Shallow
Drainage class: Well drained
Saturated hydraulic conductivity (Ksat): High or very high
Texture of surface layer: Sandy loam
Slope range: 25 to 100 percent

3. Rock outcrop-Despair-Rubble land

Steep valley walls, ridges, cirques, and arêtes throughout the survey area, generally at lower elevations below the annual snow accumulation zone

Percentage of survey area: About 2.5 percent
Elevation: 1,000 to 2,200 meters
Minor component: Harlequin soils
Detailed soil map unit aggregated in delineations: 9997

Rock outcrop
Description of areas: Bedrock exposed at surface that supports very sparse or no vegetation

Despair soils
Depth: Shallow
Drainage class: Well drained
Saturated hydraulic conductivity (Ksat): High
Texture of surface layer: Ashy sandy loam
Slope range: 35 to 100 percent

Rubble land
Description of areas: Cobbles, stones, and boulders at the base of slopes

Soils of Glaciated Valleys

Number of map units: 3
Percentage of survey area: About 15 percent

4. Ragged-Thorton-Tricouni (Frigid/Udic Soil Climate Regime)

Gently sloping to moderately sloping flood plains, terraces, debris aprons, debris cones, and depressions at lower elevations west of the Cascade Crest

Percentage of survey area: About 5 percent
Elevation: 105 to 1,535 meters
Parent material: Volcanic ash mixed with alluvium and volcanic ash over glacial drift
Dominant overstory: Western hemlock, Douglas-fir, and western redcedar
Minor components: Deerlick, Easy, Ledeir, and Roland soils
Detailed soil map units aggregated in delineations: 6000, 6009, 6010, 6014, and 6015

Ragged soils
Depth: Very deep
Drainage class: Well drained
Saturated hydraulic conductivity (Ksat): High or very high
Texture of surface layer: Gravelly ashy loamy sand
Slope range: 5 to 65 percent

Thorton soils
Depth: Very deep
Drainage class: Well drained
Saturated hydraulic conductivity (Ksat): High or very high
Texture of surface layer: Ashy sandy loam
Slope range: 15 to 65 percent

Tricouni soils
Depth: Very deep
Drainage class: Well drained
Saturated hydraulic conductivity (Ksat): High or very high
Texture of surface layer: Ashy sandy loam
Slope range: 5 to 65 percent

5. Farway-Lyall-Mesahchie (Frigid/Xeric Soil Climate Regime)

Gently sloping to moderately sloping flood plains, terraces, debris aprons, debris cones, and depressions at lower elevations east of the Cascade Crest

Percentage of survey area: About 1 percent
Elevation: 335 to 1,400 meters
Parent material: Volcanic ash over alluvium, colluvium, and glacial drift
Dominant overstory: Douglas-fir and ponderosa pine
Minor components: Inspiration, Kettling, Sandalee, and Torment soils
Detailed soil map units aggregated in delineations: 6500, 6502, and 6505

Farway soils
Depth: Very deep
Drainage class: Well drained
Saturated hydraulic conductivity (Ksat): High
Texture of surface layer: Ashy fine sandy loam
Slope range: 5 to 65 percent

Lyall soils
Depth: Very deep
Drainage class: Well drained
Saturated hydraulic conductivity (Ksat): High or very high
Texture of surface layer: Gravelly ashy coarse sandy loam
Slope range: 5 to 65 percent

Mesahchie soils
Depth: Very deep
Drainage class: Well drained
Saturated hydraulic conductivity (Ksat): High or very high
Texture of surface layer: Gravelly ashy fine sandy loam
Slope range: 15 to 65 percent

6. Stetattle-Chilliwack-Perfect (Cryic Soil Temperature Regime)

Gently sloping to moderately sloping valley bottoms, terraces, debris aprons, debris cones, and depressions at higher elevations throughout the survey area

Percentage of survey area: About 9 percent
Elevation: 325 to 2,160 meters
Parent material: Volcanic ash over alluvium and colluvium
Dominant overstory: Sitka alder, Pacific silver fir, and mountain hemlock
Minor components: Bacon, Forbidden, Kimtah, and Triumph soils
Detailed soil map units aggregated in delineations: 8000, 8006, 8007, 8009, 8010, 8011, 8014, 8500, and 8501

Stetattle soils, deciduous
Depth: Very deep
Drainage class: Well drained
Saturated hydraulic conductivity (Ksat): High or very high
Texture of surface layer: Very stony medial fine sandy loam
Slope range: 5 to 65 percent

Chilliwack soils
Depth: Very deep
Drainage class: Well drained
Saturated hydraulic conductivity (Ksat): High or very high
Texture of surface layer: Medial sandy loam
Slope range: 15 to 65 percent

Perfect soils
Depth: Very deep
Drainage class: Well drained
Saturated hydraulic conductivity (Ksat): High or very high
Texture of surface layer: Ashy sandy loam
Slope range: 5 to 65 percent

Soils of Glaciated Mountain Slopes

Number of map units: 3
Percentage of survey area: About 30 percent

7. Rock outcrop-Tricouni-Cosho (Frigid/Udic Soil Climate Regime)

Moderately sloping to steep debris aprons, valley walls, and bedrock benches at lower elevations west of the Cascade Crest

Percentage of survey area: About 7 percent
Elevation: 110 to 1,800 meters
Parent material: Volcanic ash over glacial drift and alluvium over bedrock
Dominant overstory: Western hemlock, Douglas-fir, and western redcedar
Minor components: Damnation, Deerlick, Ragged, and Thorton soils
Detailed soil map units aggregated in delineations: 7003 and 7015

Rock outcrop
Description of areas: Bedrock exposed at surface that supports very sparse or no vegetation

Tricouni soils
Depth: Very deep
Drainage class: Well drained
Saturated hydraulic conductivity (Ksat): High or very high
Texture of surface layer: Ashy sandy loam
Slope range: 35 to 100 percent

Cosho soils
Depth: Moderately deep
Drainage class: Well drained
Saturated hydraulic conductivity (Ksat): High or very high
Texture of surface layer: Gravelly ashy sandy loam
Slope range: 15 to 65 percent

8. Despair-Goode-Farway (Frigid/Xeric Soil Climate Regime)

Moderately sloping to very steep debris aprons, valley walls, and bedrock benches at lower elevations east of the Cascade Crest

Percentage of survey area: About 5 percent
Elevation: 270 to 2,060 meters
Parent material: Volcanic ash over colluvium and glacial drift over bedrock
Dominant overstory: Douglas-fir and ponderosa pine
Minor components: Inspiration, Lyall, and Mesahchie soils, Rock outcrop, and Sawtooth soils
Detailed soil map units aggregated in delineations: 7500, 7501, and 7502

Despair soils
Depth: Shallow
Drainage class: Well drained
Saturated hydraulic conductivity (Ksat): High

Texture of surface layer: Ashy sandy loam
Slope range: 35 to 100 percent

Goode soils
Depth: Very deep
Drainage class: Well drained
Saturated hydraulic conductivity (Ksat): High or very high
Texture of surface layer: Gravelly ashy fine sandy loam
Slope range: 35 to 100 percent

Farway soils
Depth: Very deep
Drainage class: Well drained
Saturated hydraulic conductivity (Ksat): High
Texture of surface layer: Ashy fine sandy loam
Slope range: 35 to 100 percent

9. Spickard-Mox-Perfect (Cryic Soil Temperature Regime)

Moderately sloping to very steep debris aprons, valley walls, and bedrock benches at higher elevations throughout the survey area

Percentage of survey area: About 18 percent
Elevation: 265 to 2,210 meters
Parent material: Volcanic ash over glacial drift
Dominant overstory: Pacific silver fir, mountain hemlock, and subalpine fir
Minor components: Doubtful, Kimtah, and Maggib soils, Rock outcrop, and Tepeh soils
Detailed soil map units aggregated in delineations: 9001, 9008, 9012, and 9501

Spickard soils
Depth: Very deep
Drainage class: Well drained
Saturated hydraulic conductivity (Ksat): High or very high
Texture of surface layer: Ashy sandy loam
Slope range: 35 to 100 percent

Mox soils
Depth: Very deep
Drainage class: Well drained
Saturated hydraulic conductivity (Ksat): High or very high
Texture of surface layer: Ashy sandy loam
Slope range: 35 to 100 percent

Perfect soils
Depth: Very deep
Drainage class: Well drained
Saturated hydraulic conductivity (Ksat): High or very high
Texture of surface layer: Ashy sandy loam
Slope range: 35 to 100 percent

Soils of Mountain Ridges and Avalanche Paths

Number of map units: 1
Percentage of survey area: About 29 percent

10. Doubtful-Treen-Triumph (Subalpine and Alpine Soils)

Percentage of survey area: About 29 percent
Elevation: 385 to 2,355 meters
Parent material: Volcanic ash over glacial drift, colluvium, and residuum over bedrock
Dominant overstory: Mountain hemlock, subalpine fir, and Sitka alder
Minor components: Arriva and Perfect soils, Rock outcrop, and Stetattle soils
Detailed soil map units aggregated in delineations: 9003, 9010, and 9016

Doubtful soils
Depth: Moderately deep
Drainage class: Well drained
Saturated hydraulic conductivity (Ksat): High or very high
Texture of surface layer: Gravelly ashy sandy loam
Slope range: 35 to 100 percent

Treen soils
Depth: Shallow
Drainage class: Well drained
Saturated hydraulic conductivity (Ksat): High
Texture of surface layer: Medial loam
Slope range: 25 to 100 percent

Triumph soils
Depth: Deep
Drainage class: Well drained
Saturated hydraulic conductivity (Ksat): High
Texture of surface layer: Gravelly ashy sandy loam
Slope range: 25 to 100 percent

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 for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Minor soil components that have properties similar to those of the dominant soil or soils in the map unit do not affect use and management. They are called noncontrasting, or similar, components. They typically are not 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. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. 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 could be considered phases of soil series

because of the natural variability of the properties of soils across landscapes. The name of a soil phase commonly indicates a feature that affects use or management. For example, Chilliwack soil, warm, is a phase of the Chilliwack series.

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

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. Roland-Skymo-Deerlick complex, 0 to 25 percent slopes, is an example.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Riverwash is an example.

Each detailed soil map unit is assigned to a major land resource area (MLRA) (USDA Agriculture Handbook 296). The MLRA assigned to each detailed soil map unit is given in this section. Some map units, such as Rock outcrop, Water, and other miscellaneous areas, may not be assigned to a single MLRA because the unit can occur in any MLRA.

Table 5 gives the acreage, hectarage, and proportionate extent of each map unit. Table 6 cross-references the detailed soil map unit symbols used in this survey to the National soil map unit symbols. Table 7 gives the percent composition and percent slope, including the low, representative (RV), and high values, for the major and minor components in each map unit in the area. 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.

Descriptive Detailed Soil Map Unit Legend

The detailed soil map units for this survey area were initially drafted based on the soil climate regimes and the mountain bottoms and mountain slopes landform positions (figs. 54, 55, 56, 57, 58, and 59). The following is a descriptive detailed soil map unit legend based on this map unit scheme.

Frigid/udic mountain bottoms
6000—Manlywham-Nohokomeen-Roland complex, 0 to 5 percent slopes
6009—Ragged-Tricouni-Cosho complex, 15 to 65 percent slopes
6010—Roland-Skymo-Deerlick complex, 0 to 25 percent slopes
6014—Thorton-Ragged-Ledeir complex, 15 to 65 percent slopes
6015—Tricouni-Ragged-Easy complex, 5 to 50 percent slopes

Frigid/xeric mountain bottoms
6500—Sandalee-Kettling-Torment complex, 0 to 15 percent slopes
6502—Mesahchie-Inspiration-Lyall complex, 15 to 65 percent slopes
6505—Farway-Lyall-Inspiration complex, 5 to 65 percent slopes

Cryic/udic mountain bottoms
8000—Beaverpass-Purple-Bacon complex, 0 to 15 percent slopes
8006—Stetattle-Forbidden-Triumph complex, 15 to 65 percent slopes
8007—Kimtah-Bacon-Yawning complex, 0 to 35 percent slopes
8009—Chilliwack-Perfect-Terror complex, 15 to 65 percent slopes
8010—Perfect-Spickard-Stetattle complex, 15 to 65 percent slopes
8011—Chilliwack-Forbidden-Stetattle complex, 15 to 65 percent slopes
8014—Chilliwack-Tepeh-Kimtah complex, 15 to 65 percent slopes

Cryic/xeric mountain bottoms
8500—Primus-Noca-Stehekin complex, 15 to 65 percent slopes
8501—Stehekin-Primus complex, 15 to 65 percent slopes

Frigid/udic mountain slopes
7003—Damnation-Ragged-Rock outcrop complex, 35 to 100 percent slopes
7015—Thorton-Ragged-Damnation complex, 35 to 100 percent slopes

Frigid/xeric mountain slopes
7500—Inspiration-Mesahchie-Sawtooth complex, 35 to 100 percent slopes
7501—Despair-Goode-Rock outcrop complex, 35 to 100 percent slopes
7502—Farway-Sawtooth-Despair complex, 35 to 100 percent slopes

Cryic/udic mountain slopes
9001—Noca-Perfect complex, 35 to 100 percent slopes
9003—Stetattle-Doubtful-Arriva complex, 15 to 100 percent slopes
9008—Mox-Doubtful-Perfect complex, 35 to 100 percent slopes
9010—Doubtful-Treen-Rock outcrop complex, 35 to 100 percent slopes
9012—Spickard-Tepeh-Maggib complex, 15 to 100 percent slopes
9016—Doubtful-Triumph-Perfect complex, 35 to 100 percent slopes

Cryic/xeric mountain slopes
9501—Stehekin-Primus-Stetattle complex, 35 to 100 percent slopes

Dominantly miscellaneous land types
9997—Rock outcrop-Despair complex, 35 to 100 percent slopes
9998—Rock outcrop-Glaciers-Harlequin complex, 25 to 100 percent slopes
9999—Water

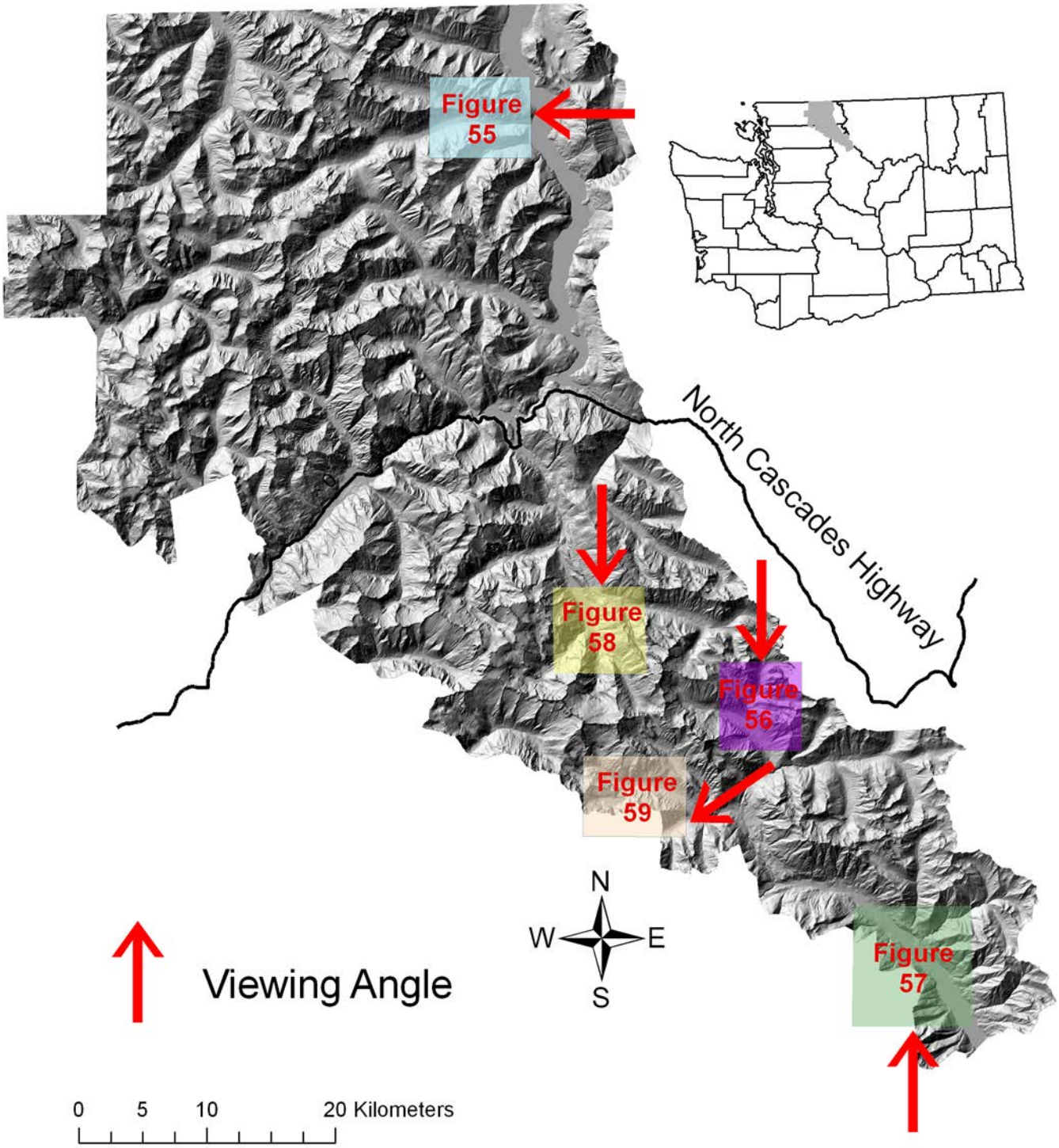


Figure 54.—Index for detailed soil map unit block diagrams for the North Cascades National Park Complex (see figures 55 through 59).

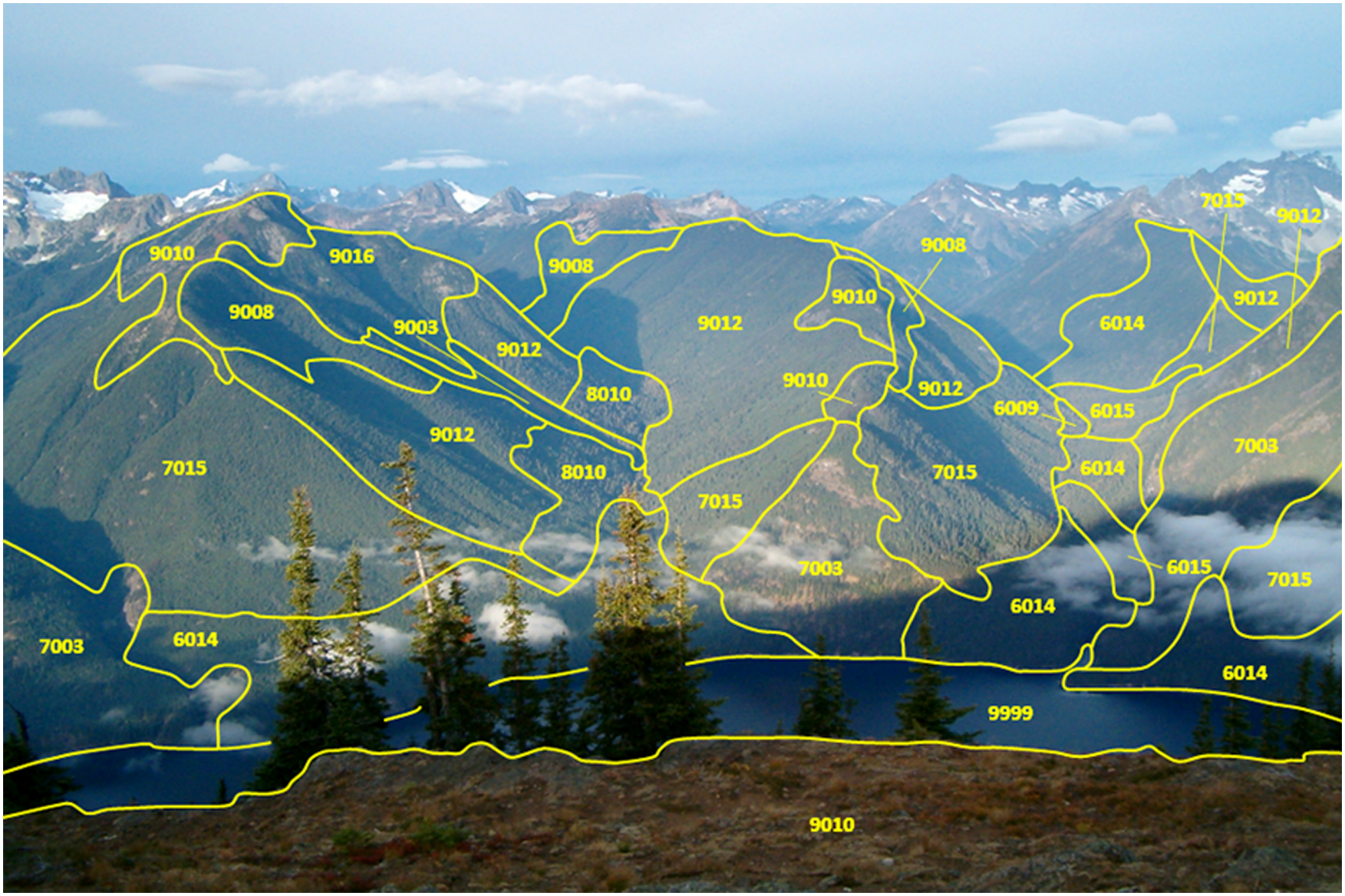


Figure 55.—Detailed soil map unit delineations and numbers draped over a photograph from Desolation Peak, looking west into the Little Beaver (right) and Arctic Creek (left) drainages. Ross Lake is in the middle foreground. The lower elevation frigid/udic map units (numbers in the 6000s and 7000s) transition to the higher elevation cryic/udic map units (numbers in the 8000s and 9000s) that are on protected northerly aspects.

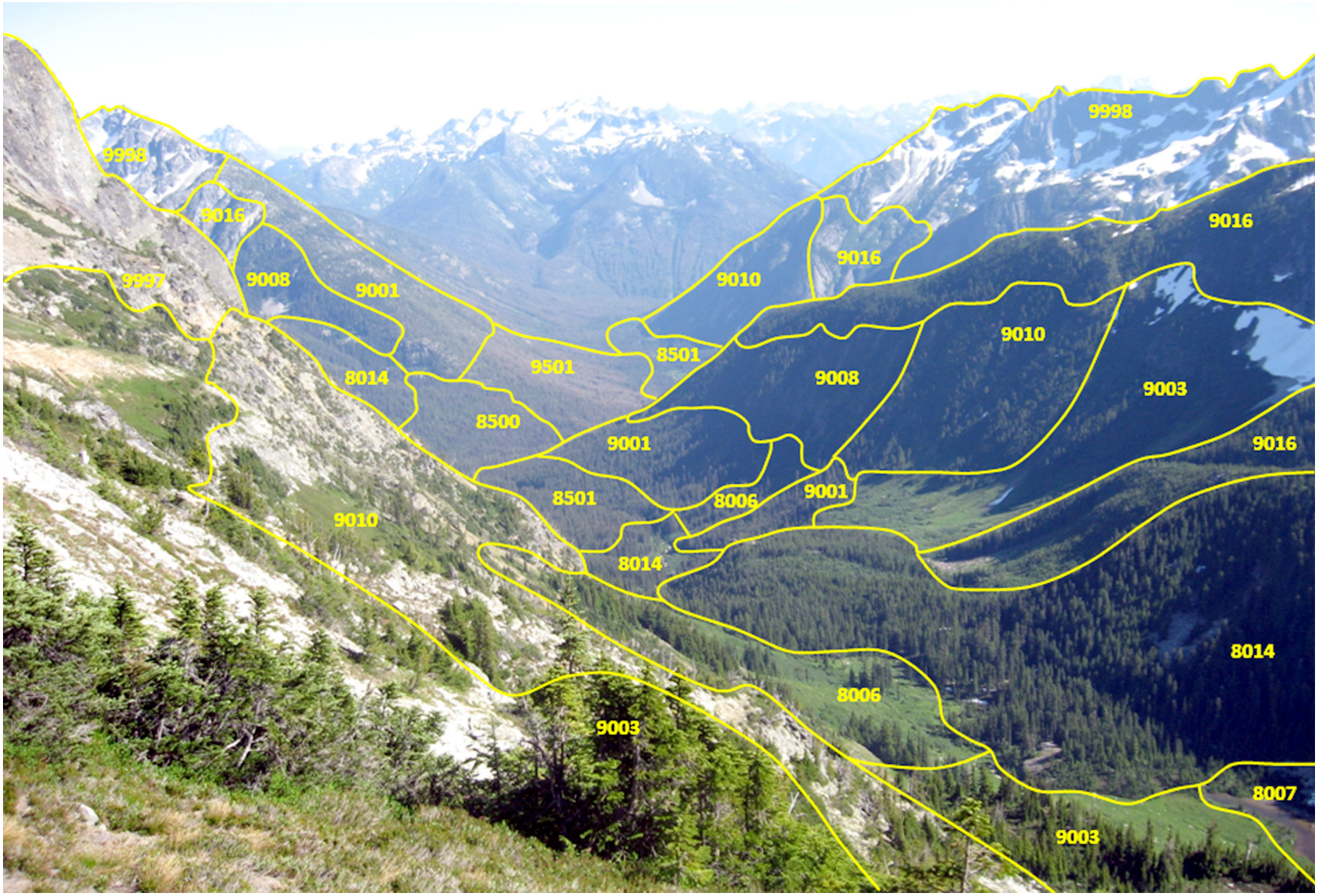


Figure 56.—Detailed soil map unit delineations and numbers draped over a photograph looking south down the Grizzly Creek drainage toward McGregor Mountain. The cryic/xeric map units (8500, 8501, and 9501) transition into the cryic/udic map units at the higher elevations. The valley floor map units (numbers in the 8000s) transition to the higher upland map units (numbers in the 9000s), with map units 9997 and 9998 typically at the highest elevations in the watershed.

Figure 57.—Detailed soil map unit delineations and numbers draped over a photograph from the 2006 National Agriculture Image Program generated in ESRI® ArcScene™ 9.2, looking up the Stehekin Valley from above Lake Chelan. Frigid/xeric map units are throughout this area. Areas that are dominantly Rock outcrop (map unit 9997) are evident as the bright tone. A mosaic of densely forested segments (map units 7500 and 7502) and sparsely forested segments with extensive areas of shallow soils and Rock outcrop (map unit 7501) are on the steep hillsides surrounding the valley.

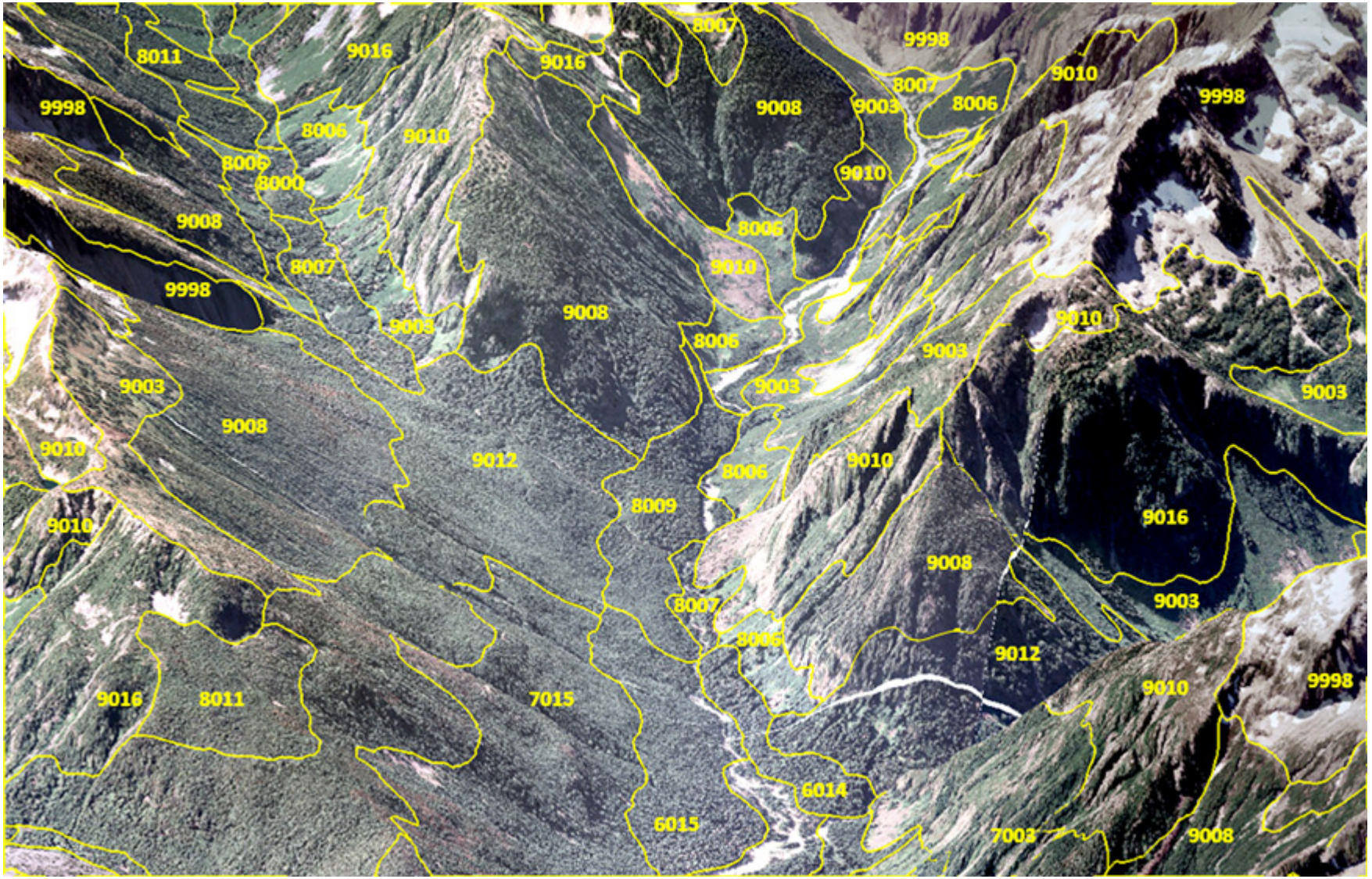


Figure 58.— Detailed soil map unit delineations and numbers draped over a photograph from the 2006 National Agriculture Image Program generated in ESRI® ArcScene™ 9.2, from above Thunder Creek looking south to the upper reaches of Thunder Creek (upper left) and Skagit Queen Creek (upper center). In this area, frigid/udic map units (6014, 6015, 7003, and 7015) transition through the low west cryic/udic unit (map unit 9012) to the high cryic/udic units (map units 8009, 9008, 9010, and 9016). Along the major drainageways are visible cryic/udic map units (numbers in the 8000s) on low slope valley floor that transition to the map units in the higher slope upland positions (numbers in the 9000s). Map units 9010, 9016, 9997, and 9998 typically are at the highest reaches of the watershed.

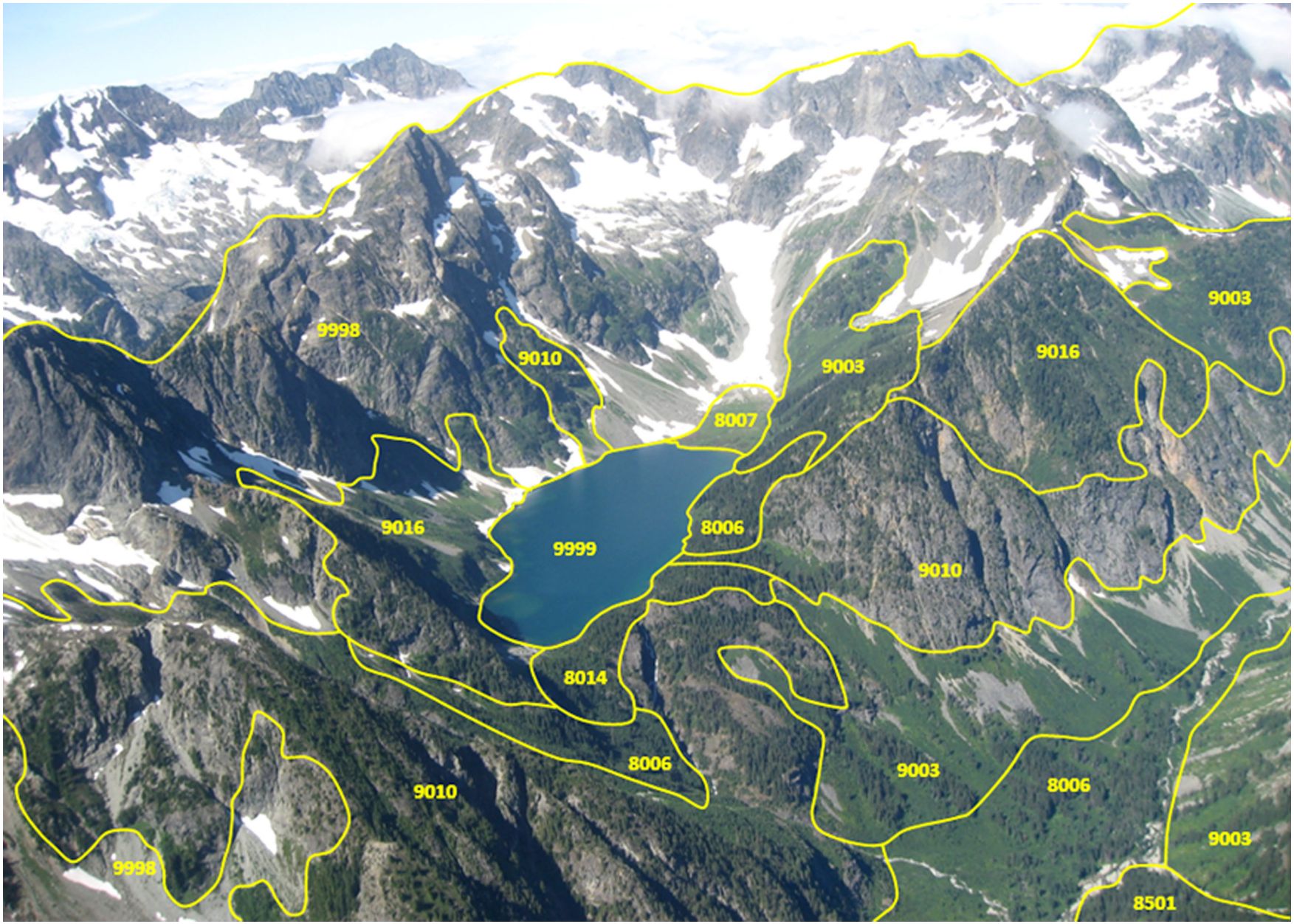


Figure 59.—Detailed soil map unit delineations and numbers draped over an oblique aerial photograph looking southwest to the survey area boundary above Trapper Lake, in the Stehekin River watershed. This high cryic/udic area consists dominantly of steep slopes and a mosaic of coniferous forests, areas that support deciduous cover, and Rock outcrop. Cryic/udic map units (numbers in the 8000s) on the low valley floors to units on the higher upland positions (numbers in the 9000s). Map unit 9998 is dominant on the skyline in the photograph. This unit is throughout the survey area, at the highest elevations where glaciers and seasonal snowfields are abundant.

Detailed Soil Map Unit Descriptions

6000—Manlywham-Nohokomeen-Roland complex, 0 to 5 percent slopes

Map Unit Setting

General landscape: Valleys (fig. 60)
Elevation: 125 to 695 meters
Mean annual precipitation: 1,245 to 2,311 millimeters
Mean annual air temperature: 6 to 10 degrees C
Frost-free period: 60 to 90 days

Map Unit Composition

Manlywham and similar soils: 60 percent
Nohokomeen and similar soils: 15 percent
Roland and similar soils: 15 percent
Dissimilar minor components: 10 percent

Manlywham Soil

Setting
Landform: Depressions, flood plains
Landform position (two-dimensional): Toeslopes

Figure 60.—View from above Junction Camp looking down to the meandering flood plain of Thunder Creek, showing an area of Manlywham-Nohokomeen-Roland complex, 0 to 5 percent slopes. The dominant ecological sites include forested areas (F003XN920WA) and wetland areas (R003XN613WA).

Landform position (three-dimensional): Lower third of mountainflanks
Aspect (range): All aspects
Parent material: Alluvium

Properties and qualities
Slope: 0 to 2 percent
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Poorly drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: Occasional (see Water Features table)
Ponding frequency: Frequent (see Water Features table)
Seasonal high water table (minimum depth): At the soil surface to a depth of 10 centimeters (see Water Features table)
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Very low (about 7.4 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 3w

Vegetation
Ecological site identification number: R003XN613WA
Ecological site name: Low Mountain Unforested Wetlands
Common vegetation: Salmonberry, redosier dogwood, red alder, American skunkcabbage, false lily of the valley

Typical profile
A1—0 to 6 centimeters; mucky fine sandy loam
A2—6 to 24 centimeters; sandy loam
Cg1—24 to 60 centimeters; gravelly sandy loam
Cg2—60 to 104 centimeters; cobbly loamy coarse sand
Cg3—104 to 150 centimeters; very cobbly loamy coarse sand

Nohokomeen Soil

Setting
Landform: Fan terraces, debris aprons, terraces
Landform position (two-dimensional): Footslopes, toeslopes
Landform position (three-dimensional): Lower third of mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash and alluvium over glacial drift

Properties and qualities
Slope: 0 to 5 percent
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Somewhat poorly drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: Occasional (see Water Features table)
Ponding frequency: None
Seasonal high water table (minimum depth): About 30 to 50 centimeters (see Water Features table)
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Moderate (about 19.5 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 4w

Vegetation
Ecological site identification number: F003XN920WA
Ecological site scientific name: Populus balsamifera ssp. trichocarpa-Alnus rubra/Acer circinatum-Rubus spectabilis/Asarum caudatum-Athyrium filix-femina
Ecological site common name: Frigid Riparian Forest
Common trees: Black cottonwood, Douglas-fir, grand fir, red alder, western hemlock, western redcedar
Common understory vegetation: Vine maple, salmonberry, devilsclub, prickly currant, red elderberry, common ladyfern, Canadian wildginger, western brackenfern, queencup bead lily, starry false lily of the valley, western swordfern

Typical profile
Oi—0 to 3 centimeters; slightly decomposed plant material
Oe—3 to 7 centimeters; moderately decomposed plant material
Bw—7 to 30 centimeters; ashy sandy loam
Bg1—30 to 73 centimeters; ashy sandy loam
Bg2—73 to 108 centimeters; very fine sandy loam
2BC—108 to 152 centimeters; very gravelly loamy sand

Roland Soil

Setting
Landform: Fan terraces, debris aprons, terraces
Landform position (two-dimensional): Footslopes, toeslopes
Landform position (three-dimensional): Lower third of mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash and alluvium over glacial drift

Properties and qualities
Slope: 0 to 5 percent
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Somewhat poorly drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: Occasional (see Water Features table)
Ponding frequency: None
Seasonal high water table (minimum depth): About 20 to 45 centimeters (see Water Features table)
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Moderate (about 15.6 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 4w

Vegetation
Ecological site identification number: F003XN920WA
Ecological site scientific name: Populus balsamifera ssp. trichocarpa-Alnus rubra/Acer circinatum-Rubus spectabilis/Asarum caudatum-Athyrium filix-femina
Ecological site common name: Frigid Riparian Forest
Common trees: Black cottonwood, Douglas-fir, grand fir, red alder, western hemlock, western redcedar
Common understory vegetation: Vine maple, salmonberry, devilsclub, prickly currant, red elderberry, common ladyfern, Canadian wildginger, western brackenfern, queencup bead lily, starry false lily of the valley, western swordfern

Typical profile
Oe—0 to 3 centimeters; moderately decomposed plant material
A—3 to 17 centimeters; fine sandy loam
Bg1—17 to 42 centimeters; fine sandy loam
Bg2—42 to 78 centimeters; very fine sandy loam
Bg3—78 to 137 centimeters; loamy sand
Bg4—137 to 152 centimeters; sand

Dissimilar Minor Components

Riverwash
Percentage of map unit: 5 percent
Landform: Flood plains, terraces

Skymo soils
Percentage of map unit: 5 percent
Landform: Debris cones, terraces

6009—Ragged-Tricouni-Cosho complex, 15 to 65 percent slopes

Map Unit Setting

General landscape: Mountains
Elevation: 120 to 1,420 meters
Mean annual precipitation: 1,143 to 2,565 millimeters
Mean annual air temperature: 5 to 10 degrees C
Frost-free period: 60 to 90 days

Map Unit Composition

Ragged, deciduous, and similar soils: 50 percent
Tricouni, deciduous, and similar soils: 30 percent
Cosho and similar soils: 15 percent
Dissimilar minor component: 5 percent

Ragged Soil, Deciduous

Setting
Landform: Debris cones
Landform position (two-dimensional): Footslopes
Landform position (three-dimensional): Lower third of mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash mixed with alluvium

Properties and qualities
Slope: 15 to 65 percent
Percentage of surface area covered with rock fragments: 0 to 30 percent with stones
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline

Sodicity (maximum): Not sodic
Available water capacity (entire profile): Very low (about 7.5 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: F003XN922WA
Ecological site scientific name: Acer circinatum/Ribes lacustre-Vaccinium parvifolium/ Polystichum munitum-Pteridium aquilinum
Ecological site common name: Frigid/Udic Active Natural Disturbance
Common trees: Vine maple
Common understory vegetation: Prickly currant, red huckleberry, Cascade Oregongrape, pachistima, western swordfern, western brackenfern, queencup bead lily

Typical profile
Oi—0 to 2 centimeters; slightly decomposed plant material
Oe—2 to 5 centimeters; moderately decomposed plant material
Bw1—5 to 20 centimeters; gravelly ashy loamy sand
Bw2—20 to 34 centimeters; ashy sandy loam
2C—34 to 150 centimeters; extremely cobbly sand

Tricouni Soil, Deciduous

Setting
Landform: Debris cones
Landform position (two-dimensional): Footslopes
Landform position (three-dimensional): Lower third of mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash mixed with alluvium

Properties and qualities
Slope: 15 to 65 percent
Percentage of surface area covered with rock fragments: 0 to 30 percent with stones
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 13.6 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: F003XN922WA
Ecological site scientific name: Acer circinatum/Ribes lacustre-Vaccinium parvifolium/Polystichum munitum-Pteridium aquilinum
Ecological site common name: Frigid/Udic Active Natural Disturbance
Common trees: Vine maple
Common understory vegetation: Prickly currant, red huckleberry, Cascade Oregongrape, pachistima, western swordfern, western brackenfern, queencup bead lily

Typical profile
Oi—0 to 3 centimeters; slightly decomposed plant material
Oe—3 to 9 centimeters; moderately decomposed plant material
E—9 to 10 centimeters; ashy sandy loam
Bw1—10 to 28 centimeters; gravelly ashy sandy loam
2Bw2—28 to 60 centimeters; very gravelly sandy loam
2BC—60 to 104 centimeters; gravelly sandy loam
2C—104 to 152 centimeters; very gravelly loamy sand

Cosho Soil

Setting
Landform: Debris cones
Landform position (two-dimensional): Footslopes
Landform position (three-dimensional): Lower third of mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash over glacial drift

Properties and qualities
Slope: 15 to 65 percent
Percentage of surface area covered with rock fragments: 0 to 50 percent with cobbles
Depth to restrictive feature: 50 to 100 centimeters to lithic bedrock
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 13.5 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: F003XN921WA
Ecological site scientific name: Tsuga heterophylla-Thuja plicata/Acer circinatum-Vaccinium parvifolium/Linnaea borealis-Polystichum munitum
Ecological site common name: Frigid/Udic Coniferous
Common trees: Bigleaf maple, Douglas-fir, grand fir, paper birch, western hemlock, western redcedar
Common understory vegetation: Vine maple, red huckleberry, Cascade Oregongrape, prince's pine, salal, twinflower, western swordfern, western rattlesnake plantain, broadleaf starflower, western brackenfern

Typical profile
Oi—0 to 6 centimeters; slightly decomposed plant material
Oe—6 to 14 centimeters; moderately decomposed plant material
E—14 to 15 centimeters; gravelly ashy sandy loam
Bw—15 to 53 centimeters; gravelly ashy sandy loam
2BC—53 to 75 centimeters; very gravelly loamy sand
2C—75 to 90 centimeters; very gravelly loamy sand
2R—90 to 152 centimeters; unweathered bedrock

Dissimilar Minor Component

Nohokomeen soils
Percentage of map unit: 5 percent
Landform: Debris cones, terraces

6010—Roland-Skymo-Deerlick complex, 0 to 25 percent slopes

Map Unit Setting

General landscape: Valleys
Elevation: 105 to 865 meters
Mean annual precipitation: 1,143 to 2,565 millimeters
Mean annual air temperature: 5 to 10 degrees C
Frost-free period: 60 to 90 days

Map Unit Composition

Roland and similar soils: 40 percent
Skymo and similar soils: 25 percent
Deerlick and similar soils: 20 percent
Dissimilar minor components: 15 percent

Roland Soil

Setting

Landform: Fan terraces, debris aprons, terraces
Landform position (two-dimensional): Footslopes, toeslopes
Landform position (three-dimensional): Lower third of mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash and alluvium over glacial drift

Properties and qualities

Slope: 0 to 25 percent
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Somewhat poorly drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: Occasional (see Water Features table)
Ponding frequency: None
Seasonal high water table (minimum depth): About 20 to 45 centimeters (see Water Features table)
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Moderate (about 15.6 centimeters)

Land capability classification

Land capability subclass (nonirrigated): 4e

Vegetation

Ecological site identification number: F003XN920WA
Ecological site scientific name: Populus balsamifera ssp. trichocarpa-Alnus rubra/Acer circinatum-Rubus spectabilis/Asarum caudatum-Athyrium filix-femina
Ecological site common name: Frigid Riparian Forest
Common trees: Black cottonwood, Douglas-fir, grand fir, red alder, western hemlock, western redcedar
Common understory vegetation: Vine maple, salmonberry, devilsclub, prickly currant, red elderberry, common ladyfern, Canadian wildginger, western brackenfern, queencup bead lily, starry false lily of the valley, western swordfern

Typical profile

Oe—0 to 3 centimeters; moderately decomposed plant material
A—3 to 17 centimeters; fine sandy loam
Bg1—17 to 42 centimeters; fine sandy loam

Bg2—42 to 78 centimeters; very fine sandy loam
Bg3—78 to 137 centimeters; loamy sand
Bg4—137 to 152 centimeters; sand

Skymo Soil

Setting
Landform: Debris cones, terraces
Landform position (two-dimensional): Footslopes
Landform position (three-dimensional): Lower third of mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash mixed with alluvium

Properties and qualities
Slope: 0 to 25 percent
Percentage of surface area covered with rock fragments: 0 to 15 percent with stones
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Moderately well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: Occasional (see Water Features table)
Ponding frequency: None
Seasonal high water table (minimum depth): About 60 to 100 centimeters (see Water Features table)
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 7.9 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 4e

Vegetation
Ecological site identification number: F003XN921WA
Ecological site scientific name: Tsuga heterophylla-Thuja plicata/Acer circinatum-Vaccinium parvifolium/Linnaea borealis-Polystichum munitum
Ecological site common name: Frigid/Udic Coniferous
Common trees: Bigleaf maple, Douglas-fir, grand fir, paper birch, western hemlock, western redcedar
Common understory vegetation: Vine maple, red huckleberry, Cascade Oregongrape, prince's pine, salal, twinflower, western swordfern, western rattlesnake plantain, broadleaf starflower, western brackenfern

Typical profile
Oi—0 to 2 centimeters; slightly decomposed plant material
C—2 to 10 centimeters; coarse sand
Ab—10 to 16 centimeters; loamy sand
C′—16 to 34 centimeters; sand
A′b—34 to 40 centimeters; sandy loam
Bwb1—40 to 45 centimeters; loamy sand
Bwb2—45 to 66 centimeters; loamy sand
Bwb3—66 to 90 centimeters; loamy sand
C″—90 to 152 centimeters; gravelly sand

Deerlick Soil

Setting
Landform: Alluvial fans, terraces, flood plains
Landform position (two-dimensional): Backslopes, footslopes, toeslopes

Landform position (three-dimensional): Lower third of mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash and alluvium over alluvium and glacial drift

Properties and qualities
Slope: 0 to 15 percent
Percentage of surface area covered with rock fragments: 0 to 50 percent with cobbles
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Moderately well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: Occasional (see Water Features table)
Ponding frequency: None
Seasonal high water table (minimum depth): About 50 to 80 centimeters (see Water Features table)
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 15.1 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 4s

Vegetation
Ecological site identification number: F003XN921WA
Ecological site scientific name: Tsuga heterophylla-Thuja plicata/Acer circinatum-Vaccinium parvifolium/Linnaea borealis-Polystichum munitum
Ecological site common name: Frigid/Udic Coniferous
Common trees: Bigleaf maple, Douglas-fir, grand fir, paper birch, western hemlock, western redcedar
Common understory vegetation: Vine maple, red huckleberry, Cascade Oregongrape, prince's pine, salal, twinflower, western swordfern, western rattlesnake plantain, broadleaf starflower, western brackenfern

Typical profile
Oi—0 to 3 centimeters; slightly decomposed plant material
Oe—3 to 10 centimeters; moderately decomposed plant material
A—10 to 14 centimeters; ashy silt loam
Bw—14 to 22 centimeters; ashy sandy loam
C1—22 to 30 centimeters; stratified gravelly ashy coarse sand
C2—30 to 50 centimeters; stratified very gravelly ashy coarse sand
2Bg—50 to 64 centimeters; very fine sandy loam
2Cg—64 to 80 centimeters; very fine sand
3C—80 to 152 centimeters; extremely cobbly sand

Dissimilar Minor Components

Manlywham soils
Percentage of map unit: 5 percent
Landform: Depressions, flood plains

Ragged soils
Percentage of map unit: 5 percent
Landform: Debris cones

Riverwash
Percentage of map unit: 5 percent
Landform: Flood plains, terraces

6014—Thorton-Ragged-Ledeir complex, 15 to 65 percent slopes

Map Unit Setting

General landscape: Mountains
Elevation: 110 to 1,535 meters
Mean annual precipitation: 889 to 2,565 millimeters
Mean annual air temperature: 4 to 10 degrees C
Frost-free period: 60 to 90 days

Map Unit Composition

Thorton and similar soils: 40 percent
Ragged and similar soils: 25 percent
Ledeir and similar soils: 15 percent
Dissimilar minor components: 20 percent

Thorton Soil

Setting
Landform: Debris aprons
Landform position (two-dimensional): Footslopes
Landform position (three-dimensional): Lower third of mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash over glacial drift

Properties and qualities
Slope: 15 to 65 percent
Percentage of surface area covered with rock fragments: 0 to 30 percent with stones
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Moderate (about 16 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: F003XN921WA
Ecological site scientific name: Tsuga heterophylla-Thuja plicata/Acer circinatum-Vaccinium parvifolium/Linnaea borealis-Polystichum munitum
Ecological site common name: Frigid/Udic Coniferous
Common trees: Bigleaf maple, Douglas-fir, grand fir, paper birch, western hemlock, western redcedar
Common understory vegetation: Vine maple, red huckleberry, Cascade Oregongrape, prince's pine, salal, twinflower, western swordfern, western rattlesnake plantain, broadleaf starflower, western brackenfern

Typical profile
Oi—0 to 4 centimeters; slightly decomposed plant material
Oe—4 to 8 centimeters; moderately decomposed plant material

E—8 to 12 centimeters; ashy sandy loam
Bw1—12 to 30 centimeters; gravelly ashy sandy loam
Bw2—30 to 46 centimeters; gravelly ashy sandy loam
2BC1—46 to 60 centimeters; very gravelly sandy loam
2BC2—60 to 150 centimeters; very gravelly sandy loam

Ragged Soil

Setting
Landform: Debris cones
Landform position (two-dimensional): Footslopes
Landform position (three-dimensional): Lower third of mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash mixed with alluvium

Properties and qualities
Slope: 15 to 65 percent
Percentage of surface area covered with rock fragments: 0 to 30 percent with stones
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Very low (about 7.5 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: F003XN921WA
Ecological site scientific name: Tsuga heterophylla-Thuja plicata/Acer circinatum-Vaccinium parvifolium/Linnaea borealis-Polystichum munitum
Ecological site common name: Frigid/Udic Coniferous
Common trees: Bigleaf maple, Douglas-fir, grand fir, paper birch, western hemlock, western redcedar
Common understory vegetation: Vine maple, red huckleberry, Cascade Oregongrape, prince's pine, salal, twinflower, western swordfern, western rattlesnake plantain, broadleaf starflower, western brackenfern

Typical profile
Oi—0 to 2 centimeters; slightly decomposed plant material
Oe—2 to 5 centimeters; moderately decomposed plant material
Bw1—5 to 20 centimeters; gravelly ashy loamy sand
Bw2—20 to 34 centimeters; ashy sandy loam
2C—34 to 150 centimeters; extremely cobbly sand

Ledeir Soil

Setting
Landform: Debris aprons, valley walls, terraces
Landform position (two-dimensional): Footslopes
Landform position (three-dimensional): Lower third of mountainflanks

Aspect (range): All aspects
Parent material: Volcanic ash over alluvium

Properties and qualities
Slope: 15 to 35 percent
Percentage of surface area covered with rock fragments: 0 to 10 percent with cobbles
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Moderate (about 20.1 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: F003XN921WA
Ecological site scientific name: Tsuga heterophylla-Thuja plicata/Acer circinatum-Vaccinium parvifolium/Linnaea borealis-Polystichum munitum
Ecological site common name: Frigid/Udic Coniferous
Common trees: Bigleaf maple, Douglas-fir, grand fir, paper birch, western hemlock, western redcedar
Common understory vegetation: Vine maple, red huckleberry, Cascade Oregongrape, prince's pine, salal, twinflower, western swordfern, western rattlesnake plantain, broadleaf starflower, western brackenfern

Typical profile
Oi—0 to 2 centimeters; slightly decomposed plant material
Oe—2 to 12 centimeters; moderately decomposed plant material
E—12 to 20 centimeters; ashy sandy loam
Bs1—20 to 50 centimeters; ashy sandy loam
Bs2—50 to 82 centimeters; ashy fine sandy loam
2C—82 to 152 centimeters; very gravelly loamy sand

Dissimilar Minor Components

Cosho soils
Percentage of map unit: 5 percent
Landform: Debris cones, debris aprons, valley walls

Deerlick soils
Percentage of map unit: 5 percent
Landform: Alluvial fans, terraces, flood plains

Rock outcrop
Percentage of map unit: 5 percent
Landform: Valley walls

Tricouni soils, deciduous
Percentage of map unit: 5 percent
Landform: Debris cones, debris aprons, valley walls

6015—Tricouni-Ragged-Easy complex, 5 to 50 percent slopes

Map Unit Setting

General landscape: Mountains
Elevation: 105 to 1,490 meters
Mean annual precipitation: 991 to 2,464 millimeters
Mean annual air temperature: 4 to 10 degrees C
Frost-free period: 60 to 90 days

Map Unit Composition

Tricouni and similar soils: 50 percent
Ragged and similar soils: 25 percent
Easy and similar soils: 15 percent
Dissimilar minor components: 10 percent

Tricouni Soil

Setting
Landform: Debris cones
Landform position (two-dimensional): Footslopes
Landform position (three-dimensional): Lower third of mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash mixed with alluvium

Properties and qualities
Slope: 5 to 50 percent
Percentage of surface area covered with rock fragments: 0 to 30 percent with stones
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 13.6 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 6e

Vegetation
Ecological site identification number: F003XN921WA
Ecological site scientific name: Tsuga heterophylla-Thuja plicata/Acer circinatum-Vaccinium parvifolium/Linnaea borealis-Polystichum munitum
Ecological site common name: Frigid/Udic Coniferous
Common trees: Bigleaf maple, Douglas-fir, grand fir, paper birch, western hemlock, western redcedar
Common understory vegetation: Vine maple, red huckleberry, Cascade Oregongrape, prince's pine, salal, twinflower, western swordfern, western rattlesnake plantain, broadleaf starflower, western brackenfern

Typical profile
Oi—0 to 3 centimeters; slightly decomposed plant material
Oe—3 to 9 centimeters; moderately decomposed plant material

E—9 to 10 centimeters; ashy sandy loam
Bw1—10 to 28 centimeters; gravelly ashy sandy loam
2Bw2—28 to 60 centimeters; very gravelly sandy loam
2BC—60 to 104 centimeters; gravelly sandy loam
2C—104 to 152 centimeters; very gravelly loamy sand

Ragged Soil

Setting
Landform: Debris cones
Landform position (two-dimensional): Footslopes
Landform position (three-dimensional): Lower third of mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash mixed with alluvium

Properties and qualities
Slope: 5 to 50 percent
Percentage of surface area covered with rock fragments: 0 to 30 percent with stones
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Very low (about 7.5 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 6e

Vegetation
Ecological site identification number: F003XN921WA
Ecological site scientific name: Tsuga heterophylla-Thuja plicata/Acer circinatum-Vaccinium parvifolium/Linnaea borealis-Polystichum munitum
Ecological site common name: Frigid/Udic Coniferous
Common trees: Bigleaf maple, Douglas-fir, grand fir, paper birch, western hemlock, western redcedar
Common understory vegetation: Vine maple, red huckleberry, Cascade Oregongrape, prince's pine, salal, twinflower, western swordfern, western rattlesnake plantain, broadleaf starflower, western brackenfern

Typical profile
Oi—0 to 2 centimeters; slightly decomposed plant material
Oe—2 to 5 centimeters; moderately decomposed plant material
Bw1—5 to 20 centimeters; gravelly ashy loamy sand
Bw2—20 to 34 centimeters; ashy sandy loam
2C—34 to 150 centimeters; extremely cobbly sand

Easy Soil

Setting
Landform: Debris cones, valley walls (fig. 61)
Landform position (two-dimensional): Backslopes
Landform position (three-dimensional): Lower third of mountainflanks
Aspect (range): All aspects
Parent material: Mixed volcanic ash over glacial drift

Figure 61.—Typical area of Easy ashy sandy loam under a canopy of western hemlock and western redcedar in an area of Tricouni-Ragged-Easy complex, 5 to 50 percent slopes, near Ross Lake. The forestland ecological site is F003XN921WA.

Properties and qualities

Slope: 5 to 35 percent
Percentage of surface area covered with rock fragments: 0 to 30 percent with stones
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 11.5 centimeters)

Land capability classification

Land capability subclass (nonirrigated): 6e

Vegetation

Ecological site identification number: F003XN921WA
Ecological site scientific name: *Tsuga heterophylla-Thuja plicata/Acer circinatum-Vaccinium parvifolium/Linnaea borealis-Polystichum munitum*
Ecological site common name: Frigid/Udic Coniferous
Common trees: Bigleaf maple, Douglas-fir, grand fir, paper birch, western hemlock, western redcedar
Common understory vegetation: Vine maple, red huckleberry, Cascade Oregongrape, prince's pine, salal, twinflower, western swordfern, western rattlesnake plantain, broadleaf starflower, western brackenfern

Typical profile
Oi—0 to 3 centimeters; slightly decomposed plant material
Oe—3 to 6 centimeters; moderately decomposed plant material
E—6 to 12 centimeters; ashy sandy loam
Bs1—12 to 28 centimeters; gravelly ashy sandy loam
Bs2—28 to 41 centimeters; gravelly ashy sandy loam
2BC—41 to 66 centimeters; extremely gravelly sandy loam
2C—66 to 150 centimeters; extremely gravelly coarse sandy loam

Dissimilar Minor Components

Deerlick soils
Percentage of map unit: 5 percent
Landform: Alluvial fans, terraces, flood plains

Nohokomeen soils
Percentage of map unit: 5 percent
Landform: Fan terraces, terraces, debris aprons

6500—Sandalee-Kettling-Torment complex, 0 to 15 percent slopes

Map Unit Setting

General landscape: River valleys, mountains
Elevation: 335 to 980 meters
Mean annual precipitation: 635 to 1,448 millimeters
Mean annual air temperature: 5 to 10 degrees C
Frost-free period: 60 to 100 days

Map Unit Composition

Sandalee and similar soils: 40 percent
Kettling and similar soils: 25 percent
Torment and similar soils: 20 percent
Dissimilar minor components: 15 percent

Sandalee Soil

Setting
Landform: Terraces, flood plains
Landform position (two-dimensional): Toeslopes
Landform position (three-dimensional): Mountain bases
Aspect (range): All aspects
Parent material: Alluvium

Properties and qualities
Slope: 0 to 15 percent
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Somewhat poorly drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: Occasional (see Water Features table)
Ponding frequency: None
Seasonal high water table (minimum depth): About 20 to 45 centimeters (see Water Features table)
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 12.3 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 4w

Vegetation
Ecological site identification number: F003XN920WA
Ecological site scientific name: Populus balsamifera ssp. trichocarpa-Alnus rubra/Acer circinatum-Rubus spectabilis/Asarum caudatum-Athyrium filix-femina
Ecological site common name: Frigid Riparian Forest
Common trees: Black cottonwood, Douglas-fir, grand fir, red alder, western hemlock, western redcedar
Common understory vegetation: Vine maple, salmonberry, devilsclub, prickly currant, red elderberry, common ladyfern, Canadian wildginger, western brackenfern, queencup bead lily, starry false lily of the valley, western swordfern

Typical profile
Oi—0 to 2 centimeters; slightly decomposed plant material
A—2 to 11 centimeters; sandy loam
Bw—11 to 40 centimeters; fine sandy loam
Bg1—40 to 56 centimeters; fine sandy loam
Bg2—56 to 80 centimeters; fine sandy loam
Cg—80 to 152 centimeters; loamy coarse sand

Kettling Soil

Setting
Landform: Debris aprons
Landform position (two-dimensional): Footslopes, toeslopes
Landform position (three-dimensional): Mountain bases
Aspect (range): All aspects
Parent material: Volcanic ash and alluvium over glacial drift

Properties and qualities
Slope: 0 to 15 percent
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Moderately well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: Occasional (see Water Features table)
Ponding frequency: None
Seasonal high water table (minimum depth): About 50 to 80 centimeters (see Water Features table)
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Moderate (about 17.1 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 3e

Vegetation
Ecological site identification number: F003XN927WA
Ecological site scientific name: Pseudotsuga menziesii-Pinus ponderosa/Paxistima myrsinites-Amelanchier alnifolia/Calamagrostis rubescens-Collomia linearis
Ecological site common name: Frigid/Xeric Coniferous
Common trees: Bigleaf maple, Douglas-fir, grand fir, lodgepole pine, ponderosa pine, western white pine
Common understory vegetation: Pachistima, serviceberry, tall Oregongrape, birchleaf spirea, baldhip rose, kinnikinnick, snowbrush ceanothus, pinegrass, narrow-leaved collomia, western rattlesnake plantain, pathfinder

Typical profile
Oi—0 to 2 centimeters; slightly decomposed plant material
Oe—2 to 5 centimeters; moderately decomposed plant material
A—5 to 13 centimeters; sandy loam
Bw1—13 to 25 centimeters; loam
Bw2—25 to 60 centimeters; fine sandy loam
C1—60 to 90 centimeters; coarse sand
C2—90 to 152 centimeters; sandy loam

Torment Soil

Setting
Landform: Terraces
Landform position (two-dimensional): Toeslopes
Landform position (three-dimensional): Mountain bases
Aspect (range): All aspects
Parent material: Minor amount of volcanic ash mixed with alluvium and glacial drift

Properties and qualities
Slope: 0 to 10 percent
Percentage of surface area covered with rock fragments: 0 to 30 percent with cobbles
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Moderately well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: Occasional (see Water Features table)
Ponding frequency: None
Seasonal high water table (minimum depth): About 60 to 100 centimeters (see Water Features table)
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 9.6 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 6s

Vegetation
Ecological site identification number: F003XN927WA
Ecological site scientific name: Pseudotsuga menziesii-Pinus ponderosa/ Paxistima myrsinites-Amelanchier alnifolia/Calamagrostis rubescens-Collomia linearis
Ecological site common name: Frigid/Xeric Coniferous
Common trees: Bigleaf maple, Douglas-fir, grand fir, lodgepole pine, ponderosa pine, western white pine
Common understory vegetation: Pachistima, serviceberry, tall Oregongrape, birchleaf spirea, baldhip rose, kinnikinnick, snowbrush ceanothus, pinegrass, narrow-leaved collomia, western rattlesnake plantain, pathfinder

Typical profile
Oi—0 to 2 centimeters; slightly decomposed plant material
C1—2 to 15 centimeters; loamy sand
Oa—15 to 25 centimeters; highly decomposed plant material
C2—25 to 35 centimeters; gravelly coarse sand
C3—35 to 70 centimeters; very gravelly coarse sand
C4—70 to 152 centimeters; very gravelly loamy sand

Dissimilar Minor Components

Manlywham soils
Percentage of map unit: 10 percent
Landform: Depressions, flood plains

Riverwash
Percentage of map unit: 5 percent
Landform: Flood plains, terraces

6502—Mesahchie-Inspiration-Lyall complex, 15 to 65 percent slopes

Map Unit Setting

General landscape: Mountains
Elevation: 340 to 1,400 meters
Mean annual precipitation: 533 to 1,702 millimeters
Mean annual air temperature: 4 to 10 degrees C
Frost-free period: 70 to 100 days

Map Unit Composition

Mesahchie and similar soils: 50 percent
Inspiration and similar soils: 25 percent
Lyall and similar soils: 15 percent
Dissimilar minor components: 10 percent

Mesahchie Soil

Setting
Landform: Debris cones, valley walls
Landform position (two-dimensional): Backslopes
Landform position (three-dimensional): Lower third of mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash mixed with glacial drift over glacial drift

Properties and qualities
Slope: 15 to 65 percent
Percentage of surface area covered with rock fragments: 0 to 10 percent with cobbles
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 12.4 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: F003XN928WA
Ecological site scientific name: Acer macrophyllum-Prunus emarginata/Corylus cornuta var. californica-Acer circinatum/Maianthemum stellatum-Streptopus amplexifolius

Ecological site common name: Frigid/Xeric Active Natural Disturbance
Common trees: Bigleaf maple, bitter cherry, Douglas-fir, ponderosa pine
Common understory vegetation: Beaked hazelnut, vine maple, Sitka willow, pachistima, serviceberry, thimbleberry, snowberry, starry false Solomon's seal, claspleaf twistedstalk, broadleaf starflower

Typical profile
Oe—0 to 2 centimeters; moderately decomposed plant material
A1—2 to 20 centimeters; gravelly ashy fine sandy loam
A2—20 to 44 centimeters; gravelly ashy sandy loam
A3—44 to 74 centimeters; very cobbly ashy sandy loam
2BC—74 to 96 centimeters; very gravelly sandy loam
2C—96 to 152 centimeters; very gravelly loamy sand

Inspiration Soil

Setting
Landform: Debris aprons
Landform position (two-dimensional): Footslopes
Landform position (three-dimensional): Lower third of mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash over glacial drift

Properties and qualities
Slope: 15 to 65 percent
Percentage of surface area covered with rock fragments: 0 to 40 percent with cobbles
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Moderate (about 15.9 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: F003XN928WA
Ecological site scientific name: Acer macrophyllum-Prunus emarginata/Corylus cornuta var. californica-Acer circinatum/Maianthemum stellatum-Streptopus amplexifolius
Ecological site common name: Frigid/Xeric Active Natural Disturbance
Common trees: Bigleaf maple, bitter cherry, Douglas-fir, ponderosa pine
Common understory vegetation: Beaked hazelnut, vine maple, Sitka willow, pachistima, serviceberry, thimbleberry, snowberry, starry false Solomon's seal, claspleaf twistedstalk, broadleaf starflower

Typical profile
Oi—0 to 2 centimeters; slightly decomposed plant material
Oe—2 to 9 centimeters; moderately decomposed plant material
Oa—9 to 15 centimeters; highly decomposed plant material
A1—15 to 25 centimeters; very gravelly ashy sandy loam
A2—25 to 37 centimeters; extremely cobbly ashy sandy loam

Bw—37 to 64 centimeters; very gravelly ashy sandy loam
2BC—64 to 150 centimeters; extremely gravelly sandy loam

Lyall Soil

Setting
Landform: Valley walls
Landform position (two-dimensional): Backslopes
Landform position (three-dimensional): Lower third of mountainflanks
Aspect (range): All aspects
Parent material: Minor amount of volcanic ash mixed with alluvium and glacial drift

Properties and qualities
Slope: 15 to 65 percent
Percentage of surface area covered with rock fragments: 0 to 30 percent with cobbles
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 10.6 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: F003XN927WA
Ecological site scientific name: Pseudotsuga menziesii-Pinus ponderosa/Paxistima myrsinites-Amelanchier alnifolia/Calamagrostis rubescens-Collomia linearis
Ecological site common name: Frigid/Xeric Coniferous
Common trees: Bigleaf maple, Douglas-fir, grand fir, lodgepole pine, ponderosa pine, western white pine
Common understory vegetation: Pachistima, serviceberry, tall Oregongrape, birchleaf spirea, baldhip rose, kinnikinnick, snowbrush ceanothus, pinegrass, narrow-leaved collomia, western rattlesnake plantain, pathfinder

Typical profile
Oi—0 to 4 centimeters; slightly decomposed plant material
Oe—4 to 7 centimeters; moderately decomposed plant material
A—7 to 19 centimeters; gravelly ashy coarse sandy loam
Bw1—19 to 44 centimeters; very gravelly ashy coarse sandy loam
Bw2—44 to 75 centimeters; very gravelly loamy sand
Bw3—75 to 120 centimeters; very gravelly loamy sand
2C—120 to 150 centimeters; extremely gravelly loamy sand

Dissimilar Minor Components

Sandalee soils
Percentage of map unit: 5 percent
Landform: Terraces, flood plains, debris cones

Torment soils
Percentage of map unit: 5 percent
Landform: Terraces, flood plains, debris cones

6505—Farway-Lyall-Inspiration complex, 5 to 65 percent slopes

Map Unit Setting

General landscape: Mountains
Elevation: 335 to 1,045 meters
Mean annual precipitation: 483 to 1,702 millimeters
Mean annual air temperature: 6 to 10 degrees C
Frost-free period: 70 to 100 days

Map Unit Composition

Farway and similar soils: 50 percent
Lyall and similar soils: 30 percent
Inspiration and similar soils: 15 percent
Dissimilar minor component: 5 percent

Farway Soil

Setting

Landform: Debris aprons
Landform position (two-dimensional): Footslopes
Landform position (three-dimensional): Mountain bases
Aspect (range): All aspects
Parent material: Volcanic ash over colluvium and reworked glacial drift

Properties and qualities

Slope: 5 to 65 percent
Percentage of surface area covered with rock fragments: 0 to 10 percent with cobbles
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Moderate (about 20 centimeters)

Land capability classification

Land capability subclass (nonirrigated): 7e

Vegetation

Ecological site identification number: F003XN927WA
Ecological site scientific name: *Pseudotsuga menziesii-Pinus ponderosa/Paxistima myrsinites-Amelanchier alnifolia/Calamagrostis rubescens-Collomia linearis*
Ecological site common name: Frigid/Xeric Coniferous
Common trees: Bigleaf maple, Douglas-fir, grand fir, lodgepole pine, ponderosa pine, western white pine
Common understory vegetation: Pachistima, serviceberry, tall Oregongrape, birchleaf spirea, baldhip rose, kinnikinnick, snowbrush ceanothus, pinegrass, narrow-leaved collomia, western rattlesnake plantain, pathfinder

Typical profile

Oe—0 to 3 centimeters; moderately decomposed plant material
Bw1—3 to 45 centimeters; ashy fine sandy loam
Bw2—45 to 78 centimeters; cobbly ashy sandy loam

Bw3—78 to 90 centimeters; cobbly ashy sandy loam
2BC—90 to 152 centimeters; very gravelly sandy loam

Lyall Soil

Setting
Landform: Valley walls
Landform position (two-dimensional): Backslopes
Landform position (three-dimensional): Lower third of mountainflanks
Aspect (range): All aspects
Parent material: Minor amount of volcanic ash mixed with alluvium and glacial drift

Properties and qualities
Slope: 5 to 65 percent
Percentage of surface area covered with rock fragments: 0 to 30 percent with cobbles
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 10.6 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: F003XN927WA
Ecological site scientific name: Pseudotsuga menziesii-Pinus ponderosa/ Paxistima myrsinites-Amelanchier alnifolia/Calamagrostis rubescens-Collomia linearis
Ecological site common name: Frigid/Xeric Coniferous
Common trees: Bigleaf maple, Douglas-fir, grand fir, lodgepole pine, ponderosa pine, western white pine
Common understory vegetation: Pachistima, serviceberry, tall Oregongrape, birchleaf spirea, baldhip rose, kinnikinnick, snowbrush ceanothus, pinegrass, narrow-leaved collomia, western rattlesnake plantain, pathfinder

Typical profile
Oi—0 to 4 centimeters; slightly decomposed plant material
Oe—4 to 7 centimeters; moderately decomposed plant material
A—7 to 19 centimeters; gravelly ashy coarse sandy loam
Bw1—19 to 44 centimeters; very gravelly ashy coarse sandy loam
Bw2—44 to 75 centimeters; very gravelly loamy sand
Bw3—75 to 120 centimeters; very gravelly loamy sand
2C—120 to 150 centimeters; extremely gravelly loamy sand

Inspiration Soil

Setting
Landform: Debris aprons
Landform position (two-dimensional): Footslopes
Landform position (three-dimensional): Lower third of mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash over glacial drift

Properties and qualities
Slope: 5 to 65 percent
Percentage of surface area covered with rock fragments: 0 to 40 percent with cobbles
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Moderate (about 15.9 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: F003XN928WA
Ecological site scientific name: Acer macrophyllum-Prunus emarginata/Corylus cornuta var. californica-Acer circinatum/Maianthemum stellatum-Streptopus amplexifolius
Ecological site common name: Frigid/Xeric Active Natural Disturbance
Common trees: Bigleaf maple, bitter cherry, Douglas-fir, ponderosa pine
Common understory vegetation: Beaked hazelnut, vine maple, Sitka willow, pachistima, serviceberry, thimbleberry, snowberry, starry false Solomon's seal, claspleaf twistedstalk, broadleaf starflower

Typical profile
Oi—0 to 2 centimeters; slightly decomposed plant material
Oe—2 to 9 centimeters; moderately decomposed plant material
Oa—9 to 15 centimeters; highly decomposed plant material
A1—15 to 25 centimeters; very gravelly ashy sandy loam
A2—25 to 37 centimeters; extremely cobbly ashy sandy loam
Bw—37 to 64 centimeters; very gravelly ashy sandy loam
2BC—64 to 150 centimeters; extremely gravelly sandy loam

Dissimilar Minor Component

Torment soils
Percentage of map unit: 5 percent
Landform: Terraces, flood plains, debris cones

7003—Damnation-Ragged-Rock outcrop complex, 35 to 100 percent slopes

Map Unit Setting

General landscape: Mountains
Elevation: 155 to 1,800 meters
Mean annual precipitation: 1,143 to 2,515 millimeters
Mean annual air temperature: 3 to 10 degrees C
Frost-free period: 60 to 90 days

Map Unit Composition

Damnation and similar soils: 50 percent
Ragged and similar soils: 25 percent

Rock outcrop: 15 percent
Dissimilar minor components: 10 percent

Damnation Soil

Setting
Landform: Bedrock benches, valley walls
Landform position (two-dimensional): Backslopes
Landform position (three-dimensional): Mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash over glacial drift

Properties and qualities
Slope: 35 to 100 percent
Percentage of surface area covered with rock fragments: 0 to 65 percent with cobbles
Depth to restrictive feature: 25 to 50 centimeters to lithic bedrock
Drainage class: Well drained
Capacity to transmit water (Ksat): High (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 8.9 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: F003XN921WA
Ecological site scientific name: *Tsuga heterophylla-Thuja plicata/Acer circinatum-Vaccinium parvifolium/Linnaea borealis-Polystichum munitum*
Ecological site common name: Frigid/Udic Coniferous
Common trees: Bigleaf maple, Douglas-fir, grand fir, paper birch, western hemlock, western redcedar
Common understory vegetation: Vine maple, red huckleberry, Cascade Oregongrape, prince's pine, salal, twinflower, western swordfern, western rattlesnake plantain, broadleaf starflower, western brackenfern

Typical profile
Oi—0 to 4 centimeters; slightly decomposed plant material
Oa—4 to 6 centimeters; highly decomposed plant material
Bw1—6 to 14 centimeters; cobbly ashy sandy loam
Bw2—14 to 31 centimeters; cobbly ashy sandy loam
Bw3—31 to 45 centimeters; cobbly ashy sandy loam
R—45 to 152 centimeters; unweathered bedrock

Ragged Soil

Setting
Landform: Valley walls, debris aprons
Landform position (two-dimensional): Backslopes
Landform position (three-dimensional): Mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash mixed with alluvium

Properties and qualities
Slope: 35 to 100 percent
Percentage of surface area covered with rock fragments: 0 to 30 percent with stones

Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Very low (about 7.5 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: F003XN921WA
Ecological site scientific name: *Tsuga heterophylla-Thuja plicata/Acer circinatum-Vaccinium parvifolium/Linnaea borealis-Polystichum munitum*
Ecological site common name: Frigid/Udic Coniferous
Common trees: Bigleaf maple, Douglas-fir, grand fir, paper birch, western hemlock, western redcedar
Common understory vegetation: Vine maple, red huckleberry, Cascade Oregongrape, prince's pine, salal, twinflower, western swordfern, western rattlesnake plantain, broadleaf starflower, western brackenfern

Typical profile
Oi—0 to 2 centimeters; slightly decomposed plant material
Oe—2 to 5 centimeters; moderately decomposed plant material
Bw1—5 to 20 centimeters; gravelly ashy loamy sand
Bw2—20 to 34 centimeters; ashy sandy loam
2C—34 to 150 centimeters; extremely cobbly sand

Rock Outcrop

Landform: Bedrock benches, valley walls
Slope: 35 to 100 percent
Land capability subclass (nonirrigated): 8

Dissimilar Minor Components

Rubble land
Percentage of map unit: 5 percent
Landform: Valley walls

Tricouni soils, deciduous
Percentage of map unit: 5 percent
Landform: Debris cones, valley walls

7015—Thorton-Ragged-Damnation complex, 35 to 100 percent slopes

Map Unit Setting

General landscape: Mountains (fig. 62)
Elevation: 110 to 1,685 meters
Mean annual precipitation: 1,016 to 2,515 millimeters
Mean annual air temperature: 3 to 10 degrees C
Frost-free period: 60 to 90 days

Figure 62.—View looking across Ross Lake from McMillan Camp to the outlet of Big Beaver Creek at right and Sourdough Mountain in distant background left of the prominent peak. The soil climate regimes transition from frigid/udic (center) and frigid/xeric (far right) at lake level to low cryic/udic midway up the mountain slope to high cryic/udic on the upper third of the mountain.

Map Unit Composition

Thorton and similar soils: 40 percent
Ragged and similar soils: 25 percent
Damnation and similar soils: 15 percent
Dissimilar minor components: 20 percent

Thorton Soil

Setting
Landform: Valley walls, debris aprons
Landform position (two-dimensional): Backslopes
Landform position (three-dimensional): Mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash over glacial drift

Properties and qualities
Slope: 35 to 100 percent
Percentage of surface area covered with rock fragments: 0 to 30 percent with stones
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters

Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Moderate (about 16 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: F003XN921WA
Ecological site scientific name: Tsuga heterophylla-Thuja plicata/Acer circinatum-Vaccinium parvifolium/Linnaea borealis-Polystichum munitum
Ecological site common name: Frigid/Udic Coniferous
Common trees: Bigleaf maple, Douglas-fir, grand fir, paper birch, western hemlock, western redcedar
Common understory vegetation: Vine maple, red huckleberry, Cascade Oregongrape, prince's pine, salal, twinflower, western swordfern, western rattlesnake plantain, broadleaf starflower, western brackenfern

Typical profile
Oi—0 to 4 centimeters; slightly decomposed plant material
Oe—4 to 8 centimeters; moderately decomposed plant material
E—8 to 12 centimeters; ashy sandy loam
Bw1—12 to 30 centimeters; gravelly ashy sandy loam
Bw2—30 to 46 centimeters; gravelly ashy sandy loam
2BC1—46 to 60 centimeters; very gravelly sandy loam
2BC2—60 to 150 centimeters; very gravelly sandy loam

Ragged Soil

Setting
Landform: Valley walls, debris aprons
Landform position (two-dimensional): Backslopes
Landform position (three-dimensional): Mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash mixed with alluvium

Properties and qualities
Slope: 35 to 100 percent
Percentage of surface area covered with rock fragments: 0 to 30 percent with stones
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Very low (about 7.5 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: F003XN921WA
Ecological site scientific name: Tsuga heterophylla-Thuja plicata/Acer circinatum-Vaccinium parvifolium/Linnaea borealis-Polystichum munitum
Ecological site common name: Frigid/Udic Coniferous

Common trees: Bigleaf maple, Douglas-fir, grand fir, paper birch, western hemlock, western redcedar
Common understory vegetation: Vine maple, red huckleberry, Cascade Oregongrape, prince's pine, salal, twinflower, western swordfern, western rattlesnake plantain, broadleaf starflower, western brackenfern

Typical profile
Oi—0 to 2 centimeters; slightly decomposed plant material
Oe—2 to 5 centimeters; moderately decomposed plant material
Bw1—5 to 20 centimeters; gravelly ashy loamy sand
Bw2—20 to 34 centimeters; ashy sandy loam
2C—34 to 150 centimeters; extremely cobbly sand

Damnation Soil

Setting
Landform: Bedrock benches, valley walls
Landform position (two-dimensional): Backslopes
Landform position (three-dimensional): Mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash over glacial drift

Properties and qualities
Slope: 35 to 100 percent
Percentage of surface area covered with rock fragments: 0 to 65 percent with cobbles
Depth to restrictive feature: 25 to 50 centimeters to lithic bedrock
Drainage class: Well drained
Capacity to transmit water (Ksat): High (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 8.9 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: F003XN921WA
Ecological site scientific name: Tsuga heterophylla-Thuja plicata/Acer circinatum-Vaccinium parvifolium/Linnaea borealis-Polystichum munitum
Ecological site common name: Frigid/Udic Coniferous
Common trees: Bigleaf maple, Douglas-fir, grand fir, paper birch, western hemlock, western redcedar
Common understory vegetation: Vine maple, red huckleberry, Cascade Oregongrape, prince's pine, salal, twinflower, western swordfern, western rattlesnake plantain, broadleaf starflower, western brackenfern

Typical profile
Oi—0 to 4 centimeters; slightly decomposed plant material
Oa—4 to 6 centimeters; highly decomposed plant material
Bw1—6 to 14 centimeters; cobbly ashy sandy loam
Bw2—14 to 31 centimeters; cobbly ashy sandy loam
Bw3—31 to 45 centimeters; cobbly ashy sandy loam
R—45 to 152 centimeters; unweathered bedrock

Dissimilar Minor Components

Cosho soils
Percentage of map unit: 5 percent
Landform: Bedrock benches, valley walls

Deerlick soils
Percentage of map unit: 5 percent
Landform: Debris aprons, debris cones

Rock outcrop
Percentage of map unit: 5 percent
Landform: Bedrock benches, valley walls

Tricouni soils, deciduous
Percentage of map unit: 5 percent
Landform: Debris aprons, debris cones

7500—Inspiration-Mesahchie-Sawtooth complex, 35 to 100 percent slopes

Map Unit Setting

General landscape: Mountains
Elevation: 350 to 1,795 meters
Mean annual precipitation: 584 to 1,702 millimeters
Mean annual air temperature: 2 to 8 degrees C
Frost-free period: 60 to 100 days

Map Unit Composition

Inspiration and similar soils: 50 percent
Mesahchie and similar soils: 25 percent
Sawtooth and similar soils: 15 percent
Dissimilar minor components: 10 percent

Inspiration Soil

Setting
Landform: Valley walls, debris aprons
Landform position (two-dimensional): Backslopes
Landform position (three-dimensional): Mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash over glacial drift

Properties and qualities
Slope: 35 to 100 percent
Percentage of surface area covered with rock fragments: 0 to 40 percent with cobbles
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Moderate (about 15.9 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: F003XN928WA
Ecological site scientific name: Acer macrophyllum-Prunus emarginata/Corylus cornuta var. californica-Acer circinatum/Maianthemum stellatum-Streptopus amplexifolius
Ecological site common name: Frigid/Xeric Active Natural Disturbance
Common trees: Bigleaf maple, bitter cherry, Douglas-fir, ponderosa pine
Common understory vegetation: Beaked hazelnut, vine maple, Sitka willow, pachistima, serviceberry, thimbleberry, snowberry, starry false Solomon's seal, claspleaf twistedstalk, broadleaf starflower

Typical profile
Oi—0 to 2 centimeters; slightly decomposed plant material
Oe—2 to 9 centimeters; moderately decomposed plant material
Oa—9 to 15 centimeters; highly decomposed plant material
A1—15 to 25 centimeters; very gravelly ashy sandy loam
A2—25 to 37 centimeters; extremely cobbly ashy sandy loam
Bw—37 to 64 centimeters; very gravelly ashy sandy loam
2BC—64 to 150 centimeters; extremely gravelly sandy loam

Mesahchie Soil

Setting
Landform: Valley walls, debris aprons
Landform position (two-dimensional): Backslopes
Landform position (three-dimensional): Mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash mixed with glacial drift over glacial drift

Properties and qualities
Slope: 35 to 100 percent
Percentage of surface area covered with rock fragments: 0 to 10 percent with cobbles
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 12.4 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: F003XN928WA
Ecological site scientific name: Acer macrophyllum-Prunus emarginata/Corylus cornuta var. californica-Acer circinatum/Maianthemum stellatum-Streptopus amplexifolius
Ecological site common name: Frigid/Xeric Active Natural Disturbance
Common trees: Bigleaf maple, bitter cherry, Douglas-fir, ponderosa pine
Common understory vegetation: Beaked hazelnut, vine maple, Sitka willow, pachistima, serviceberry, thimbleberry, snowberry, starry false Solomon's seal, claspleaf twistedstalk, broadleaf starflower

Typical profile
Oe—0 to 2 centimeters; moderately decomposed plant material
A1—2 to 20 centimeters; gravelly ashy fine sandy loam
A2—20 to 44 centimeters; gravelly ashy sandy loam
A3—44 to 74 centimeters; very cobbly ashy sandy loam
2BC—74 to 96 centimeters; very gravelly sandy loam
2C—96 to 152 centimeters; very gravelly loamy sand

Sawtooth Soil

Setting
Landform: Valley walls, bedrock benches, debris aprons
Landform position (two-dimensional): Backslopes
Landform position (three-dimensional): Mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash over glacial drift

Properties and qualities
Slope: 35 to 100 percent
Percentage of surface area covered with rock fragments: 0 to 50 percent with cobbles
Depth to restrictive feature: 50 to 100 centimeters to lithic bedrock
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Very low (about 7.3 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: F003XN927WA
Ecological site scientific name: Pseudotsuga menziesii-Pinus ponderosa/ Paxistima myrsinites-Amelanchier alnifolia/Calamagrostis rubescens-Collomia linearis
Ecological site common name: Frigid/Xeric Coniferous
Common trees: Bigleaf maple, Douglas-fir, grand fir, lodgepole pine, ponderosa pine, western white pine
Common understory vegetation: Pachistima, serviceberry, tall Oregongrape, birchleaf spirea, baldhip rose, kinnikinnick, snowbrush ceanothus, pinegrass, narrow-leaved collomia, western rattlesnake plantain, pathfinder

Typical profile
Oi—0 to 3 centimeters; slightly decomposed plant material
A—3 to 15 centimeters; gravelly ashy sandy loam
Bw1—15 to 35 centimeters; gravelly ashy sandy loam
2Bw2—35 to 45 centimeters; gravelly sandy loam
2BC—45 to 60 centimeters; very cobbly loamy sand
R—60 to 152 centimeters; unweathered bedrock

Dissimilar Minor Components

Lyall soils
Percentage of map unit: 5 percent
Landform: Valley walls

Rock outcrop
Percentage of map unit: 5 percent
Landform: Valley walls, bedrock benches

7501—Despair-Goode-Rock outcrop complex, 35 to 100 percent slopes

Map Unit Setting

General landscape: Mountains
Elevation: 270 to 2,060 meters
Mean annual precipitation: 483 to 2,159 millimeters
Mean annual air temperature: 2 to 9 degrees C
Frost-free period: 60 to 100 days

Map Unit Composition

Despair and similar soils: 40 percent
Goode and similar soils: 30 percent
Rock outcrop: 15 percent
Dissimilar minor components: 15 percent

Despair Soil

Setting
Landform: Bedrock benches, valley walls (fig. 63)
Landform position (two-dimensional): Backslopes
Landform position (three-dimensional): Mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash over glacial drift

Properties and qualities
Slope: 35 to 100 percent
Percentage of surface area covered with rock fragments: 0 to 50 percent with cobbles
Depth to restrictive feature: 25 to 50 centimeters to lithic bedrock
Drainage class: Well drained
Capacity to transmit water (Ksat): High (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 8.4 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: F003XN927WA
Ecological site scientific name: *Pseudotsuga menziesii-Pinus ponderosa/Paxistima myrsinites-Amelanchier alnifolia/Calamagrostis rubescens-Collomia linearis*
Ecological site common name: Frigid/Xeric Coniferous
Common trees: Bigleaf maple, Douglas-fir, grand fir, lodgepole pine, ponderosa pine, western white pine
Common understory vegetation: Pachistima, serviceberry, tall Oregongrape, birchleaf spirea, baldhip rose, kinnikinnick, snowbrush ceanothus, pinegrass, narrow-leaved collomia, western rattlesnake plantain, pathfinder

Figure 63.—Typical area of Despair ashy sandy loam under a canopy of Douglas-fir in an area of Despair-Goode-Rock outcrop complex, 35 to 100 percent slopes. The forestland ecological site is F003XN927WA.

Typical profile
Oa—0 to 4 centimeters; highly decomposed plant material
A—4 to 21 centimeters; ashy sandy loam
Bw—21 to 41 centimeters; gravelly ashy sandy loam
R—41 to 152 centimeters; unweathered bedrock

Goode Soil

Setting
Landform: Valley walls, debris aprons
Landform position (two-dimensional): Backslopes
Landform position (three-dimensional): Mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash mixed with colluvium and glacial drift over glacial drift

Properties and qualities
Slope: 35 to 100 percent
Percentage of surface area covered with rock fragments: 0 to 30 percent with cobbles and 0 to 50 percent with stones
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters

Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 10.8 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: F003XN927WA
Ecological site scientific name: Pseudotsuga menziesii-Pinus ponderosa/ Paxistima myrsinites-Amelanchier alnifolia/Calamagrostis rubescens-Collomia linearis
Ecological site common name: Frigid/Xeric Coniferous
Common trees: Bigleaf maple, Douglas-fir, grand fir, lodgepole pine, ponderosa pine, western white pine
Common understory vegetation: Pachistima, serviceberry, tall Oregongrape, birchleaf spirea, baldhip rose, kinnikinnick, snowbrush ceanothus, pinegrass, narrow-leaved collomia, western rattlesnake plantain, pathfinder

Typical profile
Oi—0 to 2 centimeters; gravelly slightly decomposed plant material
A—2 to 23 centimeters; gravelly ashy fine sandy loam
Bw1—23 to 66 centimeters; very gravelly ashy sandy loam
2Bw2—66 to 91 centimeters; very gravelly coarse sandy loam
2BC—91 to 152 centimeters; extremely gravelly coarse sand

Rock Outcrop

Landform: Bedrock benches, valley walls
Slope: 35 to 100 percent
Land capability subclass (nonirrigated): 8

Dissimilar Minor Components

Lyall soils
Percentage of map unit: 10 percent
Landform: Valley walls

Mesahchie soils
Percentage of map unit: 5 percent
Landform: Valley walls

7502—Farway-Sawtooth-Despair complex, 35 to 100 percent slopes

Map Unit Setting

General landscape: Mountains
Elevation: 335 to 1,900 meters
Mean annual precipitation: 483 to 2,210 millimeters
Mean annual air temperature: 2 to 9 degrees C
Frost-free period: 60 to 100 days

Map Unit Composition

Farway and similar soils: 50 percent
Sawtooth and similar soils: 25 percent
Despair and similar soils: 15 percent
Dissimilar minor components: 10 percent

Farway Soil

Setting
Landform: Debris aprons, valley walls
Landform position (two-dimensional): Backslopes
Landform position (three-dimensional): Mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash over colluvium and reworked glacial drift

Properties and qualities
Slope: 35 to 100 percent
Percentage of surface area covered with rock fragments: 0 to 10 percent with cobbles
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Moderate (about 20 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: F003XN927WA
Ecological site scientific name: Pseudotsuga menziesii-Pinus ponderosa/Paxistima myrsinites-Amelanchier alnifolia/Calamagrostis rubescens-Collomia linearis
Ecological site common name: Frigid/Xeric Coniferous
Common trees: Bigleaf maple, Douglas-fir, grand fir, lodgepole pine, ponderosa pine, western white pine
Common understory vegetation: Pachistima, serviceberry, tall Oregongrape, birchleaf spirea, baldhip rose, kinnikinnick, snowbrush ceanothus, pinegrass, narrow-leaved collomia, western rattlesnake plantain, pathfinder

Typical profile
Oe—0 to 3 centimeters; moderately decomposed plant material
Bw1—3 to 45 centimeters; ashy fine sandy loam
Bw2—45 to 78 centimeters; cobbly ashy sandy loam
Bw3—78 to 90 centimeters; cobbly ashy sandy loam
2BC—90 to 152 centimeters; very gravelly sandy loam

Sawtooth Soil

Setting
Landform: Bedrock benches, valley walls
Landform position (two-dimensional): Backslopes
Landform position (three-dimensional): Mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash over glacial drift

Properties and qualities
Slope: 35 to 100 percent
Percentage of surface area covered with rock fragments: 0 to 50 percent with cobbles
Depth to restrictive feature: 50 to 100 centimeters to lithic bedrock
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)

Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Very low (about 7.3 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: F003XN927WA
Ecological site scientific name: Pseudotsuga menziesii-Pinus ponderosa/Paxistima myrsinites-Amelanchier alnifolia/Calamagrostis rubescens-Collomia linearis
Ecological site common name: Frigid/Xeric Coniferous
Common trees: Bigleaf maple, Douglas-fir, grand fir, lodgepole pine, ponderosa pine, western white pine
Common understory vegetation: Pachistima, serviceberry, tall Oregongrape, birchleaf spirea, baldhip rose, kinnikinnick, snowbrush ceanothus, pinegrass, narrow-leaved collomia, western rattlesnake plantain, pathfinder

Typical profile
Oi—0 to 3 centimeters; slightly decomposed plant material
A—3 to 15 centimeters; gravelly ashy sandy loam
Bw1—15 to 35 centimeters; gravelly ashy sandy loam
2Bw2—35 to 45 centimeters; gravelly sandy loam
2BC—45 to 60 centimeters; very cobbly loamy sand
R—60 to 152 centimeters; unweathered bedrock

Despair Soil

Setting
Landform: Bedrock benches, valley walls
Landform position (two-dimensional): Backslopes
Landform position (three-dimensional): Mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash over glacial drift

Properties and qualities
Slope: 35 to 100 percent
Percentage of surface area covered with rock fragments: 0 to 50 percent with cobbles
Depth to restrictive feature: 25 to 50 centimeters to lithic bedrock
Drainage class: Well drained
Capacity to transmit water (Ksat): High (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 8.4 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: F003XN927WA
Ecological site scientific name: Pseudotsuga menziesii-Pinus ponderosa/Paxistima myrsinites-Amelanchier alnifolia/Calamagrostis rubescens-Collomia linearis

Ecological site common name: Frigid/Xeric Coniferous
Common trees: Bigleaf maple, Douglas-fir, grand fir, lodgepole pine, ponderosa pine, western white pine
Common understory vegetation: Pachistima, serviceberry, tall Oregongrape, birchleaf spirea, baldhip rose, kinnikinnick, snowbrush ceanothus, pinegrass, narrow-leaved collomia, western rattlesnake plantain, pathfinder

Typical profile
Oa—0 to 4 centimeters; highly decomposed plant material
A—4 to 21 centimeters; ashy sandy loam
Bw—21 to 41 centimeters; gravelly ashy sandy loam
R—41 to 152 centimeters; unweathered bedrock

Dissimilar Minor Components

Lyall soils
Percentage of map unit: 5 percent
Landform: Valley walls

Rock outcrop
Percentage of map unit: 5 percent
Landform: Bedrock benches, valley walls

8000—Beaverpass-Purple-Bacon complex, 0 to 15 percent slopes

Map Unit Setting

General landscape: Mountain valleys
Elevation: 545 to 1,745 meters
Mean annual precipitation: 1,397 to 2,616 millimeters
Mean annual air temperature: 2 to 7 degrees C
Frost-free period: 30 to 60 days

Map Unit Composition

Beaverpass and similar soils: 40 percent
Purple and similar soils: 30 percent
Bacon and similar soils: 15 percent
Dissimilar minor components: 15 percent

Beaverpass Soil

Setting
Landform: Depressions, flood plains, terraces
Landform position (two-dimensional): Toeslopes
Landform position (three-dimensional): Lower third of mountainflanks
Aspect (range): All aspects
Parent material: Highly decomposed plant material

Properties and qualities
Slope: 0 to 5 percent
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Very poorly drained
Capacity to transmit water (Ksat): Moderately high to very high (see Physical Properties table)
Flooding frequency: Occasional (see Water Features table)
Ponding frequency: Frequent (see Water Features table)

Seasonal high water table (minimum depth): At the soil surface (see Water Features table)
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Very high (about 47.3 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 6s

Vegetation
Ecological site identification number: R003XN603WA
Ecological site name: High Mountain Unforested Wetlands
Common vegetation: Barclay's willow, bluejoint reedgrass, water sedge, white marsh marigold, black alpine sedge

Typical profile
Oe1—0 to 18 centimeters; moderately decomposed plant material
Oe2—18 to 56 centimeters; woody mucky peat
Oa—56 to 91 centimeters; herbaceous muck
Cg1—91 to 107 centimeters; coarse sand
Cg2—107 to 152 centimeters; fine sandy loam

Purple Soil

Setting
Landform: Depressions, flood plains, terraces
Landform position (two-dimensional): Toeslopes
Landform position (three-dimensional): Lower third of mountainflanks
Aspect (range): All aspects
Parent material: Highly decomposed plant material over alluvium

Properties and qualities
Slope: 0 to 15 percent
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Very poorly drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: Occasional (see Water Features table)
Ponding frequency: Frequent (see Water Features table)
Seasonal high water table (minimum depth): At the soil surface (see Water Features table)
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Moderate (about 22.1 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7s

Vegetation
Ecological site identification number: R003XN603WA
Ecological site name: High Mountain Unforested Wetlands
Common vegetation: Barclay's willow, bluejoint reedgrass, water sedge, white marsh marigold, black alpine sedge

Typical profile
Oa—0 to 25 centimeters; highly decomposed plant material
A1—25 to 45 centimeters; mucky loam
A2—45 to 58 centimeters; mucky loam
Cg1—58 to 96 centimeters; sandy loam
Cg2—96 to 150 centimeters; loamy sand

Bacon Soil

Setting
Landform: Depressions, flood plains, terraces
Landform position (two-dimensional): Toeslopes
Landform position (three-dimensional): Lower third of mountainflanks
Aspect (range): All aspects
Parent material: Alluvium

Properties and qualities
Slope: 0 to 15 percent
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Very poorly drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: Occasional (see Water Features table)
Ponding frequency: Frequent (see Water Features table)
Seasonal high water table (minimum depth): At the soil surface to a depth of 10 centimeters (see Water Features table)
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 8.1 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 6s

Vegetation
Ecological site identification number: R003XN603WA
Ecological site name: High Mountain Unforested Wetlands
Common vegetation: Barclay's willow, bluejoint reedgrass, water sedge, white marsh marigold, black alpine sedge

Typical profile
Oe—0 to 2 centimeters; moderately decomposed plant material
Bg1—2 to 20 centimeters; fine sandy loam
Bg2—20 to 38 centimeters; very fine sandy loam
Cg1—38 to 43 centimeters; coarse sand
Cg2—43 to 80 centimeters; very fine sandy loam
Cg3—80 to 150 centimeters; gravelly sand

Dissimilar Minor Components

Riverwash
Percentage of map unit: 10 percent
Landform: Flood plains, terraces

Terror soils
Percentage of map unit: 5 percent
Landform: Flood plains, terraces

8006—Stetattle-Forbidden-Triumph complex, 15 to 65 percent slopes

Map Unit Setting

General landscape: Mountains
Elevation: 325 to 2,000 meters
Mean annual precipitation: 1,245 to 2,921 millimeters

Mean annual air temperature: 1 to 7 degrees C
Frost-free period: 30 to 60 days

Map Unit Composition

Stetattle, deciduous, and similar soils: 60 percent
Forbidden and similar soils: 15 percent
Triumph and similar soils: 15 percent
Dissimilar minor components: 10 percent

Stetattle Soil, Deciduous

Setting
Landform: Debris cones
Landform position (two-dimensional): Footslopes
Landform position (three-dimensional): Lower third of mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash mixed with glacial drift

Properties and qualities
Slope: 15 to 65 percent
Percentage of surface area covered with rock fragments: 0 to 50 percent with boulders
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Very low (about 7 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: F003XN926WA (fig. 64)
Ecological site scientific name: Alnus viridis ssp. sinuata/Sambucus racemosa var. racemosa/Veratrum viride-Athyrium filix-femina
Ecological site common name: Cryic/Udic Active Natural Disturbance
Common trees: Sitka alder, subalpine fir
Common understory vegetation: Red elderberry, salmonberry, Sitka mountain-ash, prickly currant, false hellebore, common ladyfern, fireweed, Sitka valerian

Typical profile
A1—0 to 12 centimeters; very stony medial fine sandy loam
A2—12 to 30 centimeters; extremely stony medial fine sandy loam
A3—30 to 55 centimeters; extremely stony medial sandy loam
Bw—55 to 100 centimeters; extremely stony medial sandy loam
2C—100 to 152 centimeters; cobbles

Forbidden Soil

Setting
Landform: Debris cones
Landform position (two-dimensional): Footslopes
Landform position (three-dimensional): Lower third of mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash mixed with reworked glacial drift over glacial drift

Figure 64.—Autumn colors vividly displayed in an area of Stetattle very stony medial fine sandy loam in Stetattle-Forbidden-Triumph complex, 15 to 65 percent slopes. The ecological sites transition from the area dominated by deciduous cover (F003XN926WA) to the adjacent low cryic/udic coniferous overstory (F003XN924WA) and upslope to the high cryic/udic coniferous overstory (F003XN925WA).

Properties and qualities

Slope: 15 to 65 percent
Percentage of surface area covered with rock fragments: 0 to 10 percent with cobbles
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 11.6 centimeters)

Land capability classification

Land capability subclass (nonirrigated): 7e

Vegetation

Ecological site identification number: F003XN924WA
Ecological site scientific name: *Abies amabilis-Tsuga heterophylla/Vaccinium membranaceum-Menziesia ferruginea/Gymnocarpium dryopteris-Clintonia uniflora*
Ecological site common name: Low Cryic/Udic West Coniferous
Common trees: Pacific silver fir, western hemlock, Douglas-fir, western redcedar

Common understory vegetation: Black huckleberry, rusty menziesia, devilsclub, strawberryleaf raspberry, western oakfern, queencup bead lily, fringecup, common ladyfern, starry false lily of the valley

Typical profile
Oi—0 to 4 centimeters; slightly decomposed plant material
Oe—4 to 14 centimeters; moderately decomposed plant material
E—14 to 16 centimeters; ashy gravelly sandy loam
Bw—16 to 46 centimeters; very gravelly ashy sandy loam
2BC1—46 to 68 centimeters; extremely gravelly loamy sand
2BC2—68 to 90 centimeters; extremely gravelly loamy sand
2C—90 to 150 centimeters; extremely gravelly coarse sand

Triumph Soil

Setting
Landform: Debris cones
Landform position (two-dimensional): Footslopes
Landform position (three-dimensional): Lower third of mountainflanks
Aspect (range): All aspects
Parent material: Minor amount of volcanic ash mixed with colluvium and residuum

Properties and qualities
Slope: 15 to 65 percent
Percentage of surface area covered with rock fragments: 20 to 65 percent with stones
Depth to restrictive feature: 100 to 150 centimeters to paralithic bedrock
Drainage class: Well drained
Capacity to transmit water (Ksat): High (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Very low (about 7.5 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: R003XN512WA
Ecological site name: Subalpine Parkland - Active Natural Soil Disturbance Complex
Common vegetation: Cascade huckleberry, western pearly everlasting, Sitka mountain-ash, Sitka valerian, salmonberry, Barclay's willow, black huckleberry, broadleaf lupine

Typical profile
A1—0 to 15 centimeters; gravelly ashy sandy loam
A2—15 to 50 centimeters; very cobbly ashy sandy loam
A3—50 to 120 centimeters; extremely cobbly ashy sandy loam
Cr—120 to 152 centimeters; weathered bedrock

Dissimilar Minor Components

Bacon soils
Percentage of map unit: 5 percent
Landform: Terraces, flood plains, depressions

Riverwash
Percentage of map unit: 5 percent
Landform: Terraces, flood plains

8007—Kimtah-Bacon-Yawning complex, 0 to 35 percent slopes

Map Unit Setting

General landscape: Mountains, valleys
Elevation: 510 to 2,110 meters
Mean annual precipitation: 1,194 to 2,921 millimeters
Mean annual air temperature: 1 to 7 degrees C
Frost-free period: 30 to 60 days

Map Unit Composition

Kimtah and similar soils: 40 percent
Bacon and similar soils: 30 percent
Yawning and similar soils: 15 percent
Dissimilar minor components: 15 percent

Kimtah Soil

Setting
Landform: Valley walls
Landform position (two-dimensional): Footslopes
Landform position (three-dimensional): Lower third of mountainflanks
Aspect (range): All aspects
Parent material: Mixed volcanic ash over colluvium and glacial drift

Properties and qualities
Slope: 0 to 35 percent
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Moderately well drained
Capacity to transmit water (Ksat): Moderately high or high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): About 40 to 70 centimeters (see Water Features table)
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Moderate (about 15.8 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7s

Vegetation
Ecological site identification number: F003XN924WA
Ecological site scientific name: *Abies amabilis-Tsuga heterophylla/Vaccinium membranaceum-Menziesia ferruginea/Gymnocarpium dryopteris-Clintonia uniflora*
Ecological site common name: Low Cryic/Udic West Coniferous
Common trees: Pacific silver fir, western hemlock, Douglas-fir, western redcedar

Common understory vegetation: Black huckleberry, rusty menziesia, devilsclub, strawberryleaf raspberry, western oakfern, queencup bead lily, fringecup, common ladyfern, starry false lily of the valley

Typical profile
Oi—0 to 2 centimeters; slightly decomposed plant material
Oe—2 to 7 centimeters; moderately decomposed plant material
E—7 to 12 centimeters; ashy fine sandy loam
Bs1—12 to 33 centimeters; ashy sandy loam
Bs2—33 to 51 centimeters; ashy sandy loam
2Bg—51 to 90 centimeters; gravelly sandy loam
2Cg—90 to 150 centimeters; gravelly sandy loam

Bacon Soil

Setting
Landform: Terraces, flood plains, depressions (fig. 65)
Landform position (two-dimensional): Toeslopes
Landform position (three-dimensional): Lower third of mountainflanks
Aspect (range): All aspects
Parent material: Alluvium

Properties and qualities
Slope: 0 to 15 percent
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Very poorly drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: Occasional (see Water Features table)
Ponding frequency: Frequent (see Water Features table)
Seasonal high water table (minimum depth): At the soil surface to a depth of 10 centimeters (see Water Features table)

Figure 65.—Typical area of Bacon fine sandy loam in an area of Kimtah-Bacon-Yawning complex, 0 to 35 percent slopes, at Pelton Basin. The rangeland ecological site is R003XN603WA.

Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 8.1 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 6s

Vegetation
Ecological site identification number: R003XN603WA
Ecological site name: High Mountain Unforested Wetlands
Common vegetation: Barclay's willow, bluejoint reedgrass, water sedge, white marsh marigold, black alpine sedge

Typical profile
Oe—0 to 2 centimeters; moderately decomposed plant material
Bg1—2 to 20 centimeters; fine sandy loam
Bg2—20 to 38 centimeters; very fine sandy loam
Cg1—38 to 43 centimeters; coarse sand
Cg2—43 to 80 centimeters; very fine sandy loam
Cg3—80 to 150 centimeters; gravelly sand

Yawning Soil

Setting
Landform: Mountain slopes, terraces
Landform position (two-dimensional): Footslopes
Landform position (three-dimensional): Lower third of mountainflanks
Aspect (range): All aspects
Parent material: Thin volcanic ash over glacial drift and colluvium

Properties and qualities
Slope: 5 to 35 percent
Percentage of surface area covered with rock fragments: 0 to 10 percent with cobbles
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 9.1 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7s

Vegetation
Ecological site identification number: F003XN924WA
Ecological site scientific name: Abies amabilis-Tsuga heterophylla/Vaccinium membranaceum-Menziesia ferruginea/Gymnocarpium dryopteris-Clintonia uniflora
Ecological site common name: Low Cryic/Udic West Coniferous
Common trees: Pacific silver fir, western hemlock, Douglas-fir, western redcedar
Common understory vegetation: Black huckleberry, rusty menziesia, devilsclub, strawberryleaf raspberry, western oakfern, queencup bead lily, fringecup, common ladyfern, starry false lily of the valley

Typical profile
Oi—0 to 2 centimeters; slightly decomposed plant material
Oa—2 to 8 centimeters; highly decomposed plant material

E—8 to 14 centimeters; ashy sandy loam
Bs—14 to 32 centimeters; very gravelly ashy sandy loam
2BC—32 to 50 centimeters; extremely cobbly sandy loam
2C1—50 to 100 centimeters; extremely cobbly sandy loam
2C2—100 to 150 centimeters; extremely cobbly sandy loam

Dissimilar Minor Components

Purple soils
Percentage of map unit: 10 percent
Landform: Flood plains, depressions

Riverwash
Percentage of map unit: 5 percent
Landform: Flood plains, depressions

8009—Chilliwack-Perfect-Terror complex, 15 to 65 percent slopes

Map Unit Setting

General landscape: Mountains
Elevation: 490 to 1,645 meters
Mean annual precipitation: 1,194 to 2,515 millimeters
Mean annual air temperature: 2 to 8 degrees C
Frost-free period: 30 to 60 days

Map Unit Composition

Chilliwack, warm, and similar soils: 40 percent
Perfect and similar soils: 30 percent
Terror and similar soils: 15 percent
Dissimilar minor components: 15 percent

Chilliwack Soil, Warm

Setting
Landform: Debris aprons, debris cones
Landform position (two-dimensional): Footslopes
Landform position (three-dimensional): Lower third of mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash over glacial drift

Properties and qualities
Slope: 15 to 65 percent
Percentage of surface area covered with rock fragments: 0 to 30 percent with stones
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 8.7 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 6s

Vegetation
Ecological site identification number: F003XN924WA
Ecological site scientific name: Abies amabilis-Tsuga heterophylla/Vaccinium membranaceum-Menziesia ferruginea/Gymnocarpium dryopteris-Clintonia uniflora
Ecological site common name: Low Cryic/Udic West Coniferous
Common trees: Pacific silver fir, western hemlock, Douglas-fir, western redcedar
Common understory vegetation: Black huckleberry, rusty menziesia, devilsclub, strawberryleaf raspberry, western oakfern, queencup bead lily, fringecup, common ladyfern, starry false lily of the valley

Typical profile
Oe—0 to 3 centimeters; slightly decomposed plant material
E—3 to 13 centimeters; medial sandy loam
Bs1—13 to 34 centimeters; gravelly medial sandy loam
Bs2—34 to 46 centimeters; gravelly medial sandy loam
2BC—46 to 70 centimeters; extremely gravelly loamy sand
2C—70 to 150 centimeters; extremely gravelly loamy sand

Perfect Soil

Setting
Landform: Debris aprons, debris cones
Landform position (two-dimensional): Footslopes
Landform position (three-dimensional): Lower third of mountainflanks
Aspect (range): All aspects
Parent material: Minor amount of volcanic ash mixed with colluvium and reworked glacial drift

Properties and qualities
Slope: 15 to 65 percent
Percentage of surface area covered with rock fragments: 0 to 30 percent with stones
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 10.4 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: F003XN924WA
Ecological site scientific name: Abies amabilis-Tsuga heterophylla/Vaccinium membranaceum-Menziesia ferruginea/Gymnocarpium dryopteris-Clintonia uniflora
Ecological site common name: Low Cryic/Udic West Coniferous
Common trees: Pacific silver fir, western hemlock, Douglas-fir, western redcedar
Common understory vegetation: Black huckleberry, rusty menziesia, devilsclub, strawberryleaf raspberry, western oakfern, queencup bead lily, fringecup, common ladyfern, starry false lily of the valley

Typical profile
Oi—0 to 3 centimeters; slightly decomposed plant material
Oe—3 to 4 centimeters; moderately decomposed plant material
Bw—4 to 7 centimeters; ashy sandy loam
Oe—7 to 11 centimeters; moderately decomposed plant material
Eb—11 to 13 centimeters; ashy sandy loam
Bwb—13 to 39 centimeters; gravelly ashy sandy loam
2BCb1—39 to 73 centimeters; extremely cobbly loamy sand
2BCb2—73 to 752 centimeters; extremely gravelly loamy coarse sand

Terror Soil

Setting
Landform: Debris aprons, debris cones
Landform position (two-dimensional): Footslopes
Landform position (three-dimensional): Lower third of mountainflanks
Aspect (range): All aspects
Parent material: Mixed volcanic ash over glacial drift and colluvium

Properties and qualities
Slope: 15 to 35 percent
Percentage of surface area covered with rock fragments: 0 to 10 percent with cobbles
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Moderately well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: Occasional (see Water Features table)
Ponding frequency: None
Seasonal high water table (minimum depth): About 50 to 80 centimeters (see Water Features table)
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Moderate (about 15.8 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7s

Vegetation
Ecological site identification number: F003XN924WA
Ecological site scientific name: Abies amabilis-Tsuga heterophylla/Vaccinium membranaceum-Menziesia ferruginea/Gymnocarpium dryopteris-Clintonia uniflora
Ecological site common name: Low Cryic/Udic West Coniferous
Common trees: Pacific silver fir, western hemlock, Douglas-fir, western redcedar
Common understory vegetation: Black huckleberry, rusty menziesia, devilsclub, strawberryleaf raspberry, western oakfern, queencup bead lily, fringecup, common ladyfern, starry false lily of the valley

Typical profile
Oe—0 to 5 centimeters; moderately decomposed plant material
Oa—5 to 8 centimeters; highly decomposed plant material
A1—8 to 17 centimeters; ashy sandy loam
A2—17 to 28 centimeters; ashy fine sandy loam
Bw1—28 to 36 centimeters; ashy sandy loam
2Bw2—36 to 52 centimeters; cobbly sandy loam
2Cg1—52 to 60 centimeters; gravelly coarse sandy loam
2Cg2—60 to 80 centimeters; gravelly coarse sandy loam
2Cg3—80 to 150 centimeters; very gravelly coarse sandy loam

Dissimilar Minor Components

Triumph soils, deciduous
Percentage of map unit: 10 percent
Landform: Debris cones

Tepeh soils, moist
Percentage of map unit: 5 percent
Landform: Debris aprons, debris cones

8010—Perfect-Spickard-Stetattle complex, 15 to 65 percent slopes

Map Unit Setting

General landscape: Mountains
Elevation: 415 to 1,695 meters
Mean annual precipitation: 1,448 to 2,769 millimeters
Mean annual air temperature: 4 to 7 degrees C
Frost-free period: 30 to 60 days

Map Unit Composition

Perfect and similar soils: 50 percent
Spickard and similar soils: 20 percent
Stetattle, deciduous, and similar soils: 15 percent
Dissimilar minor components: 15 percent

Perfect Soil

Setting
Landform: Debris aprons, debris cones
Landform position (two-dimensional): Footslopes
Landform position (three-dimensional): Lower third of mountainflanks
Aspect (range): All aspects
Parent material: Minor amount of volcanic ash mixed with colluvium and reworked glacial drift

Properties and qualities
Slope: 15 to 65 percent
Percentage of surface area covered with rock fragments: 0 to 30 percent with stones
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 10.4 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: F003XN924WA
Ecological site scientific name: Abies amabilis-Tsuga heterophylla/Vaccinium membranaceum-Menziesia ferruginea/Gymnocarpium dryopteris-Clintonia uniflora

Ecological site common name: Low Cryic/Udic West Coniferous
Common trees: Pacific silver fir, western hemlock, Douglas-fir, western redcedar
Common understory vegetation: Black huckleberry, rusty menziesia, devilsclub, strawberryleaf raspberry, western oakfern, queencup bead lily, fringecup, common ladyfern, starry false lily of the valley

Typical profile
Oi—0 to 3 centimeters; slightly decomposed plant material
Oe—3 to 4 centimeters; moderately decomposed plant material
Bw—4 to 7 centimeters; ashy sandy loam
Oe—7 to 11 centimeters; moderately decomposed plant material
Eb—11 to 13 centimeters; ashy sandy loam
Bwb—13 to 39 centimeters; gravelly ashy sandy loam
2BCb1—39 to 73 centimeters; extremely cobbly loamy sand
2BCb2—73 to 752 centimeters; extremely gravelly loamy coarse sand

Spickard Soil

Setting
Landform: Debris aprons, debris cones
Landform position (two-dimensional): Footslopes
Landform position (three-dimensional): Lower third of mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash over glacial drift

Properties and qualities
Slope: 15 to 65 percent
Percentage of surface area covered with rock fragments: 0 to 15 percent with stones
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 14.5 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: F003XN924WA
Ecological site scientific name: Abies amabilis-Tsuga heterophylla/Vaccinium membranaceum-Menziesia ferruginea/Gymnocarpium dryopteris-Clintonia uniflora
Ecological site common name: Low Cryic/Udic West Coniferous
Common trees: Pacific silver fir, western hemlock, Douglas-fir, western redcedar
Common understory vegetation: Black huckleberry, rusty menziesia, devilsclub, strawberryleaf raspberry, western oakfern, queencup bead lily, fringecup, common ladyfern, starry false lily of the valley

Typical profile
Oi—0 to 3 centimeters; slightly decomposed plant material
Oe—3 to 10 centimeters; moderately decomposed plant material
A—10 to 13 centimeters; ashy sandy loam

Bw1—13 to 22 centimeters; gravelly ashy sandy loam
Bw2—22 to 44 centimeters; gravelly ashy sandy loam
Bw3—44 to 60 centimeters; gravelly ashy sandy loam
2BC—60 to 105 centimeters; very cobbly loamy sand
2C—105 to 152 centimeters; very stony loamy sand

Stetattle Soil, Deciduous

Setting
Landform: Debris cones, debris aprons
Landform position (two-dimensional): Footslopes
Landform position (three-dimensional): Lower third of mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash mixed with glacial drift

Properties and qualities
Slope: 15 to 65 percent
Percentage of surface area covered with rock fragments: 0 to 50 percent with boulders
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Very low (about 7 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: F003XN926WA
Ecological site scientific name: Alnus viridis ssp. sinuata/Sambucus racemosa var. racemosa/Veratrum viride-Athyrium filix-femina
Ecological site common name: Cryic/Udic Active Natural Disturbance
Common trees: Sitka alder, subalpine fir
Common understory vegetation: Red elderberry, salmonberry, Sitka mountain-ash, prickly currant, false hellebore, common ladyfern, fireweed, Sitka valerian

Typical profile
A1—0 to 12 centimeters; very stony medial fine sandy loam
A2—12 to 30 centimeters; extremely stony medial fine sandy loam
A3—30 to 55 centimeters; extremely stony medial sandy loam
Bw—55 to 100 centimeters; extremely stony medial sandy loam
2C—100 to 152 centimeters; cobbles

Dissimilar Minor Components

Yawning soils
Percentage of map unit: 10 percent
Landform: Debris cones

Terror soils
Percentage of map unit: 5 percent
Landform: Terraces, debris cones

8011—Chilliwack-Forbidden-Stetattle complex, 15 to 65 percent slopes

Map Unit Setting

General landscape: Mountains (fig. 66)
Elevation: 715 to 2,155 meters
Mean annual precipitation: 1,346 to 2,769 millimeters
Mean annual air temperature: 1 to 6 degrees C
Frost-free period: 30 to 60 days

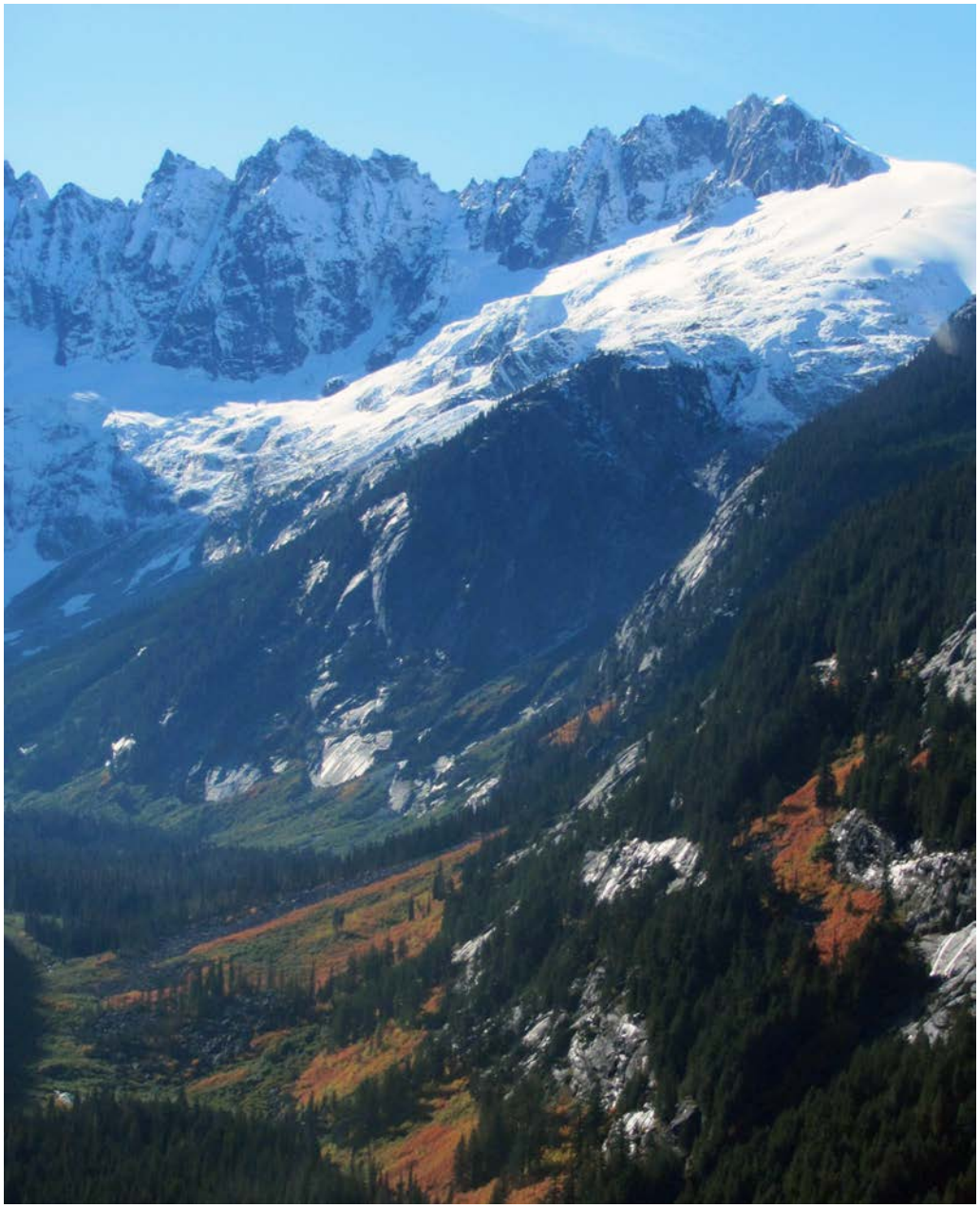


Figure 66.—View looking west up Luna Creek to Mount Challenger and Challenger Glacier. Stream valleys transition to steeper valley wall and upper mountain lanforms, crossing soil climate regimes and ecological sites over short distances, which is common in the North Cascades National Park Complex.

Map Unit Composition

Chilliwack and similar soils: 50 percent
Forbidden, cold, and similar soils: 30 percent
Stetattle, deciduous, and similar soils: 15 percent
Dissimilar minor component: 5 percent

Chilliwack Soil

Setting
Landform: Debris aprons, debris cones
Landform position (two-dimensional): Footslopes
Landform position (three-dimensional): Lower third of mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash over glacial drift

Properties and qualities
Slope: 15 to 65 percent
Percentage of surface area covered with rock fragments: 0 to 30 percent with stones
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 8.7 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 6s

Vegetation
Ecological site identification number: F003XN925WA
Ecological site scientific name: Tsuga mertensiana-Abies lasiocarpa/Phyllodoce empetriformis-Vaccinium membranaceum/Valeriana sitchensis-Veratrum viride
Ecological site common name: High Cryic/Udic Coniferous
Common trees: Alaska yellow-cedar, mountain hemlock, Pacific silver fir, subalpine fir, whitebark pine
Common understory vegetation: Pink mountain-heather, black huckleberry, Cascade huckleberry, Sitka mountain-ash, Sitka valerian, false hellebore, sidebells wintergreen

Typical profile
Oe—0 to 3 centimeters; slightly decomposed plant material
E—3 to 13 centimeters; medial sandy loam
Bs1—13 to 34 centimeters; gravelly medial sandy loam
Bs2—34 to 46 centimeters; gravelly medial sandy loam
2BC—46 to 70 centimeters; extremely gravelly loamy sand
2C—70 to 150 centimeters; extremely gravelly loamy sand

Forbidden Soil, Cold

Setting
Landform: Debris aprons, debris cones
Landform position (two-dimensional): Footslopes
Landform position (three-dimensional): Lower third of mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash mixed with reworked glacial drift over glacial drift

Properties and qualities
Slope: 15 to 65 percent
Percentage of surface area covered with rock fragments: 0 to 10 percent with cobbles
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 11.6 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: F003XN925WA
Ecological site scientific name: Tsuga mertensiana-Abies lasiocarpa/Phyllodoce empetriformis-Vaccinium membranaceum/Valeriana sitchensis-Veratrum viride
Ecological site common name: High Cryic/Udic Coniferous
Common trees: Alaska yellow-cedar, mountain hemlock, Pacific silver fir, subalpine fir, whitebark pine
Common understory vegetation: Pink mountain-heather, black huckleberry, Cascade huckleberry, Sitka mountain-ash, Sitka valerian, false hellebore, sidebells wintergreen

Typical profile
Oi—0 to 4 centimeters; slightly decomposed plant material
Oe—4 to 14 centimeters; moderately decomposed plant material
E—14 to 16 centimeters; ashy gravelly sandy loam
Bw—16 to 46 centimeters; very gravelly ashy sandy loam
2BC1—46 to 68 centimeters; extremely gravelly loamy sand
2BC2—68 to 90 centimeters; extremely gravelly loamy sand
2C—90 to 150 centimeters; extremely gravelly coarse sand

Stetattle Soil, Deciduous

Setting
Landform: Debris cones, debris aprons
Landform position (two-dimensional): Footslopes
Landform position (three-dimensional): Lower third of mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash mixed with glacial drift

Properties and qualities
Slope: 15 to 65 percent
Percentage of surface area covered with rock fragments: 0 to 50 percent with boulders
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline

Sodicity (maximum): Not sodic
Available water capacity (entire profile): Very low (about 7 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: F003XN926WA
Ecological site scientific name: Alnus viridis ssp. sinuata/Sambucus racemosa var. racemosa/Veratrum viride-Athyrium filix-femina
Ecological site common name: Cryic/Udic Active Natural Disturbance
Common trees: Sitka alder, subalpine fir
Common understory vegetation: Red elderberry, salmonberry, Sitka mountain-ash, prickly currant, false hellebore, common ladyfern, fireweed, Sitka valerian

Typical profile
A1—0 to 12 centimeters; very stony medial fine sandy loam
A2—12 to 30 centimeters; extremely stony medial fine sandy loam
A3—30 to 55 centimeters; extremely stony medial sandy loam
Bw—55 to 100 centimeters; extremely stony medial sandy loam
2C—100 to 152 centimeters; cobbles

Dissimilar Minor Component

Triumph soils, deciduous
Percentage of map unit: 5 percent
Landform: Debris cones

8014—Chilliwack-Tepeh-Kimtah complex, 15 to 65 percent slopes

Map Unit Setting

General landscape: Mountains
Elevation: 680 to 2,160 meters
Mean annual precipitation: 1,143 to 1,803 millimeters
Mean annual air temperature: 1 to 6 degrees C
Frost-free period: 30 to 75 days

Map Unit Composition

Chilliwack, dry, and similar soils: 40 percent
Tepeh and similar soils: 30 percent
Kimtah, dry, and similar soils: 15 percent
Dissimilar minor components: 15 percent

Chilliwack Soil, Dry

Setting
Landform: Debris aprons
Landform position (two-dimensional): Footslopes
Landform position (three-dimensional): Lower third of mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash over glacial drift

Properties and qualities
Slope: 15 to 65 percent
Percentage of surface area covered with rock fragments: 0 to 30 percent with stones

Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 8.7 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 6s

Vegetation
Ecological site identification number: F003XN929WA
Ecological site scientific name: Abies amabilis-Picea engelmannii/Vaccinium membranaceum-Paxistima myrsinites/Clintonia uniflora-Orthilia secunda
Ecological site common name: Low Cryic/Udic East Coniferous
Common trees: Douglas-fir, Engelmann spruce, Pacific silver fir, subalpine fir, western hemlock
Common understory vegetation: Black huckleberry, pachistima, dwarf bramble, Utah honeysuckle, prickly currant, prince's pine, queencup bead lily, sidebells wintergreen, threeleaf foamflower, western rattlesnake plantain

Typical profile
Oe—0 to 3 centimeters; slightly decomposed plant material
E—3 to 13 centimeters; medial sandy loam
Bs1—13 to 34 centimeters; gravelly medial sandy loam
Bs2—34 to 46 centimeters; gravelly medial sandy loam
2BC—46 to 70 centimeters; extremely gravelly loamy sand
2C—70 to 150 centimeters; extremely gravelly loamy sand

Tepeh Soil

Setting
Landform: Debris aprons
Landform position (two-dimensional): Footslopes
Landform position (three-dimensional): Lower third of mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash over glacial drift

Properties and qualities
Slope: 15 to 65 percent
Percentage of surface area covered with rock fragments: 0 to 10 percent with cobbles
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 9.8 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: F003XN929WA
Ecological site scientific name: Abies amabilis-Picea engelmannii/Vaccinium membranaceum-Paxistima myrsinites/Clintonia uniflora-Orthilia secunda
Ecological site common name: Low Cryic/Udic East Coniferous
Common trees: Douglas-fir, Engelmann spruce, Pacific silver fir, subalpine fir, western hemlock
Common understory vegetation: Black huckleberry, pachistima, dwarf bramble, Utah honeysuckle, prickly currant, prince's pine, queencup bead lily, sidebells wintergreen, threeleaf foamflower, western rattlesnake plantain

Typical profile
Oi—0 to 2 centimeters; slightly decomposed plant material
Oe—2 to 5 centimeters; moderately decomposed plant material
E—5 to 8 centimeters; ashy sandy loam
Bw1—8 to 30 centimeters; gravelly ashy sandy loam
2Bw2—30 to 70 centimeters; very gravelly sandy loam
2Bw3—70 to 92 centimeters; very gravelly sandy loam
2BC—92 to 152 centimeters; extremely cobbly loamy sand

Kimtah Soil, Dry

Setting
Landform: Valley walls
Landform position (two-dimensional): Footslopes
Landform position (three-dimensional): Lower third of mountainflanks
Aspect (range): All aspects
Parent material: Mixed volcanic ash over colluvium and glacial drift

Properties and qualities
Slope: 15 to 35 percent
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Moderately well drained
Capacity to transmit water (Ksat): Moderately high or high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): About 40 to 70 centimeters (see Water Features table)
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Moderate (about 15.8 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7s

Vegetation
Ecological site identification number: F003XN929WA
Ecological site scientific name: Abies amabilis-Picea engelmannii/Vaccinium membranaceum-Paxistima myrsinites/Clintonia uniflora-Orthilia secunda
Ecological site common name: Low Cryic/Udic East Coniferous
Common trees: Douglas-fir, Engelmann spruce, Pacific silver fir, subalpine fir, western hemlock
Common understory vegetation: Black huckleberry, pachistima, dwarf bramble, Utah honeysuckle, prickly currant, prince's pine, queencup bead lily, sidebells wintergreen, threeleaf foamflower, western rattlesnake plantain

Typical profile
Oi—0 to 2 centimeters; slightly decomposed plant material
Oe—2 to 7 centimeters; moderately decomposed plant material
E—7 to 12 centimeters; ashy fine sandy loam
Bs1—12 to 33 centimeters; ashy sandy loam
Bs2—33 to 51 centimeters; ashy sandy loam
2Bg—51 to 90 centimeters; gravelly sandy loam
2Cg—90 to 150 centimeters; gravelly sandy loam

Dissimilar Minor Components

Maggib soils, dry
Percentage of map unit: 5 percent
Landform: Debris aprons, valley walls

Primus soils
Percentage of map unit: 5 percent
Landform: Debris aprons, valley walls

Triumph soils, deciduous
Percentage of map unit: 5 percent
Landform: Debris aprons, valley walls

8500—Primus-Noca-Stehekin complex, 15 to 65 percent slopes

Map Unit Setting

General landscape: Mountains
Elevation: 535 to 1,750 meters
Mean annual precipitation: 838 to 1,803 millimeters
Mean annual air temperature: 2 to 7 degrees C
Frost-free period: 30 to 75 days

Map Unit Composition

Primus and similar soils: 50 percent
Noca and similar soils: 20 percent
Stehekin and similar soils: 20 percent
Dissimilar minor component: 10 percent

Primus Soil

Setting
Landform: Debris aprons, debris cones
Landform position (two-dimensional): Footslopes
Landform position (three-dimensional): Lower third of mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash and reworked glacial drift over alluvium and glacial drift

Properties and qualities
Slope: 15 to 65 percent
Percentage of surface area covered with rock fragments: 30 to 50 percent with cobbles
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None

Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 12 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: F003XN923WA
Ecological site scientific name: Abies lasiocarpa-Picea engelmannii/Rubus parviflorus-Paxistima myrsinites/Clintonia uniflora
Ecological site common name: Cryic/Xeric Coniferous
Common trees: Douglas-fir, Engelmann spruce, subalpine fir
Common understory vegetation: Thimbleberry, pachistima, dwarf bramble, black huckleberry, queencup bead lily, western pearly everlasting, sweetcicely

Typical profile
Oi—0 to 1 centimeter; gravelly slightly decomposed plant material
Oe—1 to 3 centimeters; gravelly moderately decomposed plant material
Bw1—3 to 34 centimeters; gravelly ashy fine sandy loam
Bw2—34 to 60 centimeters; gravelly ashy fine sandy loam
2BC—60 to 84 centimeters; extremely cobbly ashy sandy loam
2C—84 to 152 centimeters; extremely gravelly loamy sand

Noca Soil

Setting
Landform: Debris aprons, debris cones
Landform position (two-dimensional): Footslopes
Landform position (three-dimensional): Lower third of mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash over glacial drift

Properties and qualities
Slope: 15 to 65 percent
Percentage of surface area covered with rock fragments: 0 to 30 percent with stones
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 10.4 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: F003XN929WA
Ecological site scientific name: Abies amabilis-Picea engelmannii/Vaccinium membranaceum-Paxistima myrsinites/Clintonia uniflora-Orthilia secunda
Ecological site common name: Low Cryic/Udic East Coniferous
Common trees: Douglas-fir, Engelmann spruce, Pacific silver fir, subalpine fir, western hemlock

Common understory vegetation: Black huckleberry, pachistima, dwarf bramble, Utah honeysuckle, prickly currant, prince's pine, queencup bead lily, sidebells wintergreen, threeleaf foamflower, western rattlesnake plantain

Typical profile
Oe—0 to 2 centimeters; gravelly moderately decomposed plant material
E—2 to 5 centimeters; gravelly ashy sandy loam
Bw1—5 to 29 centimeters; stony ashy sandy loam
Bw2—29 to 51 centimeters; gravelly ashy sandy loam
2BC—51 to 77 centimeters; very gravelly loamy sand
2C—77 to 152 centimeters; extremely gravelly loamy sand

Stehekin Soil

Setting
Landform: Debris aprons, debris cones
Landform position (two-dimensional): Footslopes
Landform position (three-dimensional): Lower third of mountainflanks
Aspect (range): All aspects
Parent material: Mixed volcanic ash over colluvium and glacial drift

Properties and qualities
Slope: 15 to 65 percent
Percentage of surface area covered with rock fragments: 0 to 10 percent with cobbles
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 10.4 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: F003XN923WA
Ecological site scientific name: Abies lasiocarpa-Picea engelmannii/Rubus parviflorus-Paxistima myrsinites/Clintonia uniflora
Ecological site common name: Cryic/Xeric Coniferous
Common trees: Douglas-fir, Engelmann spruce, subalpine fir
Common understory vegetation: Thimbleberry, pachistima, dwarf bramble, black huckleberry, queencup bead lily, western pearly everlasting, sweetcicely

Typical profile
A—0 to 18 centimeters; ashy sandy loam
Bw—18 to 44 centimeters; very cobbly sandy loam
BC—44 to 109 centimeters; very bouldery sandy loam
C—109 to 152 centimeters; very stony sandy loam

Dissimilar Minor Component

Terror soils, dry
Percentage of map unit: 10 percent
Landform: Terraces, debris cones

8501—Stehekin-Primus complex, 15 to 65 percent slopes

Map Unit Setting

General landscape: Mountains
Elevation: 595 to 1,835 meters
Mean annual precipitation: 889 to 1,753 millimeters
Mean annual air temperature: 2 to 7 degrees C
Frost-free period: 30 to 75 days

Map Unit Composition

Stehekin and similar soils: 50 percent
Primus and similar soils: 30 percent
Dissimilar minor components: 20 percent

Stehekin Soil

Setting

Landform: Debris cones, debris aprons, valley walls
Landform position (two-dimensional): Backslopes, footslopes
Landform position (three-dimensional): Lower third of mountainflanks
Aspect (range): All aspects
Parent material: Mixed volcanic ash over colluvium and glacial drift

Properties and qualities

Slope: 15 to 65 percent
Percentage of surface area covered with rock fragments: 0 to 10 percent with cobbles
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 10.4 centimeters)

Land capability classification

Land capability subclass (nonirrigated): 7s

Vegetation

Ecological site identification number: F003XN923WA
Ecological site scientific name: Abies lasiocarpa-Picea engelmannii/Rubus parviflorus-Paxistima myrsinites/Clintonia uniflora
Ecological site common name: Cryic/Xeric Coniferous
Common trees: Douglas-fir, Engelmann spruce, subalpine fir
Common understory vegetation: Thimbleberry, pachistima, dwarf bramble, black huckleberry, queencup bead lily, western pearly everlasting, sweetcicely

Typical profile

A—0 to 18 centimeters; ashy sandy loam
Bw—18 to 44 centimeters; very cobbly sandy loam
BC—44 to 109 centimeters; very bouldery sandy loam
C—109 to 152 centimeters; very stony sandy loam

Primus Soil

Setting
Landform: Debris cones, debris aprons, valley walls
Landform position (two-dimensional): Backslopes, footslopes
Landform position (three-dimensional): Lower third of mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash and reworked glacial drift over alluvium and glacial drift

Properties and qualities
Slope: 15 to 65 percent
Percentage of surface area covered with rock fragments: 30 to 50 percent with cobbles
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 12 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 6s

Vegetation
Ecological site identification number: F003XN923WA
Ecological site scientific name: Abies lasiocarpa-Picea engelmannii/Rubus parviflorus-Paxistima myrsinites/Clintonia uniflora
Ecological site common name: Cryic/Xeric Coniferous
Common trees: Douglas-fir, Engelmann spruce, subalpine fir
Common understory vegetation: Thimbleberry, pachistima, dwarf bramble, black huckleberry, queencup bead lily, western pearly everlasting, sweetcicely

Typical profile
Oi—0 to 1 centimeter; gravelly slightly decomposed plant material
Oe—1 to 3 centimeters; gravelly moderately decomposed plant material
Bw1—3 to 34 centimeters; gravelly ashy fine sandy loam
Bw2—34 to 60 centimeters; gravelly ashy fine sandy loam
2BC—60 to 84 centimeters; extremely cobbly ashy sandy loam
2C—84 to 152 centimeters; extremely gravelly loamy sand

Dissimilar Minor Components

Perfect soils, dry
Percentage of map unit: 10 percent
Landform: Valley walls, debris cones

Stetattle soils, deciduous
Percentage of map unit: 10 percent
Landform: Debris cones, valley walls

9001—Noca-Perfect complex, 35 to 100 percent slopes

Map Unit Setting

General landscape: Mountains
Elevation: 620 to 2,145 meters

Mean annual precipitation: 940 to 2,159 millimeters
Mean annual air temperature: 1 to 7 degrees C
Frost-free period: 30 to 60 days

Map Unit Composition

Noca and similar soils: 40 percent
Perfect, dry, and similar soils: 30 percent
Dissimilar minor components: 30 percent

Noca Soil

Setting
Landform: Valley walls, debris aprons
Landform position (two-dimensional): Backslopes
Landform position (three-dimensional): Mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash over glacial drift

Properties and qualities
Slope: 35 to 100 percent
Percentage of surface area covered with rock fragments: 0 to 30 percent with stones
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 10.4 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: F003XN929WA
Ecological site scientific name: Abies amabilis-Picea engelmannii/Vaccinium membranaceum-Paxistima myrsinites/Clintonia uniflora-Orthilia secunda
Ecological site common name: Low Cryic/Udic East Coniferous
Common trees: Douglas-fir, Engelmann spruce, Pacific silver fir, subalpine fir, western hemlock
Common understory vegetation: Black huckleberry, pachistima, dwarf bramble, Utah honeysuckle, prickly currant, prince's pine, queencup bead lily, sidebells wintergreen, threeleaf foamflower, western rattlesnake plantain

Typical profile
Oe—0 to 2 centimeters; gravelly moderately decomposed plant material
E—2 to 5 centimeters; gravelly ashy sandy loam
Bw1—5 to 29 centimeters; stony ashy sandy loam
Bw2—29 to 51 centimeters; gravelly ashy sandy loam
2BC—51 to 77 centimeters; very gravelly loamy sand
2C—77 to 152 centimeters; extremely gravelly loamy sand

Perfect Soil, Dry

Setting
Landform: Valley walls, debris aprons
Landform position (two-dimensional): Backslopes

Landform position (three-dimensional): Mountainflanks
Aspect (range): All aspects
Parent material: Minor amount of volcanic ash mixed with colluvium and reworked glacial drift

Properties and qualities
Slope: 35 to 100 percent
Percentage of surface area covered with rock fragments: 0 to 30 percent with stones
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 10.4 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: F003XN929WA
Ecological site scientific name: Abies amabilis-Picea engelmannii/Vaccinium membranaceum-Paxistima myrsinites/Clintonia uniflora-Orthilia secunda
Ecological site common name: Low Cryic/Udic East Coniferous
Common trees: Douglas-fir, Engelmann spruce, Pacific silver fir, subalpine fir, western hemlock
Common understory vegetation: Black huckleberry, pachistima, dwarf bramble, Utah honeysuckle, prickly currant, prince's pine, queencup bead lily, sidebells wintergreen, threeleaf foamflower, western rattlesnake plantain

Typical profile
Oi—0 to 3 centimeters; slightly decomposed plant material
Oe—3 to 4 centimeters; moderately decomposed plant material
Bw—4 to 7 centimeters; ashy sandy loam
Oe—7 to 11 centimeters; moderately decomposed plant material
Eb—11 to 13 centimeters; ashy sandy loam
Bwb—13 to 39 centimeters; gravelly ashy sandy loam
2BCb1—39 to 73 centimeters; extremely cobbly loamy sand
2BCb2—73 to 752 centimeters; extremely gravelly loamy coarse sand

Dissimilar Minor Components

Maggib soils, dry
Percentage of map unit: 10 percent
Landform: Valley walls, bedrock benches

Triumph soils
Percentage of map unit: 10 percent
Landform: Valley walls, debris aprons

Rock outcrop
Percentage of map unit: 5 percent
Landform: Valley walls, bedrock benches

Terror soils, dry
Percentage of map unit: 5 percent
Landform: Valley walls, debris aprons

9003—Stetattle-Doubtful-Arriva complex, 15 to 100 percent slopes

Map Unit Setting

General landscape: Mountains (figs. 67 and 68)
Elevation: 450 to 2,270 meters
Mean annual precipitation: 940 to 2,870 millimeters
Mean annual air temperature: 1 to 8 degrees C
Frost-free period: 30 to 90 days

Map Unit Composition

Stetattle and similar soils: 30 percent
Doubtful and similar soils: 25 percent
Arriva and similar soils: 20 percent
Dissimilar minor components: 25 percent

Stetattle Soil

Setting

Landform: Valley walls, ridges
Landform position (two-dimensional): Backslopes
Landform position (three-dimensional): Upper third of mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash mixed with glacial drift

Properties and qualities

Slope: 35 to 100 percent
Percentage of surface area covered with rock fragments: 0 to 50 percent with boulders

Figure 67.—Typical area of Stetattle-Doubtful-Arriva complex, 15 to 100 percent slopes, on Easy Ridge. Doubtful gravelly ashy sandy loam under the rangeland ecological site of R003XN502WA in foreground.

Figure 68.—Hoary marmot (*Marmota caligata*) in an area of Stetattle-Doubtful-Arriva complex, 15 to 100 percent slopes, at Cascade Pass.

Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Very low (about 7 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: R003XN512WA
Ecological site name: Subalpine Parkland - Active Natural Soil Disturbance Complex
Common vegetation: Cascade huckleberry, western pearly everlasting, Sitka mountain-ash, Sitka valerian, salmonberry, Barclay's willow, black huckleberry, broadleaf lupine

Typical profile
A1—0 to 12 centimeters; very stony medial fine sandy loam
A2—12 to 30 centimeters; extremely stony medial fine sandy loam
A3—30 to 55 centimeters; extremely stony medial sandy loam
Bw—55 to 100 centimeters; extremely stony medial sandy loam
2C—100 to 152 centimeters; cobbles

Doubtful Soil

Setting
Landform: Ridges, valley walls, cirques
Landform position (two-dimensional): Backslopes
Landform position (three-dimensional): Upper third of mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash over glacial drift

Properties and qualities
Slope: 35 to 100 percent
Percentage of surface area covered with rock fragments: 0 to 10 percent with cobbles
Depth to restrictive feature: 50 to 100 centimeters to lithic bedrock
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 14.6 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: R003XN502WA
Ecological site name: Subalpine Parkland - Minor Natural Soil Disturbance Complex
Common trees: Mountain hemlock, subalpine fir
Other common vegetation: Cascade azalea, black huckleberry, pink mountain-heather, Cascade huckleberry, Sitka mountain-ash, broadleaf lupine, western pearly everlasting, showy sedge, partridgefoot

Typical profile
Oi—0 to 2 centimeters; slightly decomposed plant material
A—2 to 9 centimeters; gravelly ashy sandy loam
Bw1—9 to 27 centimeters; gravelly ashy sandy loam
Bw2—27 to 58 centimeters; gravelly ashy sandy loam
2C—58 to 70 centimeters; extremely gravelly loamy coarse sand
R—70 to 152 centimeters; unweathered bedrock

Arriva Soil

Setting
Landform: Valley walls, ridges, cirques
Landform position (two-dimensional): Backslopes
Landform position (three-dimensional): Upper third of mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash over glacial drift

Properties and qualities
Slope: 15 to 65 percent
Percentage of surface area covered with rock fragments: 0 to 30 percent with stones and 0 to 30 percent with boulders
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained

Capacity to transmit water (Ksat): Moderately high to very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Moderate (about 22.6 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: R003XN502WA
Ecological site name: Subalpine Parkland - Minor Natural Soil Disturbance Complex
Common trees: Mountain hemlock, subalpine fir
Other common vegetation: Cascade azalea, black huckleberry, pink mountain-heather, Cascade huckleberry, Sitka mountain-ash, broadleaf lupine, western pearly everlasting, showy sedge, partridgefoot

Typical profile
Oi—0 to 4 centimeters; slightly decomposed plant material
Oe—4 to 23 centimeters; moderately decomposed plant material
E—23 to 26 centimeters; ashy fine sandy loam
Oa—26 to 38 centimeters; highly decomposed plant material
Bw—38 to 47 centimeters; medial sandy loam
Ab—47 to 50 centimeters; medial loam
Bwb—50 to 60 centimeters; gravelly medial sandy loam
2C1—60 to 85 centimeters; very stony loamy coarse sand
2C2—85 to 152 centimeters; very stony loamy coarse sand

Dissimilar Minor Components

Spickard soils, cold
Percentage of map unit: 10 percent
Landform: Valley walls, ridges

Treen soils
Percentage of map unit: 10 percent
Landform: Valley walls, ridges, cirques

Rock outcrop
Percentage of map unit: 5 percent
Landform: Valley walls, ridges, cirques

9008—Mox-Doubtful-Perfect complex, 35 to 100 percent slopes

Map Unit Setting

General landscape: Mountains
Elevation: 485 to 2,085 meters
Mean annual precipitation: 991 to 2,870 millimeters
Mean annual air temperature: 1 to 7 degrees C
Frost-free period: 30 to 60 days

Map Unit Composition

Mox and similar soils: 30 percent
Doubtful and similar soils: 20 percent
Perfect, cold, and similar soils: 15 percent
Dissimilar minor components: 35 percent

Mox Soil

Setting
Landform: Valley walls, debris aprons
Landform position (two-dimensional): Backslopes
Landform position (three-dimensional): Mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash over glacial drift

Properties and qualities
Slope: 35 to 100 percent
Percentage of surface area covered with rock fragments: 0 to 30 percent with stones
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Moderate (about 20.3 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: F003XN925WA
Ecological site scientific name: Tsuga mertensiana-Abies lasiocarpa/Phyllodoce empetriformis-Vaccinium membranaceum/Valeriana sitchensis-Veratrum viride
Ecological site common name: High Cryic/Udic Coniferous
Common trees: Alaska yellow-cedar, mountain hemlock, Pacific silver fir, subalpine fir, whitebark pine
Common understory vegetation: Pink mountain-heather, black huckleberry, Cascade huckleberry, Sitka mountain-ash, Sitka valerian, false hellebore, sidebells wintergreen

Typical profile
Oi—0 to 4 centimeters; slightly decomposed plant material
Oe—4 to 16 centimeters; moderately decomposed plant material
E—16 to 27 centimeters; ashy sandy loam
Bs—27 to 49 centimeters; gravelly medial sandy loam
Bhs—49 to 76 centimeters; cobbly medial sandy loam
2BC—76 to 94 centimeters; very gravelly coarse sandy loam
2C—94 to 152 centimeters; very gravelly sandy loam

Doubtful Soil

Setting
Landform: Bedrock benches, valley walls
Landform position (two-dimensional): Backslopes

Landform position (three-dimensional): Upper third of mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash over glacial drift

Properties and qualities
Slope: 35 to 100 percent
Percentage of surface area covered with rock fragments: 0 to 10 percent with cobbles
Depth to restrictive feature: 50 to 100 centimeters to lithic bedrock
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 14.6 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: R003XN502WA
Ecological site name: Subalpine Parkland - Minor Natural Soil Disturbance Complex
Common trees: Mountain hemlock, subalpine fir
Other common vegetation: Cascade azalea, black huckleberry, pink mountain-heather, Cascade huckleberry, Sitka mountain-ash, broadleaf lupine, western pearly everlasting, showy sedge, partridgefoot

Typical profile
Oi—0 to 2 centimeters; slightly decomposed plant material
A—2 to 9 centimeters; gravelly ashy sandy loam
Bw1—9 to 27 centimeters; gravelly ashy sandy loam
Bw2—27 to 58 centimeters; gravelly ashy sandy loam
2C—58 to 70 centimeters; extremely gravelly loamy coarse sand
R—70 to 152 centimeters; unweathered bedrock

Perfect Soil, Cold

Setting
Landform: Valley walls, debris aprons
Landform position (two-dimensional): Backslopes
Landform position (three-dimensional): Mountainflanks
Aspect (range): All aspects
Parent material: Minor amount of volcanic ash mixed with colluvium and reworked glacial drift

Properties and qualities
Slope: 35 to 100 percent
Percentage of surface area covered with rock fragments: 0 to 30 percent with stones
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters

Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 10.4 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: F003XN925WA
Ecological site scientific name: *Tsuga mertensiana-Abies lasiocarpa/ Phyllodoce empetriformis-Vaccinium membranaceum/Valeriana sitchensis-Veratrum viride*
Ecological site common name: High Cryic/Udic Coniferous
Common trees: Alaska yellow-cedar, mountain hemlock, Pacific silver fir, subalpine fir, whitebark pine
Common understory vegetation: Pink mountain-heather, black huckleberry, Cascade huckleberry, Sitka mountain-ash, Sitka valerian, false hellebore, sidebells wintergreen

Typical profile
Oi—0 to 3 centimeters; slightly decomposed plant material
Oe—3 to 4 centimeters; moderately decomposed plant material
Bw—4 to 7 centimeters; ashy sandy loam
Oe—7 to 11 centimeters; moderately decomposed plant material
Eb—11 to 13 centimeters; ashy sandy loam
Bwb—13 to 39 centimeters; gravelly ashy sandy loam
2BCb1—39 to 73 centimeters; extremely cobbly loamy sand
2BCb2—73 to 752 centimeters; extremely gravelly loamy coarse sand

Dissimilar Minor Components

Kimtah soils, cold
Percentage of map unit: 10 percent
Landform: Debris aprons, valley walls

Maggib soils
Percentage of map unit: 10 percent
Landform: Valley walls, bedrock benches

Stetattle soils
Percentage of map unit: 10 percent
Landform: Valley walls, debris cones

Rock outcrop
Percentage of map unit: 5 percent
Landform: Valley walls, bedrock benches

9010—Doubtful-Treen-Rock outcrop complex, 35 to 100 percent slopes

Map Unit Setting

General landscape: Mountains (fig. 69)
Elevation: 410 to 2,355 meters
Mean annual precipitation: 838 to 2,870 millimeters
Mean annual air temperature: 0 to 8 degrees C
Frost-free period: 30 to 90 days

Figure 69.—Bioturbation on Desolation Peak in an area of Doubtful-Treen-Rock outcrop complex, 35 to 100 percent slopes. Over time, fine-earth material and coarse fragments brought to the surface change the nature of the soil surface.

Map Unit Composition

Doubtful and similar soils: 30 percent
Treen and similar soils: 25 percent
Rock outcrop: 15 percent
Dissimilar minor components: 30 percent

Doubtful Soil

Setting
Landform: Ridges, valley walls, cirques
Landform position (two-dimensional): Backslopes
Landform position (three-dimensional): Upper third of mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash over glacial drift

Properties and qualities
Slope: 35 to 100 percent
Percentage of surface area covered with rock fragments: 0 to 10 percent with cobbles
Depth to restrictive feature: 50 to 100 centimeters to lithic bedrock
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 14.6 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: R003XN502WA
Ecological site name: Subalpine Parkland - Minor Natural Soil Disturbance Complex
Common trees: Mountain hemlock, subalpine fir
Other common vegetation: Cascade azalea, black huckleberry, pink mountain-heather, Cascade huckleberry, Sitka mountain-ash, broadleaf lupine, western pearly everlasting, showy sedge, partridgefoot

Typical profile
Oi—0 to 2 centimeters; slightly decomposed plant material
A—2 to 9 centimeters; gravelly ashy sandy loam
Bw1—9 to 27 centimeters; gravelly ashy sandy loam
Bw2—27 to 58 centimeters; gravelly ashy sandy loam
2C—58 to 70 centimeters; extremely gravelly loamy coarse sand
R—70 to 152 centimeters; unweathered bedrock

Treen Soil

Setting
Landform: Ridges, valley walls, cirques
Landform position (two-dimensional): Backslopes
Landform position (three-dimensional): Upper third of mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash and colluvium

Properties and qualities
Slope: 35 to 100 percent
Percentage of surface area covered with rock fragments: 0 to 30 percent with stones
Depth to restrictive feature: 25 to 50 centimeters to lithic bedrock
Drainage class: Well drained
Capacity to transmit water (Ksat): High (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 9.1 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: R003XN512WA
Ecological site name: Subalpine Parkland - Active Natural Soil Disturbance Complex
Common vegetation: Cascade huckleberry, western pearly everlasting, Sitka mountain-ash, Sitka valerian, salmonberry, Barclay's willow, black huckleberry, broadleaf lupine

Typical profile
A1—0 to 10 centimeters; medial loam
A2—10 to 30 centimeters; medial sandy loam
Bw—30 to 40 centimeters; cobbly medial sandy loam
R—40 to 152 centimeters; unweathered bedrock

Rock Outcrop

Landform: Ridges, valley walls, cirques
Slope: 35 to 100 percent
Land capability subclass (nonirrigated): 8

Dissimilar Minor Components

Forbidden soils, cold
Percentage of map unit: 10 percent
Landform: Ridges, valley walls

Harlequin soils
Percentage of map unit: 10 percent
Landform: Ridges, cirques, valley walls

Triumph soils
Percentage of map unit: 10 percent
Landform: Valley walls, ridges

9012—Spickard-Tepeh-Maggib complex, 15 to 100 percent slopes

Map Unit Setting

General landscape: Mountains
Elevation: 265 to 1,975 meters
Mean annual precipitation: 1,245 to 2,718 millimeters
Mean annual air temperature: 1 to 8 degrees C
Frost-free period: 30 to 60 days

Map Unit Composition

Spickard and similar soils: 40 percent
Tepeh, moist, and similar soils: 25 percent
Maggib and similar soils: 15 percent
Dissimilar minor components: 20 percent

Spickard Soil

Setting
Landform: Valley walls, debris aprons
Landform position (two-dimensional): Backslopes
Landform position (three-dimensional): Mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash over glacial drift

Properties and qualities
Slope: 35 to 100 percent
Percentage of surface area covered with rock fragments: 0 to 15 percent with stones
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 14.5 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: F003XN924WA
Ecological site scientific name: Abies amabilis-Tsuga heterophylla/Vaccinium membranaceum-Menziesia ferruginea/Gymnocarpium dryopteris-Clintonia uniflora
Ecological site common name: Low Cryic/Udic West Coniferous
Common trees: Pacific silver fir, western hemlock, Douglas-fir, western redcedar
Common understory vegetation: Black huckleberry, rusty menziesia, devilsclub, strawberryleaf raspberry, western oakfern, queencup bead lily, fringecup, common ladyfern, starry false lily of the valley

Typical profile
Oi—0 to 3 centimeters; slightly decomposed plant material
Oe—3 to 10 centimeters; moderately decomposed plant material
A—10 to 13 centimeters; ashy fine sandy loam
Bw1—13 to 22 centimeters; gravelly ashy sandy loam
Bw2—22 to 44 centimeters; gravelly ashy sandy loam
Bw3—44 to 60 centimeters; gravelly ashy sandy loam
2BC—60 to 105 centimeters; very cobbly loamy sand
2C—105 to 152 centimeters; very stony loamy sand

Tepeh Soil, Moist

Setting
Landform: Valley walls, debris aprons
Landform position (two-dimensional): Backslopes
Landform position (three-dimensional): Mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash over glacial drift

Properties and qualities
Slope: 35 to 100 percent
Percentage of surface area covered with rock fragments: 0 to 10 percent with cobbles
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 9.8 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: F003XN924WA
Ecological site scientific name: Abies amabilis-Tsuga heterophylla/Vaccinium membranaceum-Menziesia ferruginea/Gymnocarpium dryopteris-Clintonia uniflora
Ecological site common name: Low Cryic/Udic West Coniferous
Common trees: Pacific silver fir, western hemlock, Douglas-fir, western redcedar
Common understory vegetation: Black huckleberry, rusty menziesia, devilsclub, strawberryleaf raspberry, western oakfern, queencup bead lily, fringecup, common ladyfern, starry false lily of the valley

Typical profile
Oi—0 to 2 centimeters; slightly decomposed plant material
Oe—2 to 5 centimeters; moderately decomposed plant material
E—5 to 8 centimeters; ashy sandy loam
Bw1—8 to 30 centimeters; gravelly ashy sandy loam
2Bw2—30 to 70 centimeters; very gravelly sandy loam
2Bw3—70 to 92 centimeters; very gravelly sandy loam
2BC—92 to 152 centimeters; extremely cobbly loamy sand

Maggib Soil

Setting
Landform: Valley walls, debris aprons, bedrock benches
Landform position (two-dimensional): Backslopes
Landform position (three-dimensional): Mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash over glacial drift

Properties and qualities
Slope: 15 to 65 percent
Percentage of surface area covered with rock fragments: 0 to 30 percent with stones and 0 to 30 percent with boulders
Depth to restrictive feature: 50 to 100 centimeters to lithic bedrock
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 12.7 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: F003XN925WA
Ecological site scientific name: Tsuga mertensiana-Abies lasiocarpa/ Phyllodoce empetriformis-Vaccinium membranaceum/Valeriana sitchensis-Veratrum viride
Ecological site common name: High Cryic/Udic Coniferous
Common trees: Alaska yellow-cedar, mountain hemlock, Pacific silver fir, subalpine fir, whitebark pine
Common understory vegetation: Pink mountain-heather, black huckleberry, Cascade huckleberry, Sitka mountain-ash, Sitka valerian, false hellebore, sidebells wintergreen

Typical profile
Oe—0 to 2 centimeters; moderately decomposed plant material
Oa—2 to 5 centimeters; highly decomposed plant material
E—5 to 9 centimeters; stony medial fine sandy loam
Bs1—9 to 27 centimeters; gravelly medial fine sandy loam
Bs2—27 to 64 centimeters; gravelly medial sandy loam
2BC—64 to 80 centimeters; extremely cobbly loamy sand
R—80 to 152 centimeters; unweathered bedrock

Dissimilar Minor Components

Perfect soils
Percentage of map unit: 10 percent
Landform: Valley walls, debris aprons

Rock outcrop
Percentage of map unit: 5 percent
Landform: Valley walls, bedrock benches

Terror soils
Percentage of map unit: 5 percent
Landform: Valley walls, debris cones

9016—Doubtful-Triumph-Perfect complex, 35 to 100 percent slopes

Map Unit Setting

General landscape: Mountains
Elevation: 385 to 2,275 meters
Mean annual precipitation: 838 to 2,819 millimeters
Mean annual air temperature: 0 to 8 degrees C
Frost-free period: 30 to 90 days

Map Unit Composition

Doubtful and similar soils: 30 percent
Triumph and similar soils: 20 percent
Perfect, cold, and similar soils: 15 percent
Dissimilar minor components: 35 percent

Doubtful Soil

Setting
Landform: Ridges, valley walls, cirques
Landform position (two-dimensional): Backslopes
Landform position (three-dimensional): Upper third of mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash over glacial drift

Properties and qualities
Slope: 35 to 100 percent
Percentage of surface area covered with rock fragments: 0 to 10 percent with cobbles
Depth to restrictive feature: 50 to 100 centimeters to lithic bedrock
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 14.6 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: R003XN502WA
Ecological site name: Subalpine Parkland - Minor Natural Soil Disturbance Complex
Common trees: Mountain hemlock, subalpine fir
Other common vegetation: Cascade azalea, black huckleberry, pink mountain-heather, Cascade huckleberry, Sitka mountain-ash, broadleaf lupine, western pearly everlasting, showy sedge, partridgefoot

Typical profile
Oi—0 to 2 centimeters; slightly decomposed plant material
A—2 to 9 centimeters; gravelly ashy sandy loam
Bw1—9 to 27 centimeters; gravelly ashy sandy loam
Bw2—27 to 58 centimeters; gravelly ashy sandy loam
2C—58 to 70 centimeters; extremely gravelly loamy coarse sand
R—70 to 152 centimeters; unweathered bedrock

Triumph Soil

Setting
Landform: Ridges, valley walls
Landform position (two-dimensional): Backslopes
Landform position (three-dimensional): Upper third of mountainflanks
Aspect (range): All aspects
Parent material: Minor amount of volcanic ash mixed with colluvium and residuum

Properties and qualities
Slope: 35 to 100 percent
Percentage of surface area covered with rock fragments: 20 to 65 percent with stones
Depth to restrictive feature: 100 to 150 centimeters to paralithic bedrock
Drainage class: Well drained
Capacity to transmit water (Ksat): High (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Very low (about 7.5 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: R003XN512WA
Ecological site name: Subalpine Parkland - Active Natural Soil Disturbance Complex
Common vegetation: Cascade huckleberry, western pearly everlasting, Sitka mountain-ash, Sitka valerian, salmonberry, Barclay's willow, black huckleberry, broadleaf lupine

Typical profile
A1—0 to 15 centimeters; gravelly ashy sandy loam
A2—15 to 50 centimeters; very cobbly ashy sandy loam
A3—50 to 120 centimeters; extremely cobbly ashy sandy loam
Cr—120 to 152 centimeters; weathered bedrock

Perfect Soil, Cold

Setting
Landform: Valley walls, ridges
Landform position (two-dimensional): Backslopes

Landform position (three-dimensional): Mountainflanks
Aspect (range): All aspects
Parent material: Minor amount of volcanic ash mixed with colluvium and reworked glacial drift

Properties and qualities
Slope: 35 to 100 percent
Percentage of surface area covered with rock fragments: 0 to 30 percent with stones
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 10.4 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: F003XN925WA
Ecological site scientific name: Tsuga mertensiana-Abies lasiocarpa/Phyllodoce empetriformis-Vaccinium membranaceum/Valeriana sitchensis-Veratrum viride
Ecological site common name: High Cryic/Udic Coniferous
Common trees: Alaska yellow-cedar, mountain hemlock, Pacific silver fir, subalpine fir, whitebark pine
Common understory vegetation: Pink mountain-heather, black huckleberry, Cascade huckleberry, Sitka mountain-ash, Sitka valerian, false hellebore, sidebells wintergreen

Typical profile
Oi—0 to 3 centimeters; slightly decomposed plant material
Oe—3 to 4 centimeters; moderately decomposed plant material
Bw—4 to 7 centimeters; ashy sandy loam
Oe—7 to 11 centimeters; moderately decomposed plant material
Eb—11 to 13 centimeters; ashy sandy loam
Bwb—13 to 39 centimeters; gravelly ashy sandy loam
2BCb1—39 to 73 centimeters; extremely cobbly loamy sand
2BCb2—73 to 752 centimeters; extremely gravelly loamy coarse sand

Dissimilar Minor Components

Arriva soils
Percentage of map unit: 10 percent
Landform: Ridges, valley walls, cirques

Rock outcrop
Percentage of map unit: 10 percent
Landform: Cirques, ridges

Treen soils
Percentage of map unit: 10 percent
Landform: Ridges, cirques, valley walls

Terror soils, cold
Percentage of map unit: 5 percent
Landform: Valley walls, cirques

9501—Stehekin-Primus-Stetattle complex, 35 to 100 percent slopes

Map Unit Setting

General landscape: Mountains
Elevation: 530 to 2,210 meters
Mean annual precipitation: 686 to 1,803 millimeters
Mean annual air temperature: 1 to 8 degrees C
Frost-free period: 30 to 90 days

Map Unit Composition

Stehekin and similar soils: 40 percent
Primus and similar soils: 25 percent
Stetattle and similar soils: 15 percent
Dissimilar minor components: 20 percent

Stehekin Soil

Setting

Landform: Debris aprons, valley walls
Landform position (two-dimensional): Backslopes, footslopes
Landform position (three-dimensional): Mountainflanks
Aspect (range): All aspects
Parent material: Mixed volcanic ash over colluvium and glacial drift

Properties and qualities

Slope: 35 to 100 percent
Percentage of surface area covered with rock fragments: 0 to 10 percent with cobbles
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 10.4 centimeters)

Land capability classification

Land capability subclass (nonirrigated): 7e

Vegetation

Ecological site identification number: F003XN923WA
Ecological site scientific name: *Abies lasiocarpa-Picea engelmannii/Rubus parviflorus-Paxistima myrsinites/Clintonia uniflora*
Ecological site common name: Cryic/Xeric Coniferous
Common trees: Douglas-fir, Engelmann spruce, subalpine fir
Common understory vegetation: Thimbleberry, pachistima, dwarf bramble, black huckleberry, queencup bead lily, western pearly everlasting, sweetcicely

Typical profile

A—0 to 18 centimeters; ashy sandy loam
Bw—18 to 44 centimeters; very cobbly sandy loam
BC—44 to 109 centimeters; very bouldery sandy loam
C—109 to 152 centimeters; very stony sandy loam

Primus Soil

Setting
Landform: Debris aprons, valley walls
Landform position (two-dimensional): Backslopes, footslopes
Landform position (three-dimensional): Mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash and reworked glacial drift over alluvium and glacial drift

Properties and qualities
Slope: 35 to 100 percent
Percentage of surface area covered with rock fragments: 30 to 50 percent with cobbles
Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 12 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: F003XN923WA
Ecological site scientific name: Abies lasiocarpa-Picea engelmannii/Rubus parviflorus-Paxistima myrsinites/Clintonia uniflora
Ecological site common name: Cryic/Xeric Coniferous
Common trees: Douglas-fir, Engelmann spruce, subalpine fir
Common understory vegetation: Thimbleberry, pachistima, dwarf bramble, black huckleberry, queencup bead lily, western pearly everlasting, sweetcicely

Typical profile
Oi—0 to 1 centimeter; gravelly slightly decomposed plant material
Oe—1 to 3 centimeters; gravelly moderately decomposed plant material
Bw1—3 to 34 centimeters; gravelly ashy fine sandy loam
Bw2—34 to 60 centimeters; gravelly ashy fine sandy loam
2BC—60 to 84 centimeters; extremely cobbly ashy sandy loam
2C—84 to 152 centimeters; extremely gravelly loamy sand

Stetattle Soil

Setting
Landform: Valley walls, debris cones, debris aprons
Landform position (two-dimensional): Backslopes
Landform position (three-dimensional): Mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash mixed with glacial drift

Properties and qualities
Slope: 35 to 100 percent
Percentage of surface area covered with rock fragments: 0 to 50 percent with boulders

Depth to restrictive feature: None within a depth of 150 centimeters
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Very low (about 7 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: R003XN512WA
Ecological site name: Subalpine Parkland - Active Natural Soil Disturbance Complex
Common vegetation: Cascade huckleberry, western pearly everlasting, Sitka mountain-ash, Sitka valerian, salmonberry, Barclay's willow, black huckleberry, broadleaf lupine

Typical profile
A1—0 to 12 centimeters; very stony medial fine sandy loam
A2—12 to 30 centimeters; extremely stony medial fine sandy loam
A3—30 to 55 centimeters; extremely stony medial sandy loam
Bw—55 to 100 centimeters; extremely stony medial sandy loam
2C—100 to 152 centimeters; cobbles

Dissimilar Minor Components

Despair soils
Percentage of map unit: 10 percent
Landform: Bedrock benches, valley walls

Rock outcrop
Percentage of map unit: 10 percent
Landform: Bedrock benches, valley walls

9997—Rock outcrop-Despair complex, 35 to 100 percent slopes

Map Unit Setting

Elevation: 260 to 2,710 meters
Mean annual precipitation: 483 to 2,565 millimeters
Mean annual air temperature: 0 to 8 degrees C
Frost-free period: 30 to 90 days

Map Unit Composition

Rock outcrop: 70 percent
Despair and similar soils: 15 percent
Dissimilar minor components: 15 percent

Rock Outcrop

Landform: Ridges, valley walls, and cirques
Slope: 35 to 100 percent
Land capability subclass (nonirrigated): 8

Despair Soil

Setting
Landform: Ridges, cirques, bedrock benches, valley walls
Landform position (two-dimensional): Backslopes
Landform position (three-dimensional): Mountainflanks
Aspect (range): All aspects
Parent material: Volcanic ash over glacial drift

Properties and qualities
Slope: 35 to 100 percent
Percentage of surface area covered with rock fragments: 0 to 50 percent with cobbles
Depth to restrictive feature: 25 to 50 centimeters to lithic bedrock
Drainage class: Well drained
Capacity to transmit water (Ksat): High (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Low (about 8.4 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: F003XN927WA
Ecological site scientific name: Pseudotsuga menziesii-Pinus ponderosa/Paxistima myrsinites-Amelanchier alnifolia/Calamagrostis rubescens-Collomia linearis
Ecological site common name: Frigid/Xeric Coniferous
Common trees: Bigleaf maple, Douglas-fir, grand fir, lodgepole pine, ponderosa pine, western white pine
Common understory vegetation: Pachistima, serviceberry, tall Oregongrape, birchleaf spirea, baldhip rose, kinnikinnick, snowbrush ceanothus, pinegrass, narrow-leaved collomia, western rattlesnake plantain, pathfinder

Typical profile
Oa—0 to 4 centimeters; highly decomposed plant material
A—4 to 21 centimeters; ashy sandy loam
Bw—21 to 41 centimeters; gravelly ashy sandy loam
R—41 to 152 centimeters; unweathered bedrock

Dissimilar Minor Components

Rubble land
Percentage of map unit: 10 percent
Landform: Ridges, cirques, valley walls, bedrock benches

Harlequin soils
Percentage of map unit: 5 percent
Landform: Ridges, cirques, valley walls, bedrock benches

9998—Rock outcrop-Glaciers-Harlequin complex, 25 to 100 percent slopes

Map Unit Setting

Elevation: 505 to 2,810 meters (fig. 70)
Mean annual precipitation: 1,245 to 3,937 millimeters
Mean annual air temperature: 0 to 7 degrees C
Frost-free period: 30 to 60 days

Map Unit Composition

Rock outcrop: 60 percent
Glaciers: 15 percent
Harlequin and similar soils: 15 percent
Dissimilar minor component: 10 percent

Rock Outcrop

Landform: Ridges, valley walls, cirques
Slope: 25 to 100 percent
Land capability subclass (nonirrigated): 8

Glaciers

Landform: Ridges, cirques
Slope: 25 to 100 percent
Land capability subclass (nonirrigated): 8

Figure 70.—Mountain goat (*Oreamnos americanus*) in an area of Rock outcrop-Glaciers-Harlequin complex, 25 to 100 percent slopes.

Harlequin Soil

Setting
Landform: Cirques, ridges, valley walls (fig. 71)
Landform position (two-dimensional): Backslopes
Landform position (three-dimensional): Upper third of mountainflanks
Aspect (range): All aspects
Parent material: Colluvium and glacial drift over residuum

Properties and qualities
Slope: 25 to 100 percent
Percentage of surface area covered with rock fragments: 0 to 10 percent with cobbles
Depth to restrictive feature: 25 to 50 centimeters to lithic bedrock
Drainage class: Well drained
Capacity to transmit water (Ksat): High or very high (see Physical Properties table)
Flooding frequency: None
Ponding frequency: None
Seasonal high water table (minimum depth): More than 200 centimeters
Salinity (maximum): Not saline
Sodicity (maximum): Not sodic
Available water capacity (entire profile): Very low (about 7.5 centimeters)

Land capability classification
Land capability subclass (nonirrigated): 7e

Vegetation
Ecological site identification number: R003XN512WA
Ecological site name: Subalpine Parkland - Active Natural Soil Disturbance Complex

Figure 71.—Typical area of Harlequin sandy loam, above Perry Creek, at right. Ridgeline in foreground marks a transition between areas of Rock outcrop-Glaciers-Harlequin complex, 25 to 100 percent slopes, and Doubtful-Triumph-Perfect complex, 35 to 100 percent slopes.

Common vegetation: Cascade huckleberry, western pearly everlasting, Sitka mountain-ash, Sitka valerian, salmonberry, Barclay's willow, black huckleberry, broadleaf lupine

Typical profile
Oi—0 to 6 centimeters; slightly decomposed plant material
A—6 to 24 centimeters; sandy loam
Bw—24 to 46 centimeters; sandy loam
2R—46 to 71 centimeters; unweathered bedrock

Dissimilar Minor Component

Rubble land
Percentage of map unit: 10 percent
Landform: Ridges, cirques, valley walls, bedrock benches

9999—Water

Elevation: 130 to 2,185 meters
Map unit composition: Water, freshwater—100 percent
Land capability subclass (nonirrigated): 8

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, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and 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 for pasture; as rangeland and forestland; as sites for buildings, sanitary facilities, highways and other transportation systems, and 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 gravel, sand, reclamation material, 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, and campgrounds.

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.

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 (USDA, 1961). Only class and subclass are used in this survey.

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, 2e. 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.

The capability classification of the soils in this survey area is given in the section “Detailed Soil Map Units” and in table 8.

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 quality, 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. The water supply is dependable and of adequate quality. Prime farmland 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.

No land that meets the requirements for prime farmland is in the survey area.

Vegetation

Characteristics of the forestland and rangeland vegetation in the survey area are described in this section. Each soil component is assigned an ecological site number and name corresponding to either a forestland or rangeland ecological site. Landscapes are divided into ecological sites for the purposes of inventory, evaluation, and management. An ecological site 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, and it has a set of key characteristics that are included in the ecological site description. Ecological sites have characteristic soils that have developed over time. The factors of soil development are parent material, climate, living organisms, topography or landscape position, and time.

The process of plant community development is known as succession. Succession occurs over time and is the result of climate, soil properties, plant growth, and natural disturbances. Plant succession is defined as the gradual or rapid orderly process of replacement of plant communities over time on an ecological site following disturbance. When a natural or manmade disturbance occurs, the successional pathway is interrupted and succession begins anew following the disturbance.

All ecological sites have a reference plant community phase, which serves as the basis for characterizing each site. The reference phase is defined as the plant community that existed prior to European immigration and settlement. It is the plant community phase that developed as a result of all site-forming factors and is considered to be best adapted to the unique combination of environmental factors associated with the site. The reference plant community phase is in dynamic equilibrium with its environment and is maintained by both biotic and abiotic pressures.

Major abiotic factors influencing the plant communities in the survey area include fire, caused by both humans and lightning; aspect, which can result in local

microclimates being either warmer and drier (south- or west-facing slopes) or cooler and wetter (north- and east-facing slopes); elevation, as the average daily high and low temperatures decrease as elevation increases; and soil properties such as texture, depth, and available water capacity. Precipitation also has a major influence on plant communities in the survey area, ranging from the wet, temperate west side to the drier east side that is influenced by the rainshadow. Precipitation influences species survival and the local growing season. Soils warm up more quickly in spring in areas that receive less cold rain. At the higher elevations, the snowpack persists into spring and buffers the soil, keeping the soil moist and cool until late in spring or early in summer.

No plant community is static; the biotic and abiotic factors present at any time can cause transitions, either abrupt or gradual, from one plant community, or state, to another. Sometimes these transitions are gradual, and the effects can be reversed by merely ceasing the activity causing the transition pressure. Commonly, the transitions are abrupt (such as after a fire or mass wasting) and only a major input of energy (such as mechanical activity or use of chemicals) can move the community from the new state back to a previous state. Even after the desired plant community is re-established, unless all the factors causing the transition pressure are addressed, the plant community will again transition to a different, commonly less desirable, community.

The common and scientific names and the symbol for the plant species inventoried for the ecological site descriptions and the rangeland and forestland productivity tables are given in tables 9 and 10. The names are alphabetized by common name in table 9 and by plant symbol in table 10. The ecological site and characteristic vegetation for rangeland soils is given in table 11. The potential productivity, ecological site, and common understory vegetation for forested soils is given in table 12. Further information about the detailed map unit components and the ecological site names and numbers for each component is given in table 13.

Forestland Ecological Sites

By Kathryn E. Smith, MLRA soil survey forester, Natural Resources Conservation Service.

A summary of the major forestland ecological sites that occur on the soils in the survey area is given in the following paragraphs.

Ecological site number: F003XN920WA
Ecological site scientific name: *Populus balsamifera ssp. trichocarpa-Alnus rubra/Acer circinatum-Rubus spectabilis/Asarum caudatum-Athyrium filix-femina* (black cottonwood-red alder/vine maple-salmonberry/Canadian wildginger-common ladyfern)
Ecological site common name: Frigid Riparian Forest

This ecological site is along rivers on the flat, historic flood plains that have a seasonal high water table (fig. 72). Black cottonwood (*Populus balsamifera ssp. Trichocarpa*) and red alder (*Alnus rubra*) are the most common overstory species on this site, but the forest commonly has a variety of species. Western redcedar (*Thuja plicata*), western hemlock (*Tsuga heterophylla*), paper birch (*Betula papyrifera*), grand fir (*Abies grandis*), and Douglas-fir (*Pseudotsuga menziesii*) are also on this site. The most common natural disturbance is flooding, with the volume and longevity of the flooding determining the effect on the dynamics of the forest. Black cottonwood and red alder germinate most successfully on bare mineral soil, which is present after the site is scoured by flooding. The longer the period between major floods, the more diverse the overstory becomes as conifers become established. The understory on this site commonly is shrubby, with vine maple (*Acer circinatum*), salmonberry (*Rubus spectabilis*), devilsclub (*Oplopanax horridus*), prickly currant (*Ribes lacustre*), and red elderberry (*Sambucus racemosa*) making up the dense subcanopy. In the more

Figure 72.—Typical area of the Frigid Riparian Forest (F003XN920WA) forestland ecological site.

flood-prone areas, the shrubs may be less dense, allowing more light to reach the forest floor. This site has an herb layer with common ladyfern (*Athyrium filix-femina*), Canadian wildginger (*Asarum caudatum*), western brackenfern (*Pteridium aquilinum*), queencup bead lily (*Clintonia uniflora*), starry false lily of the valley (*Maianthemum stellatum*) and western swordfern (*Polystichum munitum*) in scattered areas.

Ecological site number: F003XN921WA
Ecological site scientific name: Tsuga heterophylla-Thuja plicata/Acer circinatum-Vaccinium parvifolium/Linnaea borealis-Polystichum munitum (western hemlock-western redcedar/vine maple-red huckleberry/twinflower-western swordfern)
Ecological site common name: Frigid/Udic Coniferous

This ecological site is on the cool, moist, lower slopes of the Cascade Range at elevations of as much as about 1,100 meters, depending on aspect (fig. 73). It is at lower elevations on north- and east-facing slopes and at higher elevations on south- and west-facing slopes. Western hemlock (*Tsuga heterophylla*) and western redcedar (*Thuja plicata*) are the dominant overstory species, and Douglas-fir (*Pseudotsuga menziesii*) is codominant. The heavy shade provided by a hemlock/redcedar forest favors the gradual replacement of Douglas-fir with the more shade-tolerant trees in the absence of a major disturbance. Paper birch (*Betula papyrifera*), grand fir (*Abies grandis*), and bigleaf maple (*Acer macrophyllum*) may be minor components of the overstory.

The most common disturbance on this site is patchy, small pockets of windthrown overstory trees, which commonly occur in conjunction with either root-, butt- or stem-rot. The resulting openings in the canopy allow some sunlight to reach the forest floor, which benefits the understory. The historic fire regime was of low frequency (150 to 300 years or more) and moderate to high intensity. The fires are, in effect,

Figure 73.—Typical area of the Frigid/Udic Coniferous (F003XN921WA) forestland ecological site.

stand-replacing although individual trees or patches of trees survive, providing a seed source for reestablishment. The more open the forest canopy, the more dense and diverse the understory. Vine maple (*Acer circinatum*), red huckleberry (*Vaccinium parvifolium*), Cascade Oregongrape (*Mahonia nervosa*), prince's pine (*Chimaphila umbellata*), and salal (*Gaultheria shallon*) are the main shrub species in areas where the overstory canopy is relatively open, and twinflower (*Linnaea borealis*), western swordfern (*Polystichum munitum*), western rattlesnake plantain (*Goodyera oblongifolia*), broadleaf starflower (*Trientalis borealis ssp. latifolia*), and western brackenfern (*Pteridium aquilinum*) are common forbs.

Ecological site number: F003XN922WA
Ecological site scientific name: *Acer circinatum/Ribes lacustre-Vaccinium parvifolium/Polystichum munitum-Pteridium aquilinum* (vine maple/prickly currant-red huckleberry/western swordfern-western brackenfern)
Ecological site common name: Frigid/Udic Active Natural Disturbance

This ecological site is on cool, moist, active avalanche chutes at an elevation of less than 1,100 meters (fig. 74). Vine maple (*Acer ciricnatum*) is the dominant species, and it grows almost prostrate in response to the snow load and the avalanches. Repetitious disturbance by avalanches does not allow for the establishment of a forest overstory, but seedlings of many species, such as Douglas-fir (*Pseudotsuga menziesii*), western redcedar (*Thuja plicata*), western hemlock (*Tsuga heterophylla*), and grand fir (*Abies grandis*), are on this site, commonly encroaching from the forested edges. The rigid trunks of these species do not lend themselves to being repeatedly overswept with heavy snow, and over time the majority of these trees are snapped off. Common shrub species include prickly currant (*Ribes lacustre*), red huckleberry (*Vaccinium*

Figure 74.—Typical area of the Frigid/Udic Active Natural Disturbance (F003XN922WA) forestland ecological site.

parvifolium), myrtle pachistima (*Paxistima myrsinites*), and Cascade Oregongrape (*Mahonia nervosa*). Common forbs are western swordfern (*Polystichum munitum*), western brackenfern (*Pteridium aquilinum*), and queencup bead lily (*Clintonia uniflora*).

Ecological site number: F003XN923WA
Ecological site scientific name: *Abies lasiocarpa-Picea engelmannii/Rubus parviflorus-Paxistima myrsinites/Clintonia uniflora* (subalpine fir-Engelmann spruce/thimbleberry-myrtle pachistima/queencup bead lily)
Ecological site common name: Cryic/Xeric Coniferous

This ecological site is in cold, dry areas east of the Cascade Crest at an elevation of about 900 to 1,800 meters (fig. 75). Subalpine fir (*Abies lasiocarpa*) and Engelmann spruce (*Picea engelmannii*) are the dominant overstory species, and Douglas-fir (*Pseudotsuga menziesii*), lodgepole pine (*Pinus contorta*), and whitebark pine (*Pinus albicaulis*) are less abundant. Subalpine fir and Engelmann spruce are susceptible to windthrow, which results in small openings scattered throughout the forest. These species are also favored hosts for the western spruce budworm (*Choristoneura occidentalis*), which can cause major mortality during an outbreak. The historic fire regime is one of low frequency (about 200 years or more) and high intensity, and the fires are stand-replacing events. The main understory species are thimbleberry (*Rubus parviflorus*), myrtle pachistima (*Paxistima myrsinites*), dwarf bramble (*Rubus lasiococcus*), queencup bead lily (*Clintonia uniflora*), western pearly everlasting (*Anaphalis margaritacea*), and sweetcicely (*Osmorhiza berteroi*).

Figure 75.—Typical area of the Cryic/Xeric Coniferous (F003XN923WA) forestland ecological site in middle at right. Subalpine Parkland - Active Natural Soil Disturbance Complex (R003XN512WA) rangeland ecological site in foreground.

Ecological site number: F003XN924WA
Ecological site scientific name: *Abies amabilis-Tsuga heterophylla/Vaccinium membranaceum-Menziesia ferruginea/Gymnocarpium dryopteris-Clintonia uniflora* (Pacific silver fir-western hemlock/black huckleberry-rusty menziesia/western oakfern-queencup bead lily)
Ecological site common name: Low Cryic/Udic West Coniferous

This ecological site is in cold, moist areas at the middle elevations (about 800 to 1,500 meters) on the west side of the Cascade Crest (fig. 76). Pacific silver fir (*Abies amabilis*) and western hemlock (*Tsuga heterophylla*) are the dominant species with some western redcedar (*Thuja plicata*) and Douglas-fir (*Pseudotsuga menziesii*). The most common disturbance on this site is windthrow, to which both Pacific silver fir and western hemlock are susceptible. The resulting canopy openings allow more sunlight to reach the forest floor. The historic fire regime is one of low frequency (300 years or more) and high intensity, and the fires are stand-replacing events. Common understory shrubs include black huckleberry (*Vaccinium membranaceum*), rusty menziesia (*Menziesia ferruginea*), devilsclub (*Oplopanax horridus*), strawberryleaf raspberry (*Rubus pedatus*), and vine maple (*Acer circinatum*). Common forbs include western oakfern (*Gymnocarpium dryopteris*), queencup bead lily (*Clintonia uniflora*), fringecup (*Tellima grandiflora*), common ladyfern (*Athyrium filix-femina*), and starry false lily of the valley (*Maianthemum stellatum*).

Figure 76.—Typical area of the Low Cryic/Udic West Coniferous (F003XN924WA) forestland ecological site.

Ecological site number: F003XN925WA
Ecological site scientific name: *Tsuga mertensiana-Abies lasiocarpa/Phyllodoce empetriformis-Vaccinium membranaceum/Valeriana sitchensis-Veratrum viride* (mountain hemlock-subalpine fir/pink mountain-heather-black huckleberry/Sitka valerian-false hellebore)
Ecological site common name: High Cryic/Udic Coniferous

This ecological site is in cold, moist areas at high elevations (about 1,400 meters up to the tree line) (fig. 77). The dominant overstory species are mountain hemlock (*Tsuga mertensiana*) and subalpine fir (*Abies lasiocarpa*). Other common tree species include Pacific silver fir (*Abies amabilis*), Alaska yellow-cedar (*Cupressus nootkatensis*), and whitebark pine (*Pinus albicaulis*). Mountain hemlock and Pacific silver fir are considered highly susceptible to laminated root rot (*Phellinus weirii*), which will cause patches of mortality. Subalpine fir is less susceptible to this root rot, and Alaska yellow-cedar and whitebark pine are considered to be tolerant. Thus, this fungus can alter the composition of the forest. The historic fire regime is one of low frequency (500 years or more) and high intensity, and the fires are a stand-replacing event. Common understory shrubs include pink mountain-heather (*Phyllodoce empetriformis*), black huckleberry (*Vaccinium membranaceum*), Sitka mountain-ash (*Sorbus sitchensis*), and Cascade huckleberry (*Vaccinium deliciosum*). Common forbs include Sitka valerian (*Valeriana sitchensis*), false hellebore (*Veratrum viride*), sidebells wintergreen (*Orthilia secunda*), and western meadow-rue (*Thalictrum occidentale*).

Figure 77.—Typical area of the High Cryic/Udic Coniferous (F003XN925WA) forestland ecological site.

Ecological site number: F003XN926WA
Ecological site scientific name: Alnus viridis ssp. sinuata/Sambucus racemosa/ Veratrum viride-Athyrium filix-femina (Sitka alder/red elderberry/false hellebore-common ladyfern)
Ecological site common name: Cryic/Udic Active Natural Disturbance

This ecological site is in cold, moist areas at the higher elevations (above about 1,100 meters) on active avalanche chutes (fig. 78). Sitka alder (*Alnus viridis ssp. sinuata*) is the dominant species, and it grows almost prostrate in response to the snow load and the avalanches. Repetitive avalanches do not allow for the establishment of a forested overstory, but seedlings of tree species, such as Pacific silver fir (*Abies amabilis*), subalpine fir (*Abies lasiocarpa*), and mountain hemlock (*Tsuga mertensiana*), may encroach from the forested edges. Over time, the majority of these rigid-trunked trees will be snapped off by the avalanches. Common understory shrubs include red elderberry (*Sambucus racemosa*), salmonberry (*Rubus spectabilis*), Sitka mountain-ash (*Sorbus sitchensis*), and prickly currant (*Ribes lacustre*). Common forbs include false hellebore (*Veratrum viride*), common ladyfern (*Athyrium filix-femina*), fireweed (*Chamerion angustifolium*), and Sitka valerian (*Valeriana sitchensis*).

Figure 78.—Cryic/Udic Active Natural Disturbance (F003XN926WA) forestland ecological site in the area bordering the stream channel and extending onto the adjacent debris cone landforms.

Ecological site number: F003XN927WA
Ecological site scientific name: *Pseudotsuga menziesii-Pinus ponderosa/Paxistima myrsinites-Amelanchier alnifolia/Calamagrostis rubescens-Collomia linearis* (Douglas-fir-ponderosa pine/myrtle pachistima-serviceberry/pinegrass-narrow-leaved collomia)
Ecological site common name: Frigid/Xeric Coniferous

This ecological site is in cool, dry areas at low elevations east of the Cascade Crest (fig. 79). Douglas-fir (*Pseudotsuga menziesii*) and ponderosa pine (*Pinus ponderosa*) are the dominant overstory species. Lodgepole pine (*Pinus contorta*), grand fir (*Abies grandis*), bigleaf maple (*Acer macrophylla*), western white pine (*Pinus monticola*), and quaking aspen (*Populus tremuloides*) are also present in varying amounts. The most common disturbance on this site is wildfire. The historic fire regime is one of high frequency (5 to 35 years) and low intensity. Fires have kept these sites more open and parklike than other forested sites by killing young seedlings and shrubs in the understory as well as the less fire-resistant overstory species, such as grand fir, bigleaf maple, and quaking aspen. Common understory species include myrtle pachistima (*Paxistima myrsinites*), serviceberry (*Amelanchier alnifolia*), tall Oregongrape (*Mahonia aquifolium*), birchleaf spirea (*Spiraea betulifolia var. lucida*), baldhip rose (*Rosa gymnocarpa*), kinnikinnick (*Arctostaphylos uva-ursi*), snowbrush ceanothus (*Ceanothus velutinus*), pinegrass (*Calamagrostis rubescens*), narrow-leaved collomia (*Collomia linearis*), western rattlesnake plantain (*Goodyera oblongifolia*), and pathfinder (*Adenocaulon bicolor*).

Figure 79.—Typical area of the Frigid/Xeric Coniferous (F003XN927WA) forestland ecological site.

Ecological site number: F003XN928WA
Ecological site scientific name: *Acer macrophyllum-Prunus emarginata/Corylus cornuta-Acer circinatum/Maianthemum stellatum-Streptopus amplexifolius* (bigleaf maple-bitter cherry/California hazelnut-vine maple/starry false Solomon's seal-claspleaf twistedstalk)
Ecological site common name: Frigid/Xeric Active Natural Disturbance

This ecological site is in cool, dry areas at low elevations east of the Cascade Crest, where active natural disturbances occur (fig. 80). Debris torrents is the most common disturbance, and avalanches occur less commonly. The repeated disturbance prevents the establishment of a coniferous overstory. Bigleaf maple (*Acer macrophyllum*) and bitter cherry (*Prunus emarginata*) can be broken by falling debris or snow, but both sprout prolifically from their roots (unlike conifers), leading to their continued presence on this site. Common understory shrubs include beaked hazelnut (*Corylus cornuta*), vine maple (*Acer circinatum*), Sitka willow (*Salix sitchensis*), myrtle pachistima (*Paxistima myrsinites*), serviceberry (*Amelanchier alnifolia*), thimbleberry (*Rubus parviflorus*), and snowberry (*Symphoriacarpos albus*). Common forbs include starry false Solomon's seal (*Maianthemum stellatum*), claspleaf twistedstalk (*Streptopus amplexifolius*), and broadleaf starflower (*Trientalis borealis*).

Ecological site number: F003XN929WA
Ecological site scientific name: *Abies amabilis-Picea engelmannii/Vaccinium membranaceum-Paxistima myrsinites/Clintonia uniflora-Orthilia secunda* (Pacific

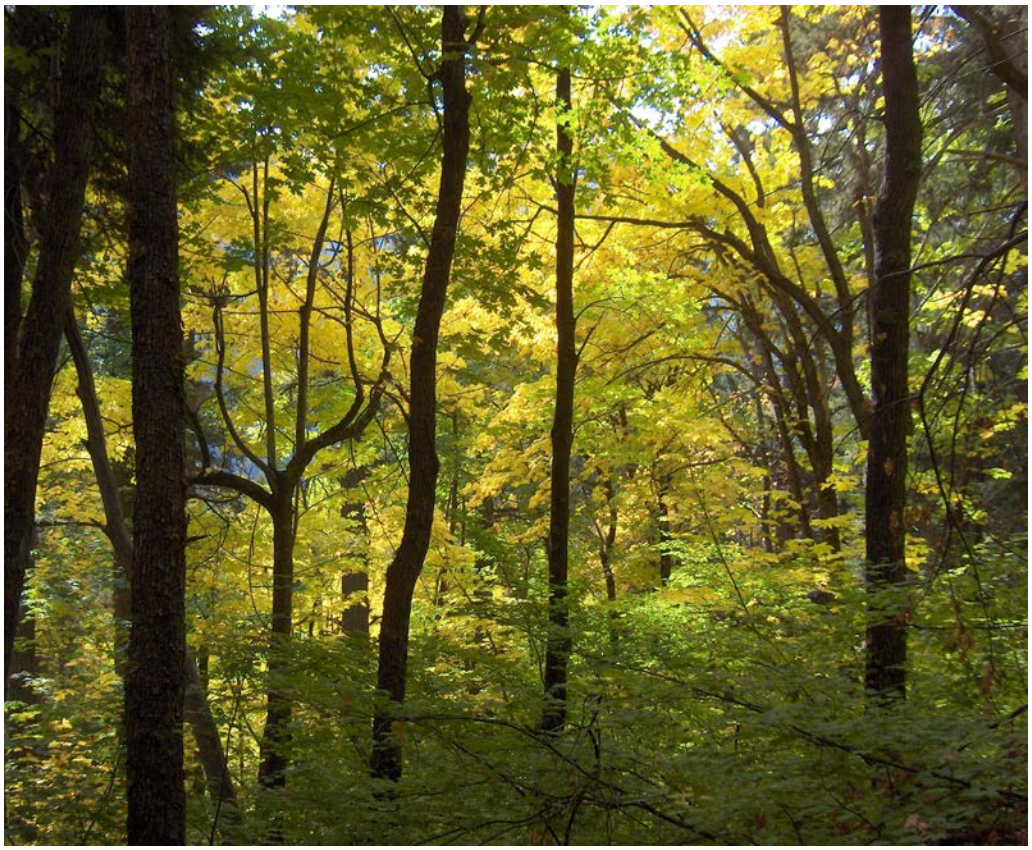


Figure 80.—Typical area of the Frigid/Xeric Active Natural Disturbance (F003XN928WA) forestland ecological site.

silver fir-Engelmann spruce/black huckleberry-myrtle pachistima/queencup bead lily-sidebells wintergreen)

Ecological site common name: Low Cryic/Udic East Coniferous

This ecological site is in cool, dry areas at the middle elevations (about 800 to 1,400 meters) on the east side of the Cascade Crest (fig. 81). Pacific silver fir (*Abies amabilis*) and Engelmann spruce (*Picea engelmannii*) are the dominant overstory species, but subalpine fir (*Abies lasiocarpa*), Douglas-fir (*Pseudotsuga menziesii*), and western hemlock (*Tsuga heterophylla*) commonly are also present. The historic fire regime is not well studied in these forests. The dominant overstory species on this site, with the exception of Douglas-fir, are not adapted to withstand fire; therefore, it is assumed that the fire regime is one of relatively low frequency (150 years or more) and high intensity. The fires are stand-replacing events. Windthrow is more common on this site, leading to open patches in the stand, where increased sunlight would benefit the understory and the tree seedlings and saplings. Common shrubs include black huckleberry (*Vaccinium membranaceum*), myrtle pachistima (*Paxistima myrsinites*), dwarf bramble (*Rubus lasiococcus*), Utah honeysuckle (*Lonicera utahensis*), prickly currant (*Ribes lacustre*), and prince's pine (*Chimaphila umbellata*). Common forbs include queencup bead lily (*Clintonia uniflora*), sidebells wintergreen (*Orthilia secunda*), threeleaf foamflower (*Tiarella trifoliata*), and western rattlesnake plantain (*Goodyera oblongifolia*).

Figure 81.—Typical area of the Low Cryic/Udic East Coniferous (F003XN929WA) forestland ecological site.

Rangeland Ecological Sites

By Marty Chaney, area agronomist, Natural Resources Conservation Service.

A summary of the major rangeland ecological sites that occur on the soils in the survey area is given in the following paragraphs.

Ecological site number: R003XN502WA
Ecological site name: Subalpine Parkland - Minor Natural Soil Disturbance Complex

This ecological site is in the unforested areas at the middle and high elevations of the Cascade Range (fig. 82). Generally, it is not subject to frequent or habitual natural disturbances such as avalanches or soil movement, which results in a mosaic of later seral stage vegetative communities.

This site commonly is on north- or east-facing slopes or in level subalpine meadows on ridge shoulders and passes. Soils generally are coarse textured and moderately deep. Generally, this site is at an elevation of 1,100 to 2,000 meters. The mean annual precipitation is 1,800 to 3,300 millimeters, and the mean annual air temperature is 2 to 5 degrees C. The frost-free season is 30 to 60 days. Common plants include Cascade azalea (*Rhododendron albiflorum*), black huckleberry (*Vaccinium membranaceum*), Sitka mountain-ash (*Sorbus sitchensis*), pink mountain-heather (*Phyllodoce empetriformis*), Cascade huckleberry, (*Vaccinium deliciosum*), broadleaf lupine (*Lupinus latifolius*), western pearly everlasting (*Anaphalis margaritacea*), showy sedge (*Carex spectabilis*), and partridgefoot (*Luetkea pectinata*).

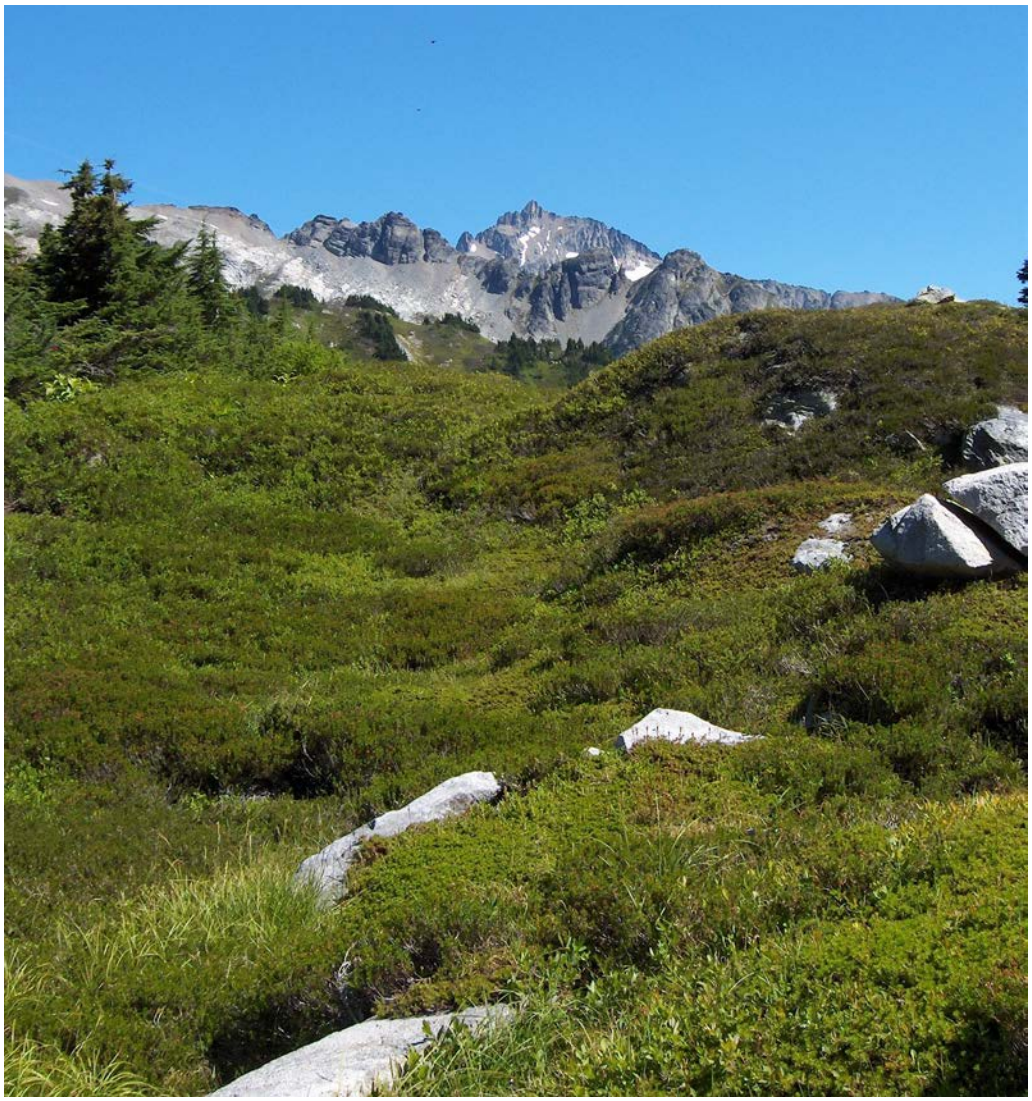


Figure 82.—Typical area of the Subalpine Parkland - Minor Natural Soil Disturbance Complex (R003XN502WA) rangeland ecological site at Cascade Pass.

Ecological site number: R003XN512WA
Ecological site name: Subalpine Parkland - Active Natural Soil Disturbance Complex

This ecological site is in the unforested areas at the middle and high elevations of the Cascade Range (fig. 83). It is subject to frequent soil disturbances, such as mixing by burrowing animals, tree tipping (bioturbation), freeze-thaw cycles (cryoturbation), and movement of soils by water, either through saturation or as a result of snow and ice. Collectively, these disturbances result in haploidization, which is hindered or decelerated horizon development or destruction of horizons. The summary effect of these disturbances is to limit most plant communities to an early seral to mid-seral type. These communities occur in a complex pattern that is related to variations in substrate, soil moisture condition, duration of snowpack, and frequency of disturbance. The soils generally are coarse textured and deep. They are on debris aprons, valley walls, and debris cones, commonly on south-facing or west-facing slopes, and in

Figure 83.—Typical area of the Subalpine Parkland - Active Natural Soil Disturbance Complex (R003XN512WA) rangeland ecological site along the North Fork Rainbow Creek.

drainageways that are subject to avalanches. Slopes are 20 to 90 percent. Generally, this site is at an elevation of 1,100 to 2,000 meters. The mean annual precipitation is 1,800 to 3,300 millimeters, and the mean annual air temperature is 2 to 5 degrees C. The frost-free season is 30 to 60 days. Common plants include Cascade huckleberry (*Vaccinium deliciosum*), western pearly everlasting (*Anaphalis margaritacea*), Sitka mountain-ash (*Sorbus sitchensis*), Sitka valerian (*Valeriana sitchensis*), salmonberry (*Rubus spectabilis*), Barclay's willow (*Salix barclayi*), black huckleberry (*Vaccinium membranaceum*), and broadleaf lupine (*Lupinus latifolius*).

Ecological site number: R003XN603WA
Ecological site name: High Mountain Unforested Wetlands

This ecological site is in the forested and unforested areas of the middle and high elevations of the Cascade Range (fig. 84). It is in depressions and on slopes surrounding lakes or ponds or is associated with flat flood plains. The water table commonly is at or near the surface for much of the growing season, and the rate of organic decomposition is slow. The site commonly consists of bogs or poor fens that consist of saturated peat soils with acidic, nutrient-poor conditions. Well-developed hummocks are common. Occasionally, this site is in complex with mounded areas of the Subalpine Parkland ecological sites. Generally, this site is at an elevation of 1,100 to 2,000 meters. The mean annual precipitation is 1,800 to 3,300 millimeters, and the mean annual air temperature is 2 to 5 degrees C. The frost-free season is 30 to 60 days. Common plants include Barclay's willow (*Salix barclayi*), bluejoint reedgrass (*Calamagrostis canadensis*), water sedge (*Carex aquatilis var. dives*), white marsh marigold (*Caltha leptosepala*), black alpine sedge (*Carex nigricans*), Sphagnum moss, and brown moss.

Figure 84.—Typical area of the High Mountain Unforested Wetlands (R003XN603WA) rangeland ecological site.

Ecological site number: R003XN613WA
Ecological site name: Low Mountain Unforested Wetlands

This ecological site is at low to middle elevations (dominantly 500 to 700 meters, but can be as high as 1,500 meters) of the Cascade Range (fig. 85). It is on flood plains, landslide surfaces, and depressions of glaciated mountains. It is part of the riparian plant community complexes and is typically in well drained areas that are subject to overbank flooding, groundwater discharge, or a high water table associated with flowing water. Slopes are 0 to 5 percent. The soils are coarse-loamy over sandy or sandy-skeletal. The climate is characterized by cool, dry summers and cold, wet winters. The mean annual precipitation is 1,700 to 2,500 millimeters, and the mean annual air temperature is 5 to 7 degrees C. The frost-free season is 60 to 90 days. Common plants include salmonberry (*Rubus spectabilis*), redosier dogwood (*Cornus stolonifera*), red alder (*Alnus rubra*), American skunkcabbage (*Lysichiton americanus*), false lily of the valley (*Maianthemum dilatatum*), and Sitka willow (*Salix sitchensis*).

Rangeland

In areas that have similar climate and topography, differences in the kind and amount of rangeland or forest understory vegetation are closely related to the kind of soil. Effective management is based on the relationship between the soils and vegetation and water.

Table 11 shows, for each soil that supports rangeland vegetation, the ecological site and the characteristic vegetation. An explanation of the column headings in the table follows.

Figure 85.—Extensive area of the Low Mountain Unforested Wetlands (R003XN613WA) rangeland ecological site along Big Beaver Creek (NAIP Photography 2006). The bodies of water are surrounded by this rangeland site, which abruptly transitions to F003XN920WA and F003XN921WA forestland ecological sites.

An *ecological site* is the product of all the environmental factors responsible for its development. It has characteristic soils that have developed over time throughout the soil development process; a characteristic hydrology, particularly infiltration and runoff, that has developed over time; and a characteristic plant community (kind and amount of vegetation). The hydrology of the site is influenced by development of the soil and plant community. The vegetation, soils, and hydrology are all interrelated. Each is influenced by the others and influences the development of the others. The plant community on an ecological site is typified by an association of species that differs from that of other ecological sites in the kind and/or proportion of species or in total production. A summary of the rangeland ecological sites is given under the heading "Vegetation." Complete descriptions of the ecological sites are provided in the Field Office Technical Guide, which is available in local offices of the Natural Resources Conservation Service.

Characteristic vegetation (the grasses, forbs, and shrubs that make up most of the potential natural plant community on each soil) is listed by common name and the U.S. Department of Agriculture plant symbol (USDA, 2006).

Range management requires a knowledge of the kinds of soil and of the potential natural plant community. It also requires an evaluation of the present range similarity index and rangeland trend. Range similarity index is determined by comparing the present plant community with the potential natural plant community on a particular rangeland ecological site. The more closely the existing community resembles the potential community, the higher the range similarity index. Rangeland trend is defined as the direction of change in an existing plant community relative to the potential natural plant community. Further information about the range similarity index and rangeland trend is available in the "National Range and Pasture Handbook," which is available in local offices of the Natural Resources Conservation Service or on the Internet.

Forestland Productivity

Table 12 described in this section can help land managers understand the potential productivity of the soils. The *potential productivity* of common trees on a soil is expressed as a site index and as a volume number. The *site index* is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. The *site index base age* is the number in the National Register of Site Index Curves corresponding to the site index curve used to determine the site index and the annual productivity of the tree species. More detailed information regarding site index is available in the "National Forestry Manual," which is available in local offices of the Natural Resources Conservation Service or on the Internet.

The *volume of wood fiber*, a number, is the yield likely to be produced by the most important tree species. This number, expressed as cubic feet per acre per year and calculated at the age of culmination of the mean annual increment (CMAI), indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand.

An *ecological site* is the product of all the environmental factors responsible for its development. It has characteristic soils that have developed over time throughout the soil development process; a characteristic hydrology, particularly infiltration and runoff, that has developed over time; and a characteristic plant community (kind and amount of vegetation). The hydrology of the site is influenced by development of the soil and plant community. The vegetation, soils, and hydrology are all interrelated. Each is influenced by the others and influences the development of the others. The plant community on an ecological site is typified by an association of species that differs from that of other ecological sites in the kind and/or proportion of species or in total production. A summary of the forestland ecological sites is given under the heading "Vegetation." Complete descriptions of the ecological sites are provided in the Field Office Technical Guide, which is available in local offices of the Natural Resources Conservation Service.

Common understory vegetation (the grasses, forbs, and shrubs that make up most of the understory) is listed by common name and the U.S. Department of Agriculture plant symbol (USDA, 2006).

Land Management

Tables 14 through 17 give interpretive ratings 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 specified aspect of land management. *Well suited* indicates that the soil has features that are favorable for the specified management aspect 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 management aspect. 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 management aspect. 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 management aspect 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 aspect of land management (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).

Table 14.—Planting and Soil Rutting Hazard

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 *soil rutting hazard* are based on depth to a water table, rock fragments on or below the surface, the Unified classification, depth to a restrictive layer, and slope. Ruts form as a result of the operation of planting equipment. The hazard is described as slight, moderate, or severe. A rating of *slight* indicates that the soil is subject to little or no rutting, *moderate* indicates that rutting is likely, and *severe* indicates that ruts form readily.

Table 15.—Hazard of Erosion and Suitability for Roads

Ratings in the column *hazard of erosion* are based on slope and the soil erosion factor K. The soil loss is a result of sheet and rill erosion in areas where 50 to 75 percent of the surface has been exposed by different types of disturbance. The hazard is described as slight, moderate, severe, or very severe. A rating of *slight* indicates that erosion is unlikely under normal 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 erosion-control measures, including revegetation of bare areas, are needed; and *very severe* indicates that significant erosion is expected, loss of soil productivity and offsite damage are likely, and erosion-control measures would be costly and generally are not practical.

Ratings in the column *hazard of erosion on roads and trails* are based on the soil erosion 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.

Table 16.—Site Preparation

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.

Table 17.—Site Restoration

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.

Recreational Development

In tables 18 and 19, the soils of the survey area are rated according to limitations that affect their suitability for recreational development. 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. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates 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 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 use (1.00) and the point at which the soil feature is not a limitation (0.00).

The ratings in the tables 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.

Table 18.—Camp and Picnic Areas

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, saturated hydraulic

conductivity (Ksat), and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, saturated hydraulic conductivity (Ksat), and toxic substances in the soil.

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, saturated hydraulic conductivity (Ksat), and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, saturated hydraulic conductivity (Ksat), and toxic substances in the soil.

Table 19.—Trail Management

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.

Sanitary Facilities

This section provides information for planning the development of sanitary facilities. Soils are rated for this use, and the most limiting features are identified. 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. 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, saturated hydraulic conductivity (Ksat), 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 septic tank absorption fields and sewage lagoons. This information, 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.

Table 20 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. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates 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 72 inches or between a depth of 24 inches and a restrictive layer 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. Saturated hydraulic conductivity (Ksat), 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, saturated hydraulic conductivity (Ksat), depth to a water table, ponding, depth to bedrock or a cemented pan, flooding, large stones, and content of organic matter.

Saturated hydraulic conductivity (Ksat) 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 Ksat rate of more than 14 micrometers per second 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.

Hydric Soils

Table 21 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; USDA, 2010).

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 all 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, under natural conditions, 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, 2002). These criteria are used to identify map unit components that normally are 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, 2010) and in the “Soil Survey Manual” (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period of time 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 are specified in “Field Indicators of Hydric Soils in the United States” (USDA, 2010).

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:

1. All Histels except for Folistels, and Histosols except for Folists.
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 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 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 saturated hydraulic conductivity (Ksat) is equal to or greater than 6 inches per hour 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 saturated hydraulic conductivity (Ksat) is less than 6 inches per hour 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.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey.

Soil properties are determined 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. Table 22 lists the sample pedons in the survey area for which laboratory data is available. The information in the table can be used to access the data from the National Cooperative Soil Characterization Database of the National Cooperative Soil Survey Program at http://ssldata.nrcs.usda.gov.

Engineering Soil Properties

Table 23 gives the engineering classifications and the range of engineering 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, 2005) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2004).

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 75 millimeters 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 75 millimeters 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.

Rock fragments larger than 250 millimeters in diameter and 75 to 250 millimeters 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 75 millimeters in diameter based on an ovendry 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.

Physical Soil Properties

Table 24 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.

Particle size is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle sizes are expressed as classes with specific effective diameter class limits. The broad classes are sand, silt, and clay, ranging from the larger to the smaller.

Sand as a soil separate consists of mineral soil particles that are 0.05 millimeter to 2 millimeters in diameter. In the table, the estimated sand content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Silt as a soil separate consists of mineral soil particles that are 0.002 to 0.05 millimeter in diameter. In the table, the estimated silt content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In the table, 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 content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

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, saturated hydraulic conductivity (Ksat), 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 (ovendry) 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 linear extensibility, 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 (Ksat) refers to the ability of a soil to transmit water or air. The estimates in the table indicate the rate of water movement, in micrometers per second, when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Saturated hydraulic conductivity (Ksat) 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 centimeters of water per centimeter 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 the table, 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 factors are shown in the table as the K factor (Kw and Kf) 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 six 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 saturated hydraulic conductivity (Ksat). 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.

Erosion factor Kw indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Erosion factor Kf 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. The groups are described in the “National Soil Survey Handbook,” which is available in local offices of the Natural Resources Conservation Service or on the Internet.

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 25 gives estimates of the total soil carbon, which includes organic and inorganic carbon.

Soil organic carbon (SOC) originates from a biological source, such as plants, animals, or micro-organisms. SOC is in both organic and mineral soil layers. It makes up about half of the weight of soil organic matter. The other half is mainly oxygen, nitrogen, and hydrogen.

Soil inorganic carbon (SIC) is in soil carbonates, commonly occurring as calcium carbonate layers in the soil or as clay-sized fractions throughout the soil. Carbonates in soils are most common in areas where the evaporation rate exceeds the amount of precipitation received, as in most desert environments. Generally, the carbonates accumulate from carbonatic dust or from solution during periods of wetter climates. Soil inorganic carbon is also in soils that formed in marl.

The content of SOC and SIC is expressed as kilograms per square meter to a depth of 2 meters or to hard bedrock or a cemented layer. The SOC and SIC values are estimated on a whole soil basis, corrected for content of rock fragments.

SOC can be an indicator of overall soil fertility and soil quality that affects the function of the ecosystem. Soil organic matter is the main reservoir for most plant nutrients, such as phosphorus and nitrogen. Managing for SOC by managing the soil organic matter results in an increase in these elements and in soil resiliency.

Soil organic matter binds soil particles together, which increases soil porosity and infiltration. This allows for better root penetration and waterflow into the soil. Greater inflow of water decreases the risk of soil erosion and the potential for runoff.

Higher SOC levels improve not only soil quality but also air and water quality. Soil acts as a filter to improve water quality. Fertile soils that support plant life remove carbon dioxide from the atmosphere and increase oxygen levels through photosynthesis. Maintaining the SOC level reduces the release of carbon into the atmosphere, which can reduce the effects of global warming.

SIC influences the types of plants that can grow. A high SIC level generally is associated with a higher soil pH level, limiting the types of plants that will thrive.

Soil carbonates, the source of SIC, bind soil particles together and fill voids in the soil, which can reduce the porosity of the soil. Compacted soil carbonates may restrict root penetration and waterflow into the soil.

Table 26 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 (CEC) is the total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams. It commonly is measured at neutral pH of 7.0 (CEC-7), but it may be measured at some other stated pH value. Soils that have a low CEC hold fewer cations and may require more frequent applications of fertilizer than those that have a high CEC. The ability to retain cations minimizes the risk of ground-water pollution.

Effective cation-exchange capacity (ECEC) refers to the sum of exchangeable cations plus aluminum, expressed in terms of milliequivalents per 100 grams. It is determined for soils that have natural pH of less than or equal to 5.5 and is a measure of the CEC at the natural pH. In soils with low pH, the ECEC more accurately reflects the actual CEC of the soils. Although CEC-7 is not actually present in these soils under natural conditions, the ECEC reflects the potential CEC if the soils are limed and the pH increased to neutral.

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.

Calcium carbonate equivalent is the percent of carbonates, by weight, in the fraction of the soil less than 2 millimeters in size. The availability of plant nutrients is influenced by the amount of carbonates in the soil.

Gypsum is expressed as a percent, by weight, of hydrated calcium sulfates in the fraction of the soil less than 20 millimeters in size. Gypsum is partially soluble in water. Soils that have a high content of gypsum may collapse if the gypsum is removed by percolating water.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Sodium adsorption ratio (SAR) is 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. Soils that have SAR values of 13 or more may be characterized by an increased dispersion of organic matter and clay particles, reduced permeability and aeration, and a general degradation of soil structure.

Water Features

Table 27 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.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

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. The table 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. The table 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 28 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 and thickness of the restrictive layer, both of which significantly affect 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, saturated hydraulic conductivity (Ksat), 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.

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Glossary

Many of the terms relating to landforms, geology, and geomorphology are defined in more detail in the “National Soil Survey Handbook” (available in local offices of the Natural Resources Conservation Service or on the Internet).

ABC soil. A soil having an A, a B, and a C horizon.

Ablation till. Loose, relatively permeable earthy material deposited during the downwasting of nearly static glacial ice, either contained within or accumulated on the surface of the glacier.

Abrupt textural change. A soil horizon boundary or thin transitional zone characterized by a considerable increase in clay that occurs at the contact between a surface layer, subsurface layer, subsoil, or substratum.

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.

Albic horizon. An eluvial horizon that is at least 1 centimeter thick or more. The color of the soil material is largely determined by the color of primary sand and silt particles rather than by the color of their coatings (Soil Survey Staff, 1999).

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 cone. A semiconical type of alluvial fan having very steep slopes. It is higher, narrower, and steeper than a fan and is composed of coarser and thicker layers of material deposited by a combination of alluvial episodes and (to a much lesser degree) landslides (debris flow). The coarsest materials tend to be concentrated at the apex of the cone.

Alluvial fan. A low, outspread mass of loose materials and/or rock material, commonly with gentle slopes. It is shaped like an open fan or a segment of a cone. The material was deposited by a stream at the place where it issues from a narrow mountain valley or upland valley or where a tributary stream is near or at its junction with the main stream. The fan is steepest near its apex, which points upstream, and slopes gently and convexly outward (downstream) with a gradual decrease in gradient.

Alluvium. Unconsolidated material, such as gravel, sand, silt, clay, and various mixtures of these, deposited on land by running water.

Alpha, alpha-dipyridyl. A compound that when dissolved in ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction implies reducing conditions and the likely presence of redoximorphic features.

Alpine. Characteristic of or resembling the European Alps, or any lofty mountain or mountain system, especially one so modified by intense glacial erosion as to contain cirques, horns, etc. Sometimes used to designate areas above or near timberline.

Amophibolite. A rock consisting largely of hornblende.

Andesite. A fine-grained volcanic rock consisting mainly of plagioclase feldspar with small amounts of pyroxene, hornblende, or biotite. It is dark colored, mainly shades of gray or green.

Andic soil properties. A collection of physical and chemical properties that define the criteria for the Andisol order (Soil Survey Staff, 1999).

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.

Anticline. A unit of folded strata that is a convex upland. In a single anticline, beds forming the opposite limbs of the fold dip away from its axial plane.

Apite. Light-colored, finely grained granite made up of quartz and feldspar.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay (Soil Survey Staff, 1999).

Aridic. A soil moisture regime common to a climate that lacks soil moisture available for plant growth during the growing season. The soils are dry for more than 50 percent of the growing season (Soil Survey Staff, 1999).

Arkose. Sandstone containing unaltered feldspar; usually formed in mountainous regions from weathered granite.

Ash (volcanic). Unconsolidated, pyroclastic material less than 2 millimeters in all dimensions; commonly called volcanic ash.

Ashy (family particle-size class). A substitute class term used for the family particle-size in mineral soils (Soil Survey Staff, 1999).

Ashy (textural modifier; for example, ashy sandy loam). A term used to describe material in which the fine-earth fraction has 30 percent or more particles that are 0.02 to 2.0 millimeters in diameter. Of this, 5 percent or more is volcanic glass and the ammonium oxalate extractable aluminum plus ½ the ammonium oxalate extractable iron times 60 added to the percentage of volcanic glass are equal to or more than 30.

Aspect. The direction toward which a slope faces. Also called slope aspect.

Aspect, north. All compass directions with a northerly aspect, including west-northwest, northwest, north-northwest, north, north-northeast, northeast, and east-northeast. North aspects have less solar radiation than south aspects and consequently are cooler and more moist.

Aspect, south. All compass directions with a southerly aspect, including east-southeast, southeast, south-southeast, south, south-southwest, southwest, and west-southwest. South aspects have more solar radiation than north aspects and consequently are warmer and more droughty.

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 (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as centimeters of water per centimeter of soil. The capacity, in centimeters, in a 150-centimeter profile or to a limiting layer is expressed as:

Very low	0 to 7.6
Low	7.6 to 15.2
Moderate	15.2 to 22.9
High	22.9 to 30.5
Very high	more than 30.5

Avalanche chute. The central channel-like corridor, scar, or depression along which an avalanche has moved. It may take the form of an open path in a forest, with bent and broken trees, or an eroded surface marked by pits, scratches, and grooves.

Backslope. The position that forms the steepest and generally linear, middle portion of a hillslope. In profile, backslopes are commonly bounded by a convex shoulder above and a concave footslope below.

Backswamp. A flood-plain landform. Extensive, marshy or swampy, depressed areas of flood plains between natural levees and valley sides or terraces.

Basal area. The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

Basalt. A fine-grained, dark-colored extrusive igneous rock composed primarily of calcic plagioclase and pyroxene, with or without olivine.

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 (geomorphology). 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).

Basin. A low area in the earth's crust, of tectonic origin, in which sediment has accumulated.

Batholith. A large, domed mass of intrusive igneous rock such as granite.

Bedding plane. A planar or nearly planar bedding surface that visibly separates each successive layer of stratified sediment or rock (of the same or different lithology) from the preceding or following layer; a plane of deposition. It commonly marks a change in the circumstances of deposition and may show a parting, a color difference, a change in particle size, or various combinations of these. The term is commonly applied to any bedding surface, even one that is conspicuously bent or deformed by folding.

Bedding system. A drainage system made by plowing, grading, or otherwise shaping the surface of a flat field. It consists of a series of low ridges separated by shallow, parallel dead furrows.

Bedrock. 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.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Bottom land. An informal term loosely applied to various portions of a flood plain.

Boulders. Rock fragments larger than 60 centimeters (2 feet) in diameter.

Breaks. A landscape or tract of steep, rough or broken land dissected by ravines and gullies and marking a sudden change in topography.

Breast height. An average height of about 137 centimeters (4.5 feet) above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

Breccia. Coarse grained, clastic rock made up of angular broken rock fragments that are held together by mineral cement or are in a fine-grained matrix.

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. The mass of soil per unit bulk volume. Moist bulk density refers to the oven-dry weight of a given volume of soil with moisture content at or near field moisture capacity.

Butte. An isolated, generally flat-topped hill or mountain with relatively steep slopes and talus or precipitous cliffs and characterized by summit width that is less than the height of bounding escarpments; commonly topped by a caprock of resistant material and representing an erosion remnant carved from flat-lying rocks.

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 subsurface horizon that has an accumulation of calcium carbonate or of calcium and magnesium carbonate (Soil Survey Staff, 1999).

Calcium carbonate equivalent. The quantity of carbonates (CO3) in the soil, expressed as CaCO3 and as a percentage by weight of the fraction less than 2 millimeters in size.

Cambic horizon. A mineral soil horizon that is loamy very fine sand or finer textured and has soil structure rather than rock structure. The cambic horizon contains some weatherable minerals, and it is characterized by alterations or removals as indicated by redoximorphic features or by stronger chroma or redder hue than that of the underlying horizons (Soil Survey Staff, 1999).

Canopy. The leafy crown of trees or shrubs. (See Crown.)

Canyon. A long, deep, narrow valley with high, precipitous walls in an area of high local relief.

Canyonland (general landscape). A deeply dissected landscape composed dominantly of relatively narrow flood plains or valley floors, commonly with considerable outcroppings of bedrock on steep slopes, ledges, or cliffs and with broad summits or interfluves.

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.

Carbonates. Chemical compounds containing the carbonate ion C03 in combination with bases such as calcium, magnesium, potassium, and sodium.

Catena. A sequence, or “chain,” of soils on a landscape that formed in similar kinds of parent material and under similar climatic conditions but that have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Cement rock. Shaly limestone used in the manufacture of cement.

Channery soil material. Soil material that has, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 15 centimeters (6 inches) along the longest axis. A single piece is called a channer.

Chemical treatment. Control of unwanted vegetation through the use of chemicals.
Cinder. A glassy vesicular pyroclastic volcanic fragment that is 2 millimeters or more in all dimensions and is strongly cemented or has a stronger degree of cementation.
Cirque. A steep-walled, semicircular or crescent-shaped, half-bowl-like recess or hollow, commonly situated at the head of a glaciated mountain valley or high on the side of a mountain. It was produced by the erosive activity of a mountain glacier. It commonly contains a small round lake (tarn).
Clastic. Pertaining to rock or sediment composed mainly of fragments derived from pre-existing rock or minerals and moved from their place of origin.
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. See Redoximorphic features.
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.
Claypan. A dense, compact subsoil layer that contains much more clay than the overlying materials, from which it is separated by a sharply defined boundary. The layer restricts the downward movement of water through the soil. A claypan is commonly hard when dry and plastic and sticky when wet.
Climax forest stage. The culminating forest succession stage. Overstory vegetation is dominated by trees that are climax for the site. Vertical depth of the understory and overstory canopies is at a maximum. Seedlings to maximum-size, mature trees are present in varying amounts, resulting in an uneven-aged stand.
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.
Climax tree. The most competitive tree capable of growing on a particular site.
Coarse textured soil. Sand or loamy sand.
Coarse-loamy. A loamy particle-size class that is 15 percent or more fine sand or coarser, including fragments as much as 7.6 centimeters (3 inches) in diameter, and is less than 18 percent clay in the fine-earth fraction.
Coarse-silty. A loamy particle-size class that is less than 15 percent fine sand or coarser, including fragments as much as 7.6 centimeters (3 inches) in diameter, and is less than 18 percent clay in the fine-earth fraction.
Cobble (or cobblestone). A rounded or partly rounded fragment of rock 7.6 to 25 centimeters (3 to 10 inches) in diameter.
Cobbly soil material. Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 7.6 to 25 centimeters (3 to 10 inches) 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.
Colluvium. Unconsolidated, unsorted earth material being transported or deposited on side slopes and/or at the base of slopes by mass movement (for example, direct gravitational action) and by local, unconcentrated runoff.
Compaction. The increase in soil bulk density as a result of applied loads or pressure. Compaction reduces porosity, water infiltration, and root penetration.
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. See Redoximorphic features.

Conglomerate. A coarse grained, clastic sedimentary rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer textured material. Conglomerate is the consolidated equivalent of gravel.

Coniferous. Pertaining to plants of the *Coniferales* order of the *Gymnospermae* subdivision. Coniferous plants have cone fruit and are commonly, but not always, evergreen. Examples include ponderosa pine, Douglas-fir, and western larch.

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."

Continental glaciation. Refers to the glaciers that covered much of North America during the Ice Age, as opposed to contemporary glaciers associated with mountains.

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 about 25 centimeters (10 inches) and 102 centimeters (40 inches) or 203 centimeters (80 inches).

Coprogenous earth (sedimentary peat). A type of limnic layer composed predominantly of fecal material derived from aquatic animals.

Cordilleran ice sheet. The glacial ice sheet that covered much of the northern half of North America, from the eastern face of the Rocky Mountains to the Pacific Ocean, during the Pleistocene.

Corrosion (geomorphology). A process of erosion whereby rocks and soil are removed or worn away by natural chemical processes, especially by the solvent action of running water, but also by other reactions, such as hydrolysis, hydration, carbonation, and oxidation.

Corrosion (soil survey interpretations). Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Coulee. A dry or intermittent stream valley, especially a long, steep-walled gorge representing a channeled scabland overflow channel that carried meltwater from the glacial Lake Missoula floods.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Cryic. A soil temperature regime in which the mean annual soil temperature at a depth of about 51 centimeters (20 inches) ranges from 33 to 46 degrees F. The mean summer soil temperature is less than 47 degrees for soils that have an O horizon, and it is less than 59 degrees for soils that do not have an O horizon.

Cryoturbate. A mass of soil or other unconsolidated earthy material moved or disturbed by frost action. It is typically coarser than the underlying 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.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Debris apron. A sedimentary landform at the base of a mountain where the slope changes from a higher to lower gradient. The sediment is derived from mass-wasting or avalanche erosional processes.

Debris cone. A conical-shaped sedimentary landform, commonly at the intersection of a tributary valley and the main valley. It is similar to an alluvial fan, but the surface

slope generally is steeper and the deposits are derived from both alluvial and mass-wasting erosional processes.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Delta. A body of alluvium having a surface that is fan shaped and nearly flat; deposited at or near the mouth of a river or stream where it enters a body of relatively quiet water, generally a sea or lake.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Densic contact. A boundary between soil and coherent underlying material that restricts the penetration of roots, is not cemented, and is typically referred to as dense glacial till and as a Cd horizon.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 152 centimeters (60 inches) deep over bedrock; deep soils, 102 to 152 centimeters (40 to 60 inches); moderately deep, 51 to 102 centimeters (20 to 40 inches); shallow, 25 to 51 centimeters (10 to 20 inches); and very shallow, less than 25 centimeters (10 inches).

Desert pavement. A natural, residual concentration or layer of wind-polished, closely packed gravel, boulders, and other rock fragments mantling a desert surface. It forms where wind action and sheetwash have removed all smaller particles or where rock fragments have migrated upward through sediments to the surface. It typically protects the finer grained underlying material from further erosion.

Diagnostic horizons. Combinations of specific soil characteristics that are indicative of certain classes of soils. Those that occur at the soil surface are called epipedons, and those that occur below the soil surface are called diagnostic subsurface horizons.

Diamict. A nonsorted or poorly sorted, unconsolidated deposit that contains a wide range of particle sizes, commonly from clay to cobble- or boulder-sized, rounded and/or angular fragments with a clayey, silty, or sandy matrix, depending on the local source bedrock.

Diatomaceous earth. A geologic deposit of fine, grayish siliceous material composed chiefly or entirely of the remains of diatoms.

Dike. An intrusion of rock that cuts across the bedding or foliation of the pre-existing rock.

Diorite. A coarse-grained igneous rock consisting mainly of plagioclase but with smaller amounts of hornblende, biotite, and pyroxene. Quartz is absent or sparse. See Quartz diorite.

Dip slope. A slope of the land surface, roughly determined by and approximately conforming to the dip of the underlying bedrock.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Dolomite. A sedimentary rock consisting mainly of the mineral dolomite, which is a carbonate of magnesium.

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. A term restricted to relatively small, linear depressions that at

some time move concentrated water and either do not have a defined channel or have only a small defined channel.

Draw. A small stream valley that generally is shallower and more open than a ravine or gulch and that has a broader bottom. The present stream channel may appear inadequate to have cut the drainageway that it occupies.

Drift. A general term applied to all mineral material (clay, silt, sand, gravel, and boulders) transported by a glacier and deposited directly by or from the ice or transported by running water emanating from a glacier. Drift includes unstratified material (till) that forms moraines and stratified deposits that form outwash plains, eskers, kames, varves, and glaciofluvial sediments. The term is generally applied to Pleistocene glacial deposits in areas that no longer contain glaciers.

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.

Durinodes. Nodules that are weakly cemented to indurated with silica oxide (SiO2).

Duripan. A subsurface soil horizon that is cemented by illuvial silica, commonly opal or microcrystalline forms of silica, to the degree that less than 50 percent of the volume of air-dry fragments will slake in water or hydrochloric acid.

Earthy fill. See Mine spoil.

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.

Effervescence. The gaseous response exhibited as bubbles on the soil ped when drops of dilute (1:10) hydrochloric acid (HCl) are applied. This response typically indicates the presence of calcium carbonates (CaCO3).

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 deposit. Sand-, silt-, or clay-sized clastic material transported and deposited primarily by wind, commonly in the form of a dune or a sheet of sand or loess.

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.

Erratic. Refers to a rock fragment transported by glacial ice or floating ice that is different from the bedrock in the area in which it is deposited.

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 surficial lag concentration or layer of gravel and other rock fragments that remains on the soil surface after sheet or rill erosion or wind has removed the finer soil particles and that tends to protect the underlying soil from further erosion.

Erosion surface. A land surface shaped by the action of erosion, especially by running water.

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. Most commonly applied to cliffs produced by differential erosion. Synonym: scarp.

Esker. A long, narrow, sinuous, steep-sided ridge of stratified sand and gravel deposited as the bed of a stream flowing in an ice tunnel within or below the ice (subglacial) or between ice walls on top of the ice of a wasting glacier and left behind as high ground when the ice melted. Eskers range in length from less than a kilometer to more than 160 kilometers and in height from 3 to 30 meters.

Extrusive rock. Igneous rock derived from deep-seated molten matter (magma) deposited and cooled on the earth's surface.

Fan remnant. A general term for landforms that are the remaining parts of older fan landforms, such as alluvial fans, that have been either dissected or partially buried.

Fault. A fracture or fracture zone of the earth with displacement along one side in respect to the other.

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 ovendry 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.

Fine-loamy. A loamy particle-size class that is 15 percent or more fine sand or coarser, including fragments as much as 7.6 centimeters (3 inches) in diameter, and is 18 to 34 percent clay in the fine-earth fraction.

Fine-silty. A loamy particle-size class that is less than 15 percent fine sand or coarser, including fragments as much as 7.6 centimeters (3 inches) in diameter, and is 18 to 34 percent clay in the fine-earth fraction.

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.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 15 to 38 centimeters (6 to 15 inches) long.

Flood plain. The nearly level plain that borders a stream and is subject to flooding unless protected artificially.

Flood-plain landforms. A variety of constructional and erosional features produced by stream channel migration and flooding. Examples include backswamps, flood-plain splays, meanders, meander belts, meander scrolls, oxbow lakes, and natural levees.

Flood-plain splay. A fan-shaped deposit or other outspread deposit formed where an overloaded stream breaks through a levee (natural or artificial) and deposits its material (commonly coarse grained) on the flood plain.

Flood-plain step. An essentially flat, terrace-like alluvial surface within a valley that is frequently covered by floodwater from the present stream; any approximately horizontal surface still actively modified by fluvial scour and/or deposition. May occur individually or as a series of steps.

Fluvial. Of or pertaining to rivers or streams; produced by stream or river action.

Foliated. Refers to metamorphic rock that exhibits parallel structure or layering.

Foothills. A region of steeply sloping hills that fringes a mountain range or high-plateau escarpment. The hills have relief of as much as 300 meters (1,000 feet).

Footslope. The concave surface at the base of a hillslope. 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.

Forestland. Land on which the historic vegetation was dominated by a 25 percent overstory canopy cover of trees, as determined by crown perimeter-vertical projection. A tree is defined as a woody-stemmed plant that can grow to 4 meters (about 13 feet) in height at maturity.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Fragmental. A particle-size class used to classify mineral soils that have less than 10 percent by volume fine-earth soil material.

Frigid. A soil temperature regime in which the mean annual soil temperature at a depth of 51 centimeters (20 inches) ranges from 33 to 46 degrees F. The mean summer soil temperature is more than 47 degrees for soils that have an O horizon. The difference between the mean winter soil temperature and the mean summer soil temperature is more than 9 degrees F.

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.

Geomorphic surface. A mappable area of the earth's surface that has a common history; the area is of similar age and is formed by a set of processes during an episode of landscape evolution.

Glaciofluvial deposits. Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur in the form of 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 bedded or laminated.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Graben. An elongated, relatively depressed unit or block of the earth's crust that is bounded by faults on its long sides.

Granite. A coarse-grained igneous rock consisting mainly of quartz and feldspar, with more orthoclase than plagioclase. See Granodiorite.

Granitic. Term generally applied to granite or granitelike rock. It is used when referring to granite, granodiorite, quartz monzonite, quartz diorite, diorite, and granitic gneiss.

Granitic gneiss. A crystalline, banded metamorphic rock of granitic composition.

Granodiorite. A coarse-grained igneous rock consisting mainly of quartz and feldspar, with more plagioclase than orthoclase. See Granite.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock 2 millimeters to 7.6 centimeters (3 inches) 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 7.6 centimeters (3 inches) in diameter.

Graywacke. An indurated sedimentary rock that consists mainly of sand-sized grains but contains fragments of feldspar, quartz, and ferromagnesian minerals.

Ground water. Water filling all the unblocked pores of the material below the water table.

Grus. The fundamental products of *in situ* granular disintegration of granite and granitic rock, dominated by intercrystal disintegration.

Gully. A small channel with steep sides caused by erosion and cut in unconsolidated materials by concentrated but intermittent flow of water. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Gypsum. A mineral consisting of hydrous calcium sulfate.

Habitat type. The collective area occupied by a single plant association. It is defined and described on the basis of the vegetation and its associated environment.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hard to reclaim (in tables). Reclamation is difficult after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

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 slope (geomorphology). A geomorphic component of hills consisting of a laterally concave area of a hillside, especially at the head of a drainageway. The overland waterflow is converging.

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 elevated area of the land surface, rising as much as 300 meters (1,000 feet) above surrounding lowlands, commonly of limited summit area and having a well defined outline. Slopes are generally more than 15 percent. The distinction between a hill and a mountain is arbitrary and may depend on local usage.

Hillslope. A generic term for the steeper part of a hill between its summit and the drainage line, valley flat, or depression floor at the base of a hill.

Histic epipedon. A thin, organic soil horizon that is saturated with water at some time during the year unless it is artificially drained. This horizon is at or near the surface of a mineral soil. It contains more than 12 percent organic carbon (Soil Survey Staff, 1999).

Historic climax plant community. The plant community that was best adapted to the unique combination of factors associated with the ecological site. It was in a natural dynamic equilibrium with the historic biotic, abiotic, and climatic factors on its ecological site in North America at the time of European immigration and settlement.

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.

L horizon.—A layer of organic and mineral limnic materials, including coprogenous earth (sedimentary peat), diatomaceous earth, and marl.

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.—Consolidated bedrock beneath the soil that has an extremely weakly cemented to moderately cemented rupture-resistance class.

R horizon.—Consolidated bedrock beneath the soil that has a strongly cemented or stronger rupture-resistance class.

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 include depth to a seasonal high water table, the infiltration rate, and depth to a layer that significantly restricts the downward movement of water. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Igneous rock. Rock that was formed by cooling and solidification of magma and that has not been changed appreciably by weathering since its formation. Major varieties include plutonic and volcanic rock (e.g., 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.

Indurated. Refers to having a hard, brittle consistency as a result of particles being held together by cementing substances such as silica, calcium carbonate, and iron. An indurated layer can be broken by a sharp blow of a hammer.

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

Interfluve. A landform composed of the relatively undissected upland or ridge between two adjacent valleys containing streams flowing in the same general direction. An elevated area between two drainageways that sheds water to those drainageways.

Interfluve (geomorphology). A geomorphic component of hills consisting of the uppermost, comparatively level or gently sloping area of a hill; shoulders of backwearing hillslopes can narrow the upland or can merge, resulting in a strongly convex shape.

Intermittent stream. A stream, or reach of a stream, that does not flow year-round but that is commonly dry for 3 or more months out of 12 and whose channel is generally below the local water table. It flows only during wet periods or when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Intermontane basin. A generic term for a wide structural depression between mountain ranges that is partly filled with alluvium.

Intrusive rock. Igneous rock derived from molten matter (magmas) that invaded pre-existing rock and cooled below the surface of the earth.

Iron depletions. See Redoximorphic features.

Kame. A low mound, knob, hummock, or short irregular ridge composed 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 the glacier; or as a ponded deposit on the surface or at the margin of stagnant ice.

Kettle. A steep-sided, usually basin- or bowl-shaped hole or depression, commonly without surface drainage in glacial-drift deposits, often containing water.

Knoll. A small, low, rounded hill rising above adjacent landforms.

Ksat. See Saturated hydraulic conductivity.

Lacustrine deposit. Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Lake plain. A nearly level surface marking the floor of an extinct lake filled by well sorted, generally fine textured, stratified deposits, commonly containing varves.

Lake terrace. A narrow shelf, partly cut and partly built, produced along a lakeshore in front of a scarp line of low cliffs and later exposed when the water level falls.

Lamella. A thin, discontinuous or continuous, generally horizontal layer of fine material (especially clay and iron oxides) that has been pedogenically concentrated (illuviated) within a coarser (e.g., sandy), eluviated layer.

Landform. Any physical, recognizable form or feature on the earth's surface that has a characteristic shape and range in composition and is produced by natural

causes; it can span a wide range in size. Landforms provide an empirical description of similar portions of the earth's surface.

Landscape (soils). An assemblage, group, or family of spatially related, natural landforms over a relatively large area; the land surface which the eye can comprehend in a single view.

Landslide. A general, encompassing term for most types of mass movement landforms and processes involving the downslope transport and outward deposition of soil and rock materials caused by gravitational forces; the movement may or may not involve saturated materials. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 7.6 centimeters (3 inches) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Leeward. Being in or facing the direction toward which the wind is blowing.

Limestone. Sedimentary rock consisting mainly of calcium carbonate (CaCO3).

Linear extensibility. Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. 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. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Lithic contact. A boundary between soil and coherent underlying material, typically bedrock. The bedrock has a cementation class of strongly cemented or stronger and is typically referred to as an R horizon.

Lithologic discontinuity. A significant change in particle-size distribution or mineralogy that indicates a difference in the material from which the soil horizons have formed.

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-skeletal. A particle-size class in which rock fragments 2 millimeters in diameter or larger make up 35 percent or more by volume. The fine-earth fraction is loamy.

Loess. Material transported and deposited by wind and consisting dominantly of silt-sized particles.

Low strength. The soil is not strong enough to support loads.

Major Land Resource Area (MLRA). A broad geographic land area characterized by a particular pattern of soils, geology, climate, water resources, and land use. An area is typically continuous, but small separate areas can occur.

Mass movement. A generic term for the dislodgment and downslope transport of soil and rock material as a unit under direct gravitational stress.

Masses. See Redoximorphic features.

Mature forest stage. A forest successional stage in which the most shade-tolerant adapted tree species are well represented (more than 50 percent composition) and are dominant in the middle to upper canopy layers. Trees generally are more than 23 centimeters (9 inches) in diameter at breast height, and the canopy cover is more than 25 percent.

Meander belt. The zone within which migration of a meandering channel occurs; the flood-plain area included between two imaginary lines drawn tangential to the outer bends of active channel loops.

Meander scar. A crescent-shaped, concave or linear mark on the face of a bluff or valley wall, produced by the lateral erosion of a meandering stream that impinged upon and undercut the bluff.

Meander scroll. One of a series of long, parallel, close-fitting, crescent-shaped ridges and troughs formed along the inner bank of a stream meander as the channel migrated laterally down-valley and toward the outer bank.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

Medial (family particle-size class). A substitute class term used for the family particle-size class in mineral soils (Soil Survey Staff, 1999).

Medial (textural modifier, such as medial loam). A USDA textural modifier used in conjunction with a USDA mineral soil texture to indicate unique physical and chemical properties. The properties are defined in Soil Taxonomy and are typically low bulk density, high content of iron and aluminum, and high retention of phosphate (Soil Survey Staff, 1999).

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mesic. A soil temperature regime in which the mean annual temperature at a depth of 51 centimeters (20 inches) ranges from 47 to 58 degrees F. The difference between the mean winter soil temperature and the mean summer soil temperature is more than 9 degrees F.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement at depth in the earth's crust. Nearly all such rocks are crystalline.

Microclimate. The climate of a small distinct area, as of a forest or city, or a confined space, as of a building or greenhouse.

Mine spoil. An accumulation of displaced earthy material, rock, or other waste material removed during mining or excavation. Also called earthy fill.

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. A kind of map unit component that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Moisture control section. The layer within a soil profile used to determine the soil moisture regime. The upper boundary is the depth to which a dry soil is moistened by 2.5 centimeters (1 inch) of water in 24 hours. The lower boundary is the depth to which a dry soil is moistened by 7.6 centimeters (3 inches) of water in 48 hours.

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 (Soil Survey Staff, 1999).

Moraine. In terms of glacial geology, a mound, ridge, or other topographically distinct accumulation of unsorted, unstratified drift, predominantly till, deposited primarily by the direct action of glacial ice in a variety of landforms. Also, a general term for a landform composed mainly of till (except for kame moraines, which are composed mainly of stratified outwash) that has been deposited by a glacier. Some types of moraines are disintegration, end, ground, kame, 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 generic term for an elevated area of the land surface, rising more than 300 meters (1,000 feet) above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides. A mountain can occur as a single, isolated mass or in a group forming a chain or range. Mountains are formed primarily by tectonic activity and/or volcanic action but can also be formed by differential erosion.

Mountain valleys. Any small, externally drained depression floored with either till or alluvium, that occurs on a mountain or within mountains. See intermontane basins.

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Mucky peat. A USDA texture associated with organic soils that meet the degree of organic matter decomposition associated with hemic soil material.

Mudstone. A blocky or massive, fine grained sedimentary rock in which the proportions of clay and silt are approximately equal. Also, a general term for such material as clay, silt, claystone, siltstone, shale, and argillite and that should be used only when the amounts of clay and silt are not known or cannot be precisely identified.

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 (Soil Survey Staff, 1999).

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nodules. See Redoximorphic features.

Nose slope (geomorphology). A geomorphic component of hills consisting of the projecting end (laterally convex area) of a hillside. The overland waterflow is predominantly divergent. Nose slopes consist dominantly of colluvium and slope-wash sediments (for example, slope alluvium).

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.

Ochric epipedon. A surface horizon of mineral soil that is too light in color, too high in chroma, too low in organic carbon, or too thin to be a mollic, umbric, or histic epipedon (Soil Survey Staff, 1999).

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

Orogenic. Of or pertaining to the process of mountain formation.

Outwash. Stratified and sorted sediment (mainly sand and gravel) removed or "washed out" from a glacier by meltwater streams and deposited in front of or beyond the end moraine or the margin of a glacier. The coarser material is deposited nearer to the ice.

Outwash plain. An extensive lowland area of coarse textured glaciofluvial material. An outwash plain is commonly smooth; where pitted, it generally is low in relief.

Outwash terrace. A valley train deposit extending along a valley downstream from an outwash plain or terminal moraine; a flat-topped bank of outwash with an abrupt outer face.

Overstory. The trees in a forest stand that form the upper crown cover. See Understory.

Paleoterrace. An erosional remnant of a terrace that retains the surface form and alluvial deposits of its origin but was not emplaced by, and commonly does not grade to, a present-day stream or drainage network.

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*.

Paralithic contact. A boundary between soil and coherent underlying material that can be dug with difficulty with a spade. It is referred to as weathered bedrock, has a cementation class of moderately cemented or weaker, and is typically referred to as a Cr horizon.

Pararock fragments. Fragments of rock that are 2 millimeters in diameter or more (e.g., paragravel, paracobble, or parastone). Pararock fragments have a moderately cemented to extremely weakly cemented rupture-resistance class.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedisediment. A layer of sediment, eroded from the shoulder and backslope of an erosional slope, that lies on and is being (or was) transported across a gently sloping erosional surface at the foot of a receding hill or mountain slope.

Pedologic. Of or pertaining to the processes of soil formation.

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 1 square meter to 10 square meters (10 to 100 square feet), depending on the variability of the soil.

Percolation. The movement of water through the soil.

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” and in this glossary. Terms describing permeability, measured in inches per hour, are as follows:

Impermeable	less than 0.0015 inch
Very slow	0.0015 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

See “Saturated hydraulic conductivity” for conversions of inches per hour to micrometers per second.

Perudic. A soil moisture regime common to a climate having moisture throughout the year. The soil moisture control section never becomes dry throughout its thickness during any time of the year (Soil Survey Staff, 1999).

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

Phyllite. A fine-textured, foliated metamorphic rock that is intermediate in metamorphic grade between slate and schist. Mica crystals impart a silky sheen to the cleavage surfaces.

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Pitting (in tables). Pits caused by melting around ice. They form on the soil after plant cover is removed.

Placic horizon. A thin (less than 2.5 centimeters thick), black to dark reddish colored horizon that is cemented by iron (or iron and manganese) and organic matter (Soil Survey Staff, 1999).

Plant association. A kind of climax plant community consisting of stands with essentially the same dominant species in corresponding layers.

Plant community. An assemblage of plants living together, reflecting no particular ecological status; a vegetative complex unique in its combination of plants.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Pleistocene. The epoch of geologic time from approximately 10,000 to 2 million years ago. The earlier of the two epochs comprising the Quaternary period. Also called the Glacial epoch.

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.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Pole stage. A forest successional stage in which the vegetation of a stand is dominantly a moderately dense to very dense overstory of trees that have minimal vertical crown depth. The trees generally range from about 12.5 to 23.0 centimeters (5 to 9 inches) in diameter at breast height, and the canopy cover normally exceeds 35 percent.

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.

Pore linings. See Redoximorphic features.

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.

Pumice. A light-colored, vesicular, glassy pararock fragment. The fragments are more than 2 millimeters in diameter and commonly have the composition of rhyolite. Pumice commonly has a specific gravity of less than 1.0 and is thereby sufficiently buoyant to float on water.

Pyroclastic. Pertaining to fragmental material produced by commonly explosive, aerial ejection of clastic particles from a volcanic vent.

Quartz diorite. A coarse-grained igneous rock consisting mainly of plagioclase with smaller amounts of quartz, hornblende, and biotite. (See Granodiorite.)

Quartz latite. A fine-grained volcanic rock consisting mainly of quartz, plagioclase, and orthoclase with minor amounts of biotite and hornblende. Phenocrysts are common. This rock is the extrusive equivalent of quartz monzonite.

Quartz monzonite. A coarse-grained igneous rock consisting mainly of plagioclase, orthoclase, and quartz with minor amounts of biotite and hornblende. (See Granite and Granodiorite.)

Quartzite. A nonfoliated metamorphic rock consisting mainly of quartz sand cemented with quartz.

Quaternary. The period of the Cenozoic era of geologic time, extending from the end of the Tertiary (about 2 million years ago) to the present and comprising two epochs, the Pleistocene (Ice Age) and the Holocene (Recent).

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed as 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. See Redoximorphic features.

Redoximorphic depletions. See Redoximorphic features.

Redoximorphic features. Redoximorphic features are associated with wetness and result from alternating periods of reduction and oxidation of iron and manganese compounds in the soil. Reduction occurs during saturation with water, and oxidation occurs when the soil is not saturated. Characteristic color patterns are created by these processes. The reduced iron and manganese ions may be removed from a soil if vertical or lateral fluxes of water occur, in which case there is no iron or manganese precipitation in that soil. Wherever the iron and manganese are oxidized and precipitated, they form either soft masses or hard concretions or nodules. Movement of iron and manganese as a result of redoximorphic processes in a soil may result in redoximorphic features that are defined as follows:

1. Redoximorphic concentrations.—These are zones of apparent accumulation of iron-manganese oxides, including:

   A. Nodules and concretions, which are cemented bodies that can be removed from the soil intact. Concretions are distinguished from nodules on the basis of internal organization. A concretion typically has concentric layers that are visible to the naked eye. Nodules do not have visible organized internal structure; *and*

   B. Masses, which are noncemented concentrations of substances within the soil matrix; *and*

C. Pore linings, i.e., zones of accumulation along pores that may be either coatings on pore surfaces or impregnations from the matrix adjacent to the pores.

2. Redoximorphic depletions.—These are zones of low chroma (chroma less than that of the matrix) where either iron-manganese oxides alone or both iron-manganese oxides and clay have been stripped out, including:

A. Iron depletions, i.e., zones that contain low amounts of iron and manganese oxides but have a clay content similar to that of the adjacent matrix; *and*

B. Clay depletions, i.e., zones that contain low amounts of iron, manganese, and clay (often referred to as silt coatings or skeletans).

3. Reduced matrix.—This is a soil matrix that has low chroma *in situ* but undergoes a change in hue or chroma within 30 minutes after the soil material has been exposed to air.

Reduced matrix. See Redoximorphic features.

Regolith. All unconsolidated earth materials above the solid bedrock. It includes material weathered in place from all kinds of bedrock and alluvial, glacial, eolian, lacustrine, and pyroclastic deposits.

Relief. The relative difference in elevation between the upland summits and the lowlands or valleys of a given region.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as bedrock disintegrated in place.

Restrictive feature. A nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly reduce the movement of water and/or air through the soil or that otherwise provide an unfavorable root environment.

Rhyodacite. A fine-grained volcanic rock consisting mainly of quartz and feldspar, with more plagioclase than orthoclase. Phenocrysts are common. Ryodacite is the extrusive equivalent of granodiorite.

Rill. A very small, steep-sided channel resulting from erosion and cut in unconsolidated materials by concentrated but intermittent flow of water. A rill generally is not an obstacle to wheeled vehicles and is shallow enough to be smoothed over by ordinary tillage.

Riparian. Refers to areas adjacent to water or wetlands; vegetation is dependent on water or use and management directly impacts the water or wetlands.

Riser. The vertical or steep side slope (e.g., escarpment) of terraces, flood-plain steps, or other stepped landforms; commonly a recurring part of a series of natural, steplike landforms, such as successive stream terraces.

Riverwash. Unstable areas of sandy, silty, clayey, gravelly and cobbly sediments. These areas are flooded, washed and reworked by rivers so frequently that they support little or no vegetation; see National Soil Survey Handbook

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments that are 2 millimeters in diameter or more (i.e., gravel, cobbles, stones, and boulders). Rock fragments have a strongly cemented or stronger rupture-resistance class.

Rock outcrop. Exposures of bare bedrock.

Rubble land. Areas that consist of cobbles, stones, and boulders, commonly at the base of mountains.

Root zone. The part of the soil that can be penetrated by plant roots.

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.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

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. A particle-size class in which the texture of the fine-earth fraction is sand or loamy sand but not loamy very fine sand or very fine sand; it is less than 35 percent rock fragments by volume.

Sandy-skeletal. A particle-size class that is 35 percent or more by volume rock fragments 2 millimeters in diameter or larger. The fine-earth fraction is sandy.

Sapling/pole stage. A forest successional stage in which the vegetation of a stand is dominantly saplings and pole-sized trees (generally 5 to 23 centimeters in diameter at breast height). The canopy cover and understory production are intermediate between the herbaceous or shrub stage and the pole stage.

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.

Saturated hydraulic conductivity (Ksat). The ease with which pores of a saturated soil transmit water. Formally, the proportionality coefficient that expresses the relationship of the rate of water movement to hydraulic gradient in Darcy's Law, a law that describes the rate of water movement through porous media. Commonly abbreviated as "Ksat." Terms describing saturated hydraulic conductivity are *very high*, 100 or more micrometers per second (14.17 or more inches per hour); *high*, 10 to 100 micrometers per second (1.417 to 14.17 inches per hour); *moderately high*, 1 to 10 micrometers per second (0.1417 inch to 1.417 inches per hour); *moderately low*, 0.1 to 1 micrometer per second (0.01417 to 0.1417 inch per hour); *low*, 0.01 to 0.1 micrometer per second (0.001417 to 0.01417 inch per hour); and *very low*, less than 0.01 micrometer per second (less than 0.001417 inch per hour). To convert inches per hour to micrometers per second, multiply inches per hour by 7.0572. To convert micrometers per second to inches per hour, multiply micrometers per second by 0.1417.

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.

Schist. A medium- to coarse-grained foliated metamorphic rock in which the platy minerals are clearly visible. Micaceous minerals commonly are present.

Secondary carbonates and silica. Calcium carbonate and silica weathered from the soil matrix in upper soil horizons and then transported and deposited in the lower horizons by water moving through the soil profile.

Sedimentary rock. A consolidated deposit of clastic particles, chemical precipitates, or organic remains accumulated at or near the surface of the earth under normal low temperature and pressure conditions. Sedimentary rocks include consolidated equivalents of alluvium, colluvium, drift, and 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, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock that formed by the hardening of a deposit of clay, silty clay, or silty clay loam and that has a tendency to split into thin layers.

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 convex, erosional surface near the top of a hillslope. A shoulder is a transition from summit to backslope.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Shrub-coppice dune. A small, streamlined dune that forms around brush and clump vegetation.

Side slope (geomorphology). A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel. Side slopes are dominantly colluvium and slope-wash sediments.

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. An indurated silt having the texture and composition of shale but lacking its fine lamination or fissility; a massive mudstone in which silt predominates over clay.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Slate. A fine-grained metamorphic rock that exhibits strong cleavage or layering.

Slickensides (pedogenic). Grooved, striated, and/or glossy (shiny) slip faces on structural peds, such as wedges; produced by shrink-swell processes, most commonly in soils that have a high content of expansive clays.

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 about 6 meters (20 feet) in 30.5 meters (100 feet) of horizontal distance.

Slope alluvium. Sediment gradually transported down the slopes of mountains or hills primarily by nonchannel alluvial processes (i.e., slope-wash processes) and characterized by particle sorting. Lateral particle sorting is evident on long slopes. In a profile sequence, sediments may be distinguished by differences in size and/or specific gravity of rock fragments and may be separated by stone lines. Burnished peds and sorting of rounded or subrounded pebbles or cobbles distinguish these materials from unsorted colluvial deposits.

Slow refill (in tables). The slow filling of ponds, resulting from restricted water transmission in the soil.

Slow water movement (in tables). Restricted downward movement of water through the soil. See Saturated hydraulic conductivity.

Slump. A mass movement process characterized by a landslide involving shearing and rotary movement of a generally independent mass of rock or earth along a

curved slip surface. The mass (slump) has its axis parallel to the slope from which it descends. A slump surface commonly exhibits a reversed slope facing uphill.

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 $Ca^{++} + Mg^{++}$. The degrees of sodicity and their respective ratios are:

Slight	less than 13:1
Moderate	13-30:1
Strong	more than 30:1

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 and by the passage of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

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.

Spodic horizon. An illuvial horizon that is 85 percent or more spodic material. This layer is dominated by active amorphous material that is illuvial and is composed of organic matter and aluminum, with or without iron (Soil Survey Staff, 1999).

Stone line. In a vertical cross section, a line formed by scattered fragments or a discrete layer of angular and subangular rock fragments (commonly a gravel- or cobble-sized lag concentration) that formerly was draped across a topographic surface and was later buried by additional sediments. A stone line generally caps material that was subject to weathering, soil formation, and erosion before burial. Many stone lines seem to be buried erosion pavements, originally formed by sheet and rill erosion across the land surface.

Stones. Rock fragments 25 to 60 centimeters (10 to 24 inches) in diameter if rounded or 38 to 60 centimeters (15 to 24 inches) in length if flat.

Stoniness (or boulderiness). The relative proportion of larger rock fragments on the surface layer. Used as map unit phase designation for soils containing sufficient amounts of stones and boulders to impose important restrictions on use and management. These phases should not be confused with the use of fragments as textural modifiers. The four phases recognized in this survey are:

Stony (or bouldery).—The areas have enough stones and boulders at or near the surface to be a continuing nuisance during operations that mix the surface layer, but they do not make most such operations impractical. Conventional, wheeled vehicles can move with reasonable freedom over the area. Rocks may damage both the equipment that mixes the soil and the vehicles that move on the surface. Large rock fragments cover about 0.01 to 0.1 percent of the surface.

Very stony (or very bouldery).—The areas have so many stones and boulders at or near the surface that operations that mix the surface layer either require heavy equipment or use of implements that can operate between the larger ones. Tillage with conventionally powered farm equipment is impractical. Wheeled tractors and vehicles with high clearance can operate on carefully chosen routes over and around stones and boulders. Large rock fragments cover about 0.1 to 3 percent of the surface.

Extremely stony (or extremely bouldery).—The areas have so many stones and boulders at or near the surface that wheeled powered equipment, other than some special types, can operate only along selected routes. Tracked vehicles can be used in most places, although some routes have to be cleared. Large rock fragments cover about 3 to 15 percent of the surface.

Rubbly and very rubbly.—The areas have so many stones and boulders at or near the surface that tracked vehicles cannot be used in most places. Large rock fragments cover about 15 to 90 percent of the surface.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Strath terrace. A type of stream terrace; formed as an erosional surface cut on bedrock and thinly mantled with stream deposits (alluvium).

Stream terrace. One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel, originally formed near the level of the stream; represents the remnants of an abandoned flood plain, stream bed, or valley floor produced during a former state of fluvial 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 grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subaqueous. Refers to conditions and processes, features, or deposits that exist in or under water, especially fresh water, as in a lake or stream.

Subduction. The process of one lithospheric plate descending beneath another.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

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 10 to 25 centimeters (4 to 10 inches). 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.

Tailings. Areas of washed ore left in uneven piles after placer mining activities such as sluicing, hydraulicing, or dredging.

Talus. Rock fragments of any size or shape (commonly coarse and angular) derived from and lying at the base of a cliff or very steep rock slope. The accumulated mass of such loose broken rock formed chiefly 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.

Tectonic. Pertaining to the forces involved in, or the resulting structures of, deformation of the earth's crust.

Terminal moraine. An end moraine that marks the farthest advance of a glacier. It typically has the form of a massive arcuate or concentric ridge, or complex of ridges, and is underlain by till and other types of drift.

Terrace (conservation). An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace. (geomorphology). A steplike surface, bordering a valley floor or shoreline, that represents the former position of a flood plain, lake, or seashore. The term is usually applied both to the relatively flat summit surface (tread) that was cut or built by stream or wave action and to the steeper descending slope (scarp or riser) that has graded to a lower base level of erosion.

Terrane. A group of related rocks and the area in which they are exposed at the earth's surface.

Tertiary. The period of geologic time from approximately 2 to 63 million years ago (radiometric dates). The earlier of the two geologic periods comprising the Cenozoic era.

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."

Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.

Thrust fault. A fault with a dip of 45 degrees or less on which the hanging wall appears to have moved upward relative to the footwall.

Till. Dominantly unsorted and nonstratified drift, generally unconsolidated and deposited directly by a glacier without subsequent reworking by meltwater, and consisting of a heterogeneous mixture of clay, silt, sand, gravel, stones, and boulders; rock fragments of various lithologies are embedded within a finer matrix that can range from clay to sandy loam.

Till plain. An extensive area of level to gently undulating soils underlain predominantly by till and bounded at the distal end by subordinate recessional or end moraines.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toeslope. The gently inclined surface at the base of a hillslope. Toeslopes in profile are commonly gentle and linear and are constructional surfaces forming the lower part of a hillslope continuum that grades to valley or closed-depression floors.

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.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Tread. The flat to gently sloping, topmost, laterally extensive slope of terraces, flood-plain steps, or other stepped landforms; commonly a recurring part of a series of natural steplike landforms, such as successive stream terraces.

Tuff. A generic term for any consolidated or cemented deposit that is 50 percent or more volcanic ash.

Udic. A soil moisture regime common to a climate that has moisture throughout the year. The soil moisture control section is dry for less than 45 consecutive days during the 4 months following the summer solstice (Soil Survey Staff, 1999).

Umbric epipedon. A thick, dark-colored, humus-rich surface horizon that has low base saturation and pedogenic soil structure. It may include the upper part of the subsoil (Soil Survey Staff, 1999).

Understory. Plants in a forest community that grow to a height of about 137 centimeters (4.5 feet) or less.

Upland. An informal, general term for the higher ground of a region, in contrast with a low-lying adjacent area, such as a valley or plain, or for land at a higher elevation than the flood plain or low stream terrace; land above the footslope zone of the hillslope continuum.

Valley fill. The unconsolidated sediment deposited by any agent (water, wind, ice, or mass wasting) so as to fill or partly fill a valley.

Variegation. 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.

Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

Weathering. All physical disintegration, chemical decomposition, and biologically induced changes in rocks or other deposits at or near the earth's surface by atmospheric or biologic agents or by circulating surface waters but involving essentially no transport of the altered material.

Welded tuff. A glass-rich rock that has been indurated by the welding together of its glass shards under the combined action of the heat retained by particles, the weight of overlying material, and hot gasses.

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.

Windthrow. The uprooting and tipping over of trees by the wind.

Xeric. A soil moisture regime common to a climate having moist winters and dry summers. The soils are dry in the moisture control section for more than 45 consecutive days during the 4 months following the summer solstice and are moist for more than 45 consecutive days during the 4 months following the winter solstice (Soil Survey Staff, 1999).

Young forest stage. A forest successional stage in which the overstory vegetation of a stand is dominantly shade-intolerant successional trees. Trees generally are more than 23 centimeters (9 inches) in diameter at breast height, and the canopy cover exceeds 25 percent. Shade-tolerant climax tree species can be absent to nearly well represented (less than 50 percent).

Tables

Table 1.—Temperature and Precipitation

(Recorded in the period 1971 to 2000 at Ross Dam, Washington [7185])

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 2.5 millimeters or more	Average snowfall
	°C	°C	°C	°C	°C	Units	mm	mm	mm		cm
January	3.1	-1.8	0.6	11	-14	5	225	109	344	12	39.1
February	5.3	-0.9	2.2	12	-11	11	171	92	247	11	27.4
March	8.9	0.7	4.8	18	-6	68	131	72	189	11	8.6
April	13.3	3.1	8.2	24	-2	206	76	36	113	7	0.0
May	17.5	6.5	12.0	31	1	417	54	28	78	5	0.0
June	20.7	9.6	15.2	33	4	570	42	23	57	4	0.0
July	24.6	12.0	18.3	37	7	761	35	12	57	3	0.0
August	25.0	12.6	18.8	36	7	799	31	8	55	3	0.0
September	20.8	9.7	15.3	32	4	576	56	20	87	4	0.0
October	13.9	5.6	9.8	25	-2	298	133	52	214	9	0.3
November	6.5	1.6	4.0	14	-7	53	266	136	390	15	9.7
December	3.3	-1.2	1.1	11	-13	8	245	137	351	13	36.8
Yearly:											
Average	13.6	4.8	9.2	---	---	---	---	---	---	---	---
Extreme	38.0	-20.0	---	37	-16	---	---	---	---	---	---
Total	---	---	---	---	---	3,772	1,465	1,206	1,683	97	121.9

Average number of days per year with at least 2.5 centimeters of snow on the ground: 50 days

*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 (Threshold: 4.4 degrees C)

Table 2.—Freeze Dates in Spring and Fall

(Recorded in the period 1971 to 2000 at Ross Dam, Washington [7185])

Probability	Temperature		
	-4.4 °C or lower	-2.2 °C or lower	0 °C or lower
Last freezing temperature in spring:			
1 year in 10 later than	March 12	March 28	April 30
2 years in 10 later than	March 2	March 19	April 25
5 years in 10 later than	February 13	March 1	April 14
First freezing temperature in fall:			
1 year in 10 earlier than	November 6	November 2	October 19
2 years in 10 earlier than	November 16	November 10	October 25
5 years in 10 earlier than	December 6	November 25	November 5

Table 3.—Growing Season

(Recorded in the period 1971 to 2000 at Ross Dam, Washington [7185])

Probability	Daily minimum temperature		
	Higher than -4.4 °C	Higher than -2.2 °C	Higher than 0 °C
	Days	Days	Days
9 years in 10	256	232	181
8 years in 10	270	245	190
5 years in 10	297	270	206
2 years in 10	324	294	222
1 year in 10	338	307	231

Table 4.—Taxonomic Classification of the Soils

Soil name	Family or higher taxonomic class
Arriva	Medial over sandy or sandy-skeletal, amorphic over isotic Thaptic Haplocryands
Bacon	Coarse-loamy over sandy or sandy-skeletal, isotic, acid Typic Cryaquepts
Beaverpass	Sandy or sandy-skeletal, isotic, euic Terric Cryosaprists
Chilliwack	Medial over sandy or sandy-skeletal, amorphic over isotic Andic Haplocryods
Cosho	Ashy over sandy or sandy-skeletal, amorphic over isotic, frigid Typic Udivitrands
Damnation	Ashy, amorphic, frigid Lithic Udivitrands
Deerlick	Ashy over sandy or sandy-skeletal, amorphic over isotic, frigid Aquic Udivitrands
Despair	Ashy, glassy, frigid Lithic Vitrixerands
Doubtful	Ashy over sandy or sandy-skeletal, amorphic over isotic Typic Vitricryands
Easy	Ashy over loamy-skeletal, amorphic over isotic, frigid Andic Haplorthods
Farway	Ashy over loamy-skeletal, glassy over isotic, frigid Typic Vitrixerands
Forbidden	Sandy-skeletal, isotic Andic Dystrocryepts
Goode	Loamy-skeletal, isotic, frigid Andic Dystroxerepts
Harlequin	Loamy, isotic Lithic Dystrocryepts
Inspiration	Ashy-skeletal over loamy-skeletal, glassy over isotic, frigid Humic Vitrixerands
Kettling	Coarse-loamy, isotic, frigid Fluventic Humixerepts
Kimtah	Ashy over loamy, amorphic over isotic Aquandic Haplocryods
Ledeir	Ashy over sandy or sandy-skeletal, amorphic over isotic, frigid Andic Haplorthods
Lyall	Sandy-skeletal, isotic, frigid Vitrandic Dystroxerepts
Maggib	Medial over sandy or sandy-skeletal, amorphic over isotic Andic Haplocryods
Manlywham	Coarse-loamy over sandy or sandy-skeletal, isotic, acid, frigid Typic Humaquepts
Mesahchie	Loamy-skeletal, isotic, frigid Andic Humixerepts
Mox	Medial over loamy-skeletal, amorphic over isotic Andic Humicryods
Noca	Ashy over sandy or sandy-skeletal, amorphic over isotic Spodic Vitricryands
Nohokomeen	Coarse-loamy, isotic, frigid Aquandic Dystrudepts
Perfect	Sandy-skeletal, isotic Vitrandic Dystrocryepts
Primus	Ashy over sandy or sandy-skeletal, glassy over isotic Xeric Vitricryands
Purple	Coarse-loamy over sandy or sandy-skeletal, isotic, acid Histic Cryaquepts
Ragged	Sandy-skeletal, isotic, frigid Vitrandic Dystrudepts
Roland	Coarse-loamy, isotic, frigid Fluvaquentic Dystrudepts
Sandalee	Coarse-loamy, isotic, frigid Fluvaquentic Dystroxerepts
Sawtooth	Loamy-skeletal, isotic, frigid Andic Dystroxerepts
Skymo	Sandy, isotic, frigid Oxyaquic Udifluvents
Spickard	Ashy over sandy or sandy-skeletal, amorphic over isotic Typic Vitricryands
Stehekin	Loamy-skeletal, isotic Vitrixerandic Dystrocryepts
Stetattle	Medial-skeletal, amorphic Pachic Fulvicryands
Tepeh	Loamy-skeletal, isotic Andic Dystrocryepts
Terror	Ashy over loamy, amorphic over isotic Andic Dystrocryepts
Thorton	Ashy over loamy-skeletal, amorphic over isotic, frigid Typic Udivitrands
Torment	Sandy-skeletal, isotic, frigid Oxyaquic Xerofluvents
Treen	Medial, amorphic Lithic Haplocryands
Tricouni	Loamy-skeletal, isotic, frigid Andic Dystrudepts
Triumph	Loamy-skeletal, isotic Vitrandic Humicryepts
Yawning	Loamy-skeletal, isotic Typic Haplocryods

Table 5.—Acreage, Hectarage, and Proportionate Extent of the Map Units

Map symbol	Map unit name	Acres	Hectares	Percent
6000	Manlywham-Nohokomeen-Roland complex, 0 to 5 percent slopes	1,142	463	0.2
6009	Ragged-Tricouni-Cosho complex, 15 to 65 percent slopes	5,680	2,300	0.8
6010	Roland-Skymo-Deerlick complex, 0 to 25 percent slopes	4,935	1,999	0.7
6014	Thorton-Ragged-Ledeir complex, 15 to 65 percent slopes	13,731	5,561	2.0
6015	Tricouni-Ragged-Easy complex, 5 to 50 percent slopes	10,730	4,346	1.6
6500	Sandalee-Kettling-Torment complex, 0 to 15 percent slopes	1,759	712	0.3
6502	Mesahchie-Inspiration-Lyall complex, 15 to 65 percent slopes	3,091	1,252	0.5
6505	Farway-Lyall-Inspiration complex, 5 to 65 percent slopes	3,910	1,584	0.6
7003	Damnation-Ragged-Rock outcrop complex, 35 to 100 percent slopes	11,278	4,568	1.6
7015	Thorton-Ragged-Damnation complex, 35 to 100 percent slopes	36,833	14,917	5.4
7500	Inspiration-Mesahchie-Sawtooth complex, 35 to 100 percent slopes	3,793	1,536	0.6
7501	Despair-Goode-Rock outcrop complex, 35 to 100 percent slopes	17,997	7,289	2.6
7502	Farway-Sawtooth-Despair complex, 35 to 100 percent slopes	9,641	3,905	1.4
8000	Beaverpass-Purple-Bacon complex, 0 to 15 percent slopes	1,317	533	0.2
8006	Stetattle-Forbidden-Triumph complex, 15 to 65 percent slopes	22,272	9,020	3.3
8007	Kimtah-Bacon-Yawning complex, 0 to 35 percent slopes	6,034	2,444	0.9
8009	Chilliwack-Perfect-Terror complex, 15 to 65 percent slopes	9,621	3,897	1.4
8010	Perfect-Spickard-Stetattle complex, 15 to 65 percent slopes	7,649	3,098	1.1
8011	Chilliwack-Forbidden-Stetattle complex, 15 to 65 percent slopes	6,118	2,478	0.9
8014	Chilliwack-Tepeh-Kimtah complex, 15 to 65 percent slopes	3,464	1,403	0.5
8500	Primus-Noca-Stehekin complex, 15 to 65 percent slopes	1,293	524	0.2
8501	Stehekin-Primus complex, 15 to 65 percent slopes	1,868	757	0.3
9001	Noca-Perfect complex, 35 to 100 percent slopes	10,008	4,053	1.5
9003	Stetattle-Doubtful-Arriva complex, 15 to 100 percent slopes	52,289	21,177	7.6
9008	Mox-Doubtful-Perfect complex, 35 to 100 percent slopes	55,110	22,320	8.1
9010	Doubtful-Treen-Rock outcrop complex, 35 to 100 percent slopes	73,426	29,738	10.7
9012	Spickard-Tepeh-Maggib complex, 15 to 100 percent slopes	51,845	20,997	7.6
9016	Doubtful-Triumph-Perfect complex, 35 to 100 percent slopes	68,186	27,615	10.0
9501	Stehekin-Primus-Stetattle complex, 35 to 100 percent slopes	10,197	4,130	1.5
9997	Rock outcrop-Despair complex, 35 to 100 percent slopes	17,719	7,176	2.6
9998	Rock outcrop-Glaciers-Harlequin complex, 25 to 100 percent slopes	144,475	58,512	21.1
9999	Water	16,891	6,841	2.5
	Total	684,302	277,142	100.0

* Less than 0.1 percent.

Table 6.—Detailed Soil Map Legend

National map symbol	Publication map symbol	Map unit name
2ph9q	6000	Manlywham-Nohokomeen-Roland complex, 0 to 5 percent slopes
2lwmc	6009	Ragged-Tricouni-Cosho complex, 15 to 65 percent slopes
2m8yv	6010	Roland-Skymo-Deerlick complex, 0 to 25 percent slopes
2ph9m	6014	Thorton-Ragged-Ledeir complex, 15 to 65 percent slopes
2ph9l	6015	Tricouni-Ragged-Easy complex, 5 to 50 percent slopes
2lwmf	6500	Sandalee-Kettling-Torment complex, 0 to 15 percent slopes
2ffbm	6502	Mesahchie-Inspiration-Lyall complex, 15 to 65 percent slopes
2m8ys	6505	Farway-Lyall-Inspiration complex, 5 to 65 percent slopes
2m8yz	7003	Damnation-Ragged-Rock outcrop complex, 35 to 100 percent slopes
2ph9g	7015	Thorton-Ragged-Damnation complex, 35 to 100 percent slopes
2lwmb	7500	Inspiration-Mesahchie-Sawtooth complex, 35 to 100 percent slopes
2m8yr	7501	Despair-Goode-Rock outcrop complex, 35 to 100 percent slopes
2lwmd	7502	Farway-Sawtooth-Despair complex, 35 to 100 percent slopes
2ffvq	8000	Beaverpass-Purple-Bacon complex, 0 to 15 percent slopes
2ph9d	8006	Stetattle-Forbidden-Triumph complex, 15 to 65 percent slopes
2ph9c	8007	Kimtah-Bacon-Yawning complex, 0 to 35 percent slopes
2ph99	8009	Chilliwack-Perfect-Terror complex, 15 to 65 percent slopes
2ph98	8010	Perfect-Spickard-Stetattle complex, 15 to 65 percent slopes
2ph97	8011	Chilliwack-Forbidden-Stetattle complex, 15 to 65 percent slopes
2ph94	8014	Chilliwack-Tepeh-Kimtah complex, 15 to 65 percent slopes
2m8zb	8500	Primus-Noca-Stehekin complex, 15 to 65 percent slopes
2ph95	8501	Stehekin-Primus complex, 15 to 65 percent slopes
1v267	9001	Noca-Perfect complex, 35 to 100 percent slopes
2lwm7	9003	Stetattle-Doubtful-Arriva complex, 15 to 100 percent slopes
2m8zc	9008	Mox-Doubtful-Perfect complex, 35 to 100 percent slopes
2m8zd	9010	Doubtful-Treen-Rock outcrop complex, 35 to 100 percent slopes
2lwm4	9012	Spickard-Tepeh-Maggib complex, 15 to 100 percent slopes
2ph90	9016	Doubtful-Triumph-Perfect complex, 35 to 100 percent slopes
2ph8z	9501	Stehekin-Primus-Stetattle complex, 35 to 100 percent slopes
2p8pr	9997	Rock outcrop-Despair complex, 35 to 100 percent slopes
2p8ps	9998	Rock outcrop-Glaciers-Harlequin complex, 25 to 100 percent slopes
2p8pt	9999	Water

Table 7.—Component Legend

("RV" means representative value.)

Map unit symbol and name	Component name	Pct. of map unit	Percent slope		
			Low	RV	High
6000:					
Manlywham-Nohokomeen-Roland complex, 0 to 5 percent slopes	Manlywham	60	0	1	2
	Nohokomeen	15	0	2	5
	Roland	15	0	2	5
	Riverwash	5	0	5	10
	Skymo	5	0	2	5
6009:					
Ragged-Tricouni-Cosho complex, 15 to 65 percent slopes	Ragged, deciduous	50	15	35	65
	Tricouni, deciduous	30	15	35	65
	Cosho	15	15	35	65
	Nohokomeen	5	15	35	65
6010:					
Roland-Skymo-Deerlick complex, 0 to 25 percent slopes	Roland	40	0	10	25
	Skymo	25	0	10	25
	Deerlick	20	0	3	15
	Manlywham	5	0	1	2
	Ragged	5	5	15	25
	Riverwash	5	0	5	10
6014:					
Thorton-Ragged-Ledeir complex, 15 to 65 percent slopes	Thorton	40	15	35	65
	Ragged	25	15	35	65
	Ledeir	15	15	35	35
	Cosho	5	15	35	35
	Deerlick	5	5	10	15
	Rock outcrop	5	15	50	65
	Tricouni, deciduous	5	15	35	65
6015:					
Tricouni-Ragged-Easy complex, 5 to 50 percent slopes	Tricouni	50	5	25	50
	Ragged	25	5	25	50
	Easy	15	5	15	35
	Deerlick	5	0	5	15
	Nohokomeen	5	0	5	15

Table 7.—Component Legend—Continued

Map unit symbol and name	Component name	Pct. of map unit	Percent slope		
			Low	RV	High
6500:					
Sandalee-Kettling-Torment complex, 0 to 15 percent slopes	Sandalee	40	0	5	15
	Kettling	25	0	5	15
	Torment	20	0	5	10
	Manlywham	10	0	1	2
	Riverwash	5	0	5	10
6502:					
Mesahchie-Inspiration-Lyall complex, 15 to 65 percent slopes	Mesahchie	50	15	35	65
	Inspiration	25	15	35	65
	Lyall	15	15	35	65
	Sandalee	5	0	3	10
	Torment	5	0	3	10
6505:					
Farway-Lyall-Inspiration complex, 5 to 65 percent slopes	Farway	50	5	35	65
	Lyall	30	5	35	65
	Inspiration	15	5	35	65
	Torment	5	0	3	15
7003:					
Damnation-Ragged-Rock outcrop complex, 35 to 100 percent slopes	Damnation	50	35	75	100
	Ragged	25	35	75	100
	Rock outcrop	15	35	75	100
	Rubble land	5	25	65	100
	Tricouni, deciduous	5	35	75	100
7015:					
Thorton-Ragged-Damnation complex, 35 to 100 percent slopes	Thorton	40	35	65	100
	Ragged	25	35	65	100
	Damnation	15	35	65	100
	Cosho	5	15	35	65
	Deerlick	5	15	25	35
	Rock outcrop	5	35	65	100
	Tricouni, deciduous	5	35	65	100

Table 7.—Component Legend—Continued

Map unit symbol and name	Component name	Pct. of map unit	Percent slope		
			Low	RV	High
7500:					
Inspiration-Mesahchie-Sawtooth complex, 35 to 100 percent slopes	Inspiration	50	35	65	100
	Mesahchie	25	35	65	100
	Sawtooth	15	35	65	100
	Lyall	5	15	35	65
	Rock outcrop	5	15	35	100
7501:					
Despair-Goode-Rock outcrop complex, 35 to 100 percent slopes	Despair	40	35	65	100
	Goode	30	35	65	100
	Rock outcrop	15	35	65	100
	Lyall	10	15	25	65
	Mesahchie	5	15	35	65
7502:					
Farway-Sawtooth-Despair complex, 35 to 100 percent slopes	Farway	50	35	65	100
	Sawtooth	25	35	65	100
	Despair	15	35	65	100
	Lyall	5	15	35	65
	Rock outcrop	5	35	65	100
8000:					
Beaverpass-Purple-Bacon complex, 0 to 15 percent slopes	Beaverpass	40	0	2	5
	Purple	30	0	5	15
	Bacon	15	0	5	15
	Riverwash	10	0	5	10
	Terror	5	0	5	15
8006:					
Stetattle-Forbidden-Triumph complex, 15 to 65 percent slopes	Stetattle, deciduous	60	15	35	65
	Forbidden	15	15	35	65
	Triumph	15	15	35	65
	Bacon	5	0	2	10
	Riverwash	5	0	5	10

Table 7.—Component Legend—Continued

Map unit symbol and name	Component name	Pct. of map unit	Percent slope		
			Low	RV	High
8007:					
Kimtah-Bacon-Yawning complex, 0 to 35 percent slopes	Kimtah	40	0	15	35
	Bacon	30	0	5	15
	Yawning	15	5	15	35
	Purple	10	0	2	5
	Riverwash	5	0	5	10
8009:					
Chilliwack-Perfect-Terror complex, 15 to 65 percent slopes	Chilliwack, warm	40	15	35	65
	Perfect	30	15	35	65
	Terror	15	15	25	35
	Triumph, deciduous	10	15	35	65
	Tepeh, moist	5	15	25	65
8010:					
Perfect-Spickard-Stetattle complex, 15 to 65 percent slopes	Perfect	50	15	35	65
	Spickard	20	15	35	65
	Stetattle, deciduous	15	15	35	65
	Yawning	10	0	3	15
	Terror	5	0	3	15
8011:					
Chilliwack-Forbidden-Stetattle complex, 15 to 65 percent slopes	Chilliwack	50	15	35	65
	Forbidden, cold	30	15	35	65
	Stetattle, deciduous	15	15	35	65
	Triumph, deciduous	5	15	25	65
8014:					
Chilliwack-Tepeh-Kimtah complex, 15 to 65 percent slopes	Chilliwack, dry	40	15	35	65
	Tepeh	30	15	35	65
	Kimtah, dry	15	15	25	35
	Maggib, dry	5	15	25	35
	Primus	5	15	35	65
	Triumph, deciduous	5	15	35	65

Table 7.—Component Legend—Continued

Map unit symbol and name	Component name	Pct. of map unit	Percent slope		
			Low	RV	High
8500:					
Primus-Noca-Stehekin complex, 15 to 65 percent slopes	Primus	50	15	35	65
	Noca	20	15	35	65
	Stehekin	20	15	25	65
	Terror, dry	10	5	10	25
8501:					
Stehekin-Primus complex, 15 to 65 percent slopes	Stehekin	50	15	35	65
	Primus	30	15	35	65
	Perfect, dry	10	5	35	65
	Stetattle, deciduous	10	5	35	65
9001:					
Noca-Perfect complex, 35 to 100 percent slopes	Noca	40	35	65	100
	Perfect, dry	30	35	65	100
	Maggib, dry	10	15	35	65
	Triumph	10	35	65	100
	Rock outcrop	5	35	65	100
	Terror, dry	5	5	10	25
9003:					
Stetattle-Doubtful-Arriva complex, 15 to 100 percent slopes	Stetattle	30	35	65	100
	Doubtful	25	35	65	100
	Arriva	20	15	25	65
	Spickard, cold	10	5	15	35
	Treen	10	25	35	65
	Rock outcrop	5	35	65	100
9008:					
Mox-Doubtful-Perfect complex, 35 to 100 percent slopes	Mox	30	35	65	100
	Doubtful	20	35	65	100
	Perfect, cold	15	35	65	100
	Kimtah, cold	10	5	25	35
	Maggib	10	15	25	65
	Stetattle	10	35	65	100
	Rock outcrop	5	35	65	100

Table 7.—Component Legend—Continued

Map unit symbol and name	Component name	Pct. of map unit	Percent slope		
			Low	RV	High
9010:					
Doubtful-Treen-Rock outcrop complex, 35 to 100 percent slopes	Doubtful	30	35	75	100
	Treen	25	35	75	100
	Rock outcrop	15	35	75	100
	Forbidden, cold	10	35	65	100
	Harlequin	10	35	50	100
	Triumph	10	25	50	100
9012:					
Spickard-Tepeh-Maggib complex, 15 to 100 percent slopes	Spickard	40	35	75	100
	Tepeh, moist	25	35	75	100
	Maggib	15	15	35	65
	Perfect	10	35	65	100
	Rock outcrop	5	35	65	100
	Terror	5	5	10	25
9016:					
Doubtful-Triumph-Perfect complex, 35 to 100 percent slopes	Doubtful	30	35	75	100
	Triumph	20	35	75	100
	Perfect, cold	15	35	75	100
	Arriva	10	15	25	65
	Rock outcrop	10	35	75	100
	Treen	10	35	75	100
	Terror, cold	5	5	15	35
9501:					
Stehekin-Primus-Stetattle complex, 35 to 100 percent slopes	Stehekin	40	35	65	100
	Primus	25	35	65	100
	Stetattle	15	35	65	100
	Despair	10	35	65	100
	Rock outcrop	10	35	65	100
9997:					
Rock outcrop-Despair complex, 35 to 100 percent slopes	Rock outcrop	70	35	90	100
	Despair	15	35	65	100
	Rubble land	10	25	65	100
	Harlequin	5	15	35	100

Table 7.—Component Legend—Continued

Map unit symbol and name	Component name	Pct. of map unit	Percent slope		
			Low	RV	High
9998:					
Rock outcrop-Glaciers-Harlequin complex, 25 to 100 percent slopes	Rock outcrop	60	25	75	100
	Glaciers	15	25	65	100
	Harlequin	15	25	75	100
	Rubble land	10	25	65	100
9999:					
Water	Water, freshwater	100	0	0	0

Table 8.—Land Capability Classification

Map unit symbol and soil name	Nonirrigated land capability subclass
6000:	
Manlywham	3w
Nohokomeen	4w
Roland	4w
6009:	
Ragged, deciduous	7e
Tricouni, deciduous	7e
Cosho	7e
6010:	
Roland	4e
Skymo	4e
Deerlick	4s
6014:	
Thorton	7e
Ragged	7e
Ledeir	7e
6015:	
Tricouni	6e
Ragged	6e
Easy	6e
6500:	
Sandalee	4w
Kettling	3e
Torment	6s
6502:	
Mesahchie	7e
Inspiration	7e
Lyall	7e
6505:	
Farway	7e
Lyall	7e
Inspiration	7e
7003:	
Damnation	7e
Ragged	7e
Rock outcrop	8

Table 8.—Land Capability Classification—Continued

Map unit symbol and soil name	Nonirrigated land capability subclass
7015:	
Thorton	7e
Ragged	7e
Damnation	7e
7500:	
Inspiration	7e
Mesahchie	7e
Sawtooth	7e
7501:	
Despair	7e
Goode	7e
Rock outcrop	8
7502:	
Farway	7e
Sawtooth	7e
Despair	7e
8000:	
Beaverpass	6s
Purple	7s
Bacon	6s
8006:	
Stetattle, deciduous	7e
Forbidden	7e
Triumph	7e
8007:	
Kimtah	7s
Bacon	6s
Yawning	7s
8009:	
Chilliwack, warm	6s
Perfect	7e
Terror	7s
8010:	
Perfect	7e
Spickard	7e
Stetattle, deciduous	7e

Table 8.—Land Capability Classification—Continued

Map unit symbol and soil name	Nonirrigated land capability subclass
8011:	
Chilliwack	6s
Forbidden, cold	7e
Stetattle, deciduous	7e
8014:	
Chilliwack, dry	6s
Tepeh	7e
Kimtah, dry	7s
8500:	
Primus	7e
Noca	7e
Stehekin	7e
8501:	
Stehekin	7s
Primus	6s
9001:	
Noca	7e
Perfect, dry	7e
9003:	
Stetattle	7e
Doubtful	7e
Arriva	7e
9008:	
Mox	7e
Doubtful	7e
Perfect, cold	7e
9010:	
Doubtful	7e
Treen	7e
Rock outcrop	8
9012:	
Spickard	7e
Tepeh, moist	7e
Maggib	7e
9016:	
Doubtful	7e

Table 8.—Land Capability Classification—Continued

Map unit symbol and soil name	Nonirrigated land capability subclass
9016:	
Triumph	7e
Perfect, cold	7e
9501:	
Stehekin	7e
Primus	7e
Stetattle	7e
9997:	
Rock outcrop	8
Despair	7e
9998:	
Rock outcrop	8
Glaciers	8
Harlequin	7e
9999:	
Water, freshwater	8

Table 9.—Common and Scientific Plant Names and Symbols by Common Name

(The plant names shown in this table are in the National Soils Information System (NASIS) database used for this soil survey. The common and scientific names are referenced in the U.S.Department of Agriculture PLANTS database at http://plants.usda.gov.)

Local common name	Scientific name	Plant symbol
Alaska yellow-cedar	*Cupressus nootkatensis*	CUNO
American skunkcabbage	*Lysichiton americanus*	LYAM3
Baldhip rose	Rosa gymnocarpa	ROGY
Barclay's willow	*Salix barclayi*	SABA3
Big huckleberry	*Vaccinium membranaceum*	VAME
Bigleaf maple	*Acer macrophyllum*	ACMA3
Bitter cherry	*Prunus emarginata*	PREM
Black alpine sedge	*Carex nigricans*	CANI2
Black cottonwood	*Populus balsamifera ssp. trichocarpa*	POBAT
Bluejoint reedgrass	*Calamagrostis canadensis*	CACA4
Broadleaf lupine	*Lupinus latifolius*	LULA4
Broadleaf starflower	*Trientalis borealis ssp. latifolia*	TRBOL
California hazelnut	Corylus *cornuta var.* californica	COCOC
Cascade azalea	*Rhododendron albiflorum*	RHAL2
Cascade huckleberry	*Vaccinium deliciosum*	VADE
Cascade Oregongrape	*Mahonia nervosa*	MANE2
Claspleaf twistedstalk	*Streptopus amplexifolius*	STAM2
Common ladyfern	*Athyrium filix-femina*	ATFI
Devilsclub	*Oplopanax horridus*	OPHO
Douglas-fir	*Pseudotsuga menziesii*	PSME
Dwarf bramble	*Rubus lasiococcus*	RULA2
Engelmann spruce	*Picea engelmannii*	PIEN
False hellebore	*Veratrum viride*	VEVI
False lily of the valley	*Maianthemum dilatatum*	MADI
Fireweed	*Chamerion angustifolium ssp. angustifolium*	CHANA2
Fringecup	*Tellima grandiflora*	TEGR2
Grand fir	*Abies grandis*	ABGR
Lodgepole pine	*Pinus contorta*	PICO
Mountain hemlock	*Tsuga mertensiana*	TSME
Myrtle pachistima	*Paxistima myrsinites*	PAMY
Narrow-leaved collomia	*Collomia linearis*	COLI2
Pacific silver fir	*Abies amabilis*	ABAM
Paper birch	*Betula papyrifera*	BEPA
Partridgefoot	*Luetkea pectinata*	LUPE
Pinegrass	*Calamagrostis rubescens*	CARU
Pink mountain-heather	*Phyllodoce empetriformis*	PHEM
Ponderosa pine	*Pinus ponderosa*	PIPO
Prickly currant	*Ribes lacustre*	RILA
Prince's pine	*Chimaphila umbellata*	CHUM
Queencup bead lily	*Clintonia uniflora*	CLUN2
Red alder	*Alnus rubra*	ALRU2
Red elderberry	*Sambucus racemosa*	SARA2
Red huckleberry	*Vaccinium parvifolium*	VAPA
Redosier dogwood	*Cornus stolonifera*	COST4
Rusty menziesia	*Menziesia ferruginea*	MEFE
Salal	*Gaultheria shallon*	GASH
Salmonberry	*Rubus spectabilis*	RUSP
Saskatoon serviceberry	*Amelanchier alnifolia*	AMAL2
Shinyleaf spirea	*Spiraea betulifolia var. lucida*	SPBEL
Showy sedge	*Carex spectabilis*	CASP5
Sidebells wintergreen	*Orthilia secunda*	ORSE
Sitka alder	*Alnus viridis ssp. sinuata*	ALVIS
Sitka mountain-ash	*Sorbus sitchensis var. sitchensis*	SOSIS2
Sitka valerian	*Valeriana sitchensis*	VASI
Sitka willow	*Salix sitchensis*	SASI2
Starry false Solomon's seal	*Maianthemum stellatum*	MAST4
Strawberryleaf raspberry	*Rubus pedatus*	RUPE
Subalpine fir	*Abies lasiocarpa*	ABLA
Tall Oregongrape	*Mahonia aquifolium*	MAAQ2

Table 9.—Common and Scientific Plant Names and Symbols by Common Name—Continued

Local common name	Scientific name	Plant symbol
Thimbleberry	*Rubus parviflorus*	RUPA
Threeleaf foamflower	*Tiarella trifoliata*	TITR
Twinflower	*Linnaea borealis*	LIBO3
Utah honeysuckle	*Lonicera utahensis*	LOUT2
Vine maple	Acer *circinatum*	ACCI
Water sedge	*Carex aquatilis*	CAAQ
Western brackenfern	Pteridium *aquilinum*	PTAQ
Western hemlock	Tsuga *heterophylla*	TSHE
Western oakfern	*Gymnocarpium dryopteris*	GYDR
Western pearly everlasting	*Anaphalis margaritacea*	ANMA
Western rattlesnake plantain	*Goodyera oblongifolia*	GOOB2
Western redcedar	*Thuja plicata*	THPL
Western swordfern	*Polystichum* munitum	POMU
White marsh marigold	*Caltha leptosepala*	CALE4
Wild ginger	*Asarum caudatum*	ASCA2

Table 10.—Common and Scientific Plant Names and Plant Symbols by Plant Symbol

(The plant names shown in this table are in the National Soils Information System (NASIS) database used for this soil survey. The common and scientific names are referenced in the U.S. Department of Agriculture PLANTS database at http://plants.usda.gov.)

Plant symbol	Local common name	Scientific name
ABAM	Pacific silver fir	*Abies amabilis*
ABGR	Grand fir	*Abies grandis*
ABLA	Subalpine fir	*Abies lasiocarpa*
ACCI	Vine maple	*Acer circinatum*
ACMA3	Bigleaf maple	*Acer macrophyllum*
ALRU2	Red alder	*Alnus rubra*
ALVIS	Sitka alder	*Alnus viridis ssp. sinuata*
AMAL2	Saskatoon serviceberry	*Amelanchier alnifolia*
ANMA	Western pearly everlasting	*Anaphalis margaritacea*
ASCA2	Wild ginger	*Asarum caudatum*
ATFI	Common ladyfern	*Athyrium filix-femina*
BEPA	Paper birch	*Betula papyrifera*
CAAQ	Water sedge	*Carex aquatilis*
CACA4	Bluejoint reedgrass	*Calamagrostis canadensis*
CALE4	White marsh marigold	*Caltha leptosepala*
CANI2	Black alpine sedge	*Carex nigricans*
CARU	Pinegrass	*Calamagrostis rubescens*
CASP5	Showy sedge	*Carex spectabilis*
CHANA2	Fireweed	*Chamerion angustifolium ssp. angustifolium*
CHUM	Prince's pine	*Chimaphila umbellata*
CLUN2	Queencup bead lily	*Clintonia uniflora*
COCOC	California hazelnut	*Corylus cornuta var. californica*
COLI2	Narrow-leaved collomia	*Collomia linearis*
COST4	Redosier dogwood	*Cornus stolonifera*
CUNO	Alaska yellow-cedar	*Cupressus nootkatensis*
GASH	Salal	*Gaultheria shallon*
GOOB2	Western rattlesnake plantain	*Goodyera oblongifolia*
GYDR	Western oakfern	*Gymnocarpium dryopteris*
LIBO3	Twinflower	*Linnaea borealis*
LOUT2	Utah honeysuckle	*Lonicera utahensis*
LULA4	Broadleaf lupine	*Lupinus latifolius*
LUPE	Partridgefoot	*Luetkea pectinata*
LYAM3	American skunkcabbage	*Lysichiton americanus*
MAAQ2	Tall Oregongrape	*Mahonia aquifolium*
MADI	False lily of the valley	*Maianthemum dilatatum*
MANE2	Cascade Oregongrape	*Mahonia nervosa*
MAST4	Starry false Solomon's seal	*Maianthemum stellatum*
MEFE	Rusty menziesia	*Menziesia ferruginea*
OPHO	Devilsclub	*Oplopanax horridus*
ORSE	Sidebells wintergreen	*Orthilia secunda*
PAMY	Myrtle pachistima	*Paxistima myrsinites*
PHEM	Pink mountain-heather	*Phyllodoce empetriformis*
PICO	Lodgepole pine	*Pinus contorta*
PIEN	Engelmann spruce	*Picea engelmannii*
PIPO	Ponderosa pine	*Pinus ponderosa*
POBAT	Black cottonwood	*Populus balsamifera ssp. trichocarpa*
POMU	Western swordfern	*Polystichum munitum*
PREM	Bitter cherry	*Prunus emarginata*
PSME	Douglas-fir	*Pseudotsuga menziesii*
PTAQ	Western brackenfern	*Pteridium aquilinum*
RHAL2	Cascade azalea	*Rhododendron albiflorum*
RILA	Prickly currant	*Ribes lacustre*
ROGY	Baldhip rose	*Rosa gymnocarpa*
RULA2	Dwarf bramble	*Rubus lasiococcus*
RUPA	Thimbleberry	*Rubus parviflorus*
RUPE	Strawberryleaf raspberry	*Rubus pedatus*
RUSP	Salmonberry	*Rubus spectabilis*
SABA3	Barclay's willow	*Salix barclayi*
SARA2	Red elderberry	*Sambucus racemosa*

Table 10.—Common and Scientific Plant Names and Plant Symbols by Plant Symbol—Continued

Plant symbol	Local common name	Scientific name
SASI2	Sitka willow	*Salix sitchensis*
SOSIS2	Sitka mountain-ash	*Sorbus sitchensis var. sitchensis*
SPBEL	Shinyleaf spirea	*Spiraea betulifolia var. lucida*
STAM2	Claspleaf twistedstalk	*Streptopus amplexifolius*
TEGR2	Fringecup	*Tellima grandiflora*
THPL	Western redcedar	*Thuja plicata*
TITR	Threeleaf foamflower	*Tiarella trifoliata*
TRBOL	Broadleaf starflower	*Trientalis borealis ssp. latifolia*
TSHE	Western hemlock	*Tsuga heterophylla*
TSME	Mountain hemlock	*Tsuga mertensiana*
VADE	Cascade huckleberry	*Vaccinium deliciosum*
VAME	Big huckleberry	*Vaccinium membranaceum*
VAPA	Red huckleberry	*Vaccinium parvifolium*
VASI	Sitka valerian	*Valeriana sitchensis*
VEVI	False hellebore	*Veratrum viride*

Table 11.—Rangeland Ecological Site and Characteristic Vegetation

(Only the map unit compoenents that support rangeland vegetation are shown in this table.)

Map symbol and soil name	Ecological site number and name	Characteristic vegetation
6000:		
Manlywham	R003XN613WA Low Mountain Unforested Wetlands	Salmonberry (RUSP) Redosier dogwood (COST4) Red alder (ALRU2) American skunkcabbage (LYAM3) False lily of the valley (MADI)
8000:		
Beaverpass	R003XN603WA High Mountain Unforested Wetlands	Barclay's willow (SABA3) Bluejoint reedgrass (CACA4) Water sedge (CAAQ) White marsh marigold (CALE4) Black alpine sedge (CANI2)
Purple	R003XN603WA High Mountain Unforested Wetlands	Barclay's willow (SABA3) Bluejoint reedgrass (CACA4) Water sedge (CAAQ) White marsh marigold (CALE4) Black alpine sedge (CANI2)
Bacon	R003XN603WA High Mountain Unforested Wetlands	Barclay's willow (SABA3) Bluejoint reedgrass (CACA4) Water sedge (CAAQ) White marsh marigold (CALE4) Black alpine sedge (CANI2)
8006:		
Triumph	R003XN512WA Subalpine Parkland - Active Natural Soil Disturbance Complex	Cascade huckleberry (VADE) Western pearly everlasting (ANMA) Sitka mountain-ash (SOSIS2) Sitka valerian (VASI) Salmonberry (RUSP) Barclay's willow (SABA3) Big huckleberry (VAME) Broadleaf lupine (LULA4)
8007:		
Bacon	R003XN603WA High Mountain Unforested Wetlands	Barclay's willow (SABA3) Bluejoint reedgrass (CACA4) Water sedge (CAAQ) White marsh marigold (CALE4) Black alpine sedge (CANI2)
9003:		
Stetattle	R003XN512WA Subalpine Parkland - Active Natural Soil Disturbance Complex	Cascade huckleberry (VADE) Western pearly everlasting (ANMA) Sitka mountain-ash (SOSIS2) Sitka valerian (VASI) Salmonberry (RUSP) Barclay's willow (SABA3) Big huckleberry (VAME) Broadleaf lupine (LULA4)

Table 11.—Rangeland Ecological Site and Characteristic Vegetation—Continued

Map symbol and soil name	Ecological site number and name	Characteristic vegetation
9003:		
Doubtful	R003XN502WA Subalpine Parkland - Minor Natural Soil Disturbance Complex	Cascade azalea (RHAL2) Big huckleberry (VAME) Pink mountain-heather (PHEM) Cascade huckleberry (VADE) Sitka mountain-ash (SOSIS2) Broadleaf lupine (LULA4) Western pearly everlasting (ANMA) Showy sedge (CASP5) Partridgefoot (LUPE)
Arriva	R003XN502WA Subalpine Parkland - Minor Natural Soil Disturbance Complex	Cascade azalea (RHAL2) Big huckleberry (VAME) Pink mountain-heather (PHEM) Cascade huckleberry (VADE) Sitka mountain-ash (SOSIS2) Broadleaf lupine (LULA4) Western pearly everlasting (ANMA) Showy sedge (CASP5) Partridgefoot (LUPE)
9008:		
Doubtful	R003XN502WA Subalpine Parkland - Minor Natural Soil Disturbance Complex	Cascade azalea (RHAL2) Big huckleberry (VAME) Pink mountain-heather (PHEM) Cascade huckleberry (VADE) Sitka mountain-ash (SOSIS2) Broadleaf lupine (LULA4) Western pearly everlasting (ANMA) Showy sedge (CASP5) Partridgefoot (LUPE)
9010:		
Doubtful	R003XN502WA Subalpine Parkland - Minor Natural Soil Disturbance Complex	Cascade azalea (RHAL2) Big huckleberry (VAME) Pink mountain-heather (PHEM) Cascade huckleberry (VADE) Sitka mountain-ash (SOSIS2) Broadleaf lupine (LULA4) Western pearly everlasting (ANMA) Showy sedge (CASP5) Partridgefoot (LUPE)
Treen	R003XN512WA Subalpine Parkland - Active Natural Soil Disturbance Complex	Cascade huckleberry (VADE) Western pearly everlasting (ANMA) Sitka mountain-ash (SOSIS2) Sitka valerian (VASI) Salmonberry (RUSP) Barclay's willow (SABA3) Big huckleberry (VAME) Broadleaf lupine (LULA4)
9016:		
Doubtful	R003XN502WA Subalpine Parkland - Minor Natural Soil Disturbance Complex	Cascade azalea (RHAL2) Big huckleberry (VAME) Pink mountain-heather (PHEM) Cascade huckleberry (VADE) Sitka mountain-ash (SOSIS2) Broadleaf lupine (LULA4) Western pearly everlasting (ANMA) Showy sedge (CASP5) Partridgefoot (LUPE)

Table 11.—Rangeland Ecological Site and Characteristic Vegetation—Continued

Map symbol and soil name	Ecological site number and name	Characteristic vegetation
9016:		
Triumph	R003XN512WA Subalpine Parkland - Active Natural Soil Disturbance Complex	Cascade huckleberry (VADE) Western pearly everlasting (ANMA) Sitka mountain-ash (SOSIS2) Sitka valerian (VASI) Salmonberry (RUSP) Barclay's willow (SABA3) Big huckleberry (VAME) Broadleaf lupine (LULA4)
9501:		
Stetattle	R003XN512WA Subalpine Parkland - Active Natural Soil Disturbance Complex	Cascade huckleberry (VADE) Western pearly everlasting (ANMA) Sitka mountain-ash (SOSIS2) Sitka valerian (VASI) Salmonberry (RUSP) Barclay's willow (SABA3) Big huckleberry (VAME) Broadleaf lupine (LULA4)
9998:		
Harlequin	R003XN512WA Subalpine Parkland - Active Natural Soil Disturbance Complex	Cascade huckleberry (VADE) Western pearly everlasting (ANMA) Sitka mountain-ash (SOSIS2) Sitka valerian (VASI) Salmonberry (RUSP) Barclay's willow (SABA3) Big huckleberry (VAME) Broadleaf lupine (LULA4)

Table 12.—Forestland Productivity, Ecological Site, and Understory Vegetation

(Only the map unit components that support forest vegetation are shown in this table. Absence of an entry indicates that data were not estimated.)

Map symbol and soil name	Potential productivity			Ecological site number and name	Common understory vegetation
	Common trees	Site index	Site index base age	Volume of wood fiber (CMAI)		
		Ft	*Yrs*	*Cu ft/ac/yr*		
6000:						
Nohokomeen	Black cottonwood	---	---	---	F003XN920WA *Populus balsamifera ssp. trichocarpa-Alnus rubra/Acer circinatum-Rubus spectabilis/Asarum caudatum-Athyrium filix-femina*	Vine maple (ACCI) Common ladyfern (ATFI) Western brackenfern (PTAQ) Devilsclub (OPHO) Prickly currant (RILA) Salmonberry (RUSP) Red elderberry (SARA2) Wild ginger (ASCA2)
	Red alder	---	---	---		
	Douglas-fir	84	50	105		
	Western redcedar	57	50	---		
	Western hemlock	61	50	166		
	Engelmann spruce	122	100	145		
Roland	Black cottonwood	---	---	---	F003XN920WA *Populus balsamifera ssp. trichocarpa-Alnus rubra/Acer circinatum-Rubus spectabilis/Asarum caudatum-Athyrium filix-femina*	Vine maple (ACCI) Common ladyfern (ATFI) Western brackenfern (PTAQ) Devilsclub (OPHO) Prickly currant (RILA) Salmonberry (RUSP) Red elderberry (SARA2) Wild ginger (ASCA2)
	Red alder	103	50	123		
	Red alder	57	20	---		
	Douglas-fir	---	---	---		
	Western redcedar	---	---	---		
6009:						
Ragged, deciduous	Vine maple	---	---	---	F003XN922WA *Acer circinatum/Ribes lacustre-Vaccinium parvifolium/Polystichum munitum-Pteridium aquilinum*	Prickly currant (RILA) Red huckleberry (VAPA) Cascade Oregongrape (MANE2) Myrtle pachistima (PAMY) Western swordfern (POMU) Western brackenfern (PTAQ) Queencup bead lily (CLUN2)
Tricouni, deciduous	Vine maple	---	---	---	F003XN922WA *Acer circinatum/Ribes lacustre-Vaccinium parvifolium/Polystichum munitum-Pteridium aquilinum*	Prickly currant (RILA) Red huckleberry (VAPA) Cascade Oregongrape (MANE2) Myrtle pachistima (PAMY) Western swordfern (POMU) Western brackenfern (PTAQ) Queencup bead lily (CLUN2)

Table 12.—Forestland Productivity, Ecological Site, and Understory Vegetation—Continued

Map symbol and soil name	Potential productivity: Common trees	Site index	Site index base age	Volume of wood fiber (CMAI)	Ecological site number and name	Common understory vegetation
		Ft	*Yrs*	*Cu ft/ac/yr*		
6009:						
Cosho	Western hemlock	67	50	175	F003XN921WA *Tsuga heterophylla-Thuja plicata/Acer circinatum-Vaccinium parvifolium/Linnaea borealis-Polystichum munitum*	Vine maple (ACCI) Red huckleberry (VAPA) Cascade Oregongrape (MANE2) Twinflower (LIBO3) Western swordfern (POMU) Prince's pine (CHUM) Western rattlesnake plantain (GOOB2) Salal (GASH)
	Western redcedar	---	---	---		
	Douglas-fir	88	50	113		
	Paper birch	---	---	---		
	Grand fir	---	---	---		
	Bigleaf maple	---	---	---		
	Pacific silver fir	120	100	---		
	Lodgepole pine	79	100	86		
6010:						
Roland	Black cottonwood	---	---	---	F003XN920WA *Populus balsamifera ssp. trichocarpa-Alnus rubra/Acer circinatum-Rubus spectabilis/Asarum caudatum-Athyrium filix-femina*	Vine maple (ACCI) Common ladyfern (ATFI) Western brackenfern (PTAQ) Devilsclub (OPHO) Prickly currant (RILA) Salmonberry (RUSP) Red elderberry (SARA2) Wild ginger (ASCA2)
	Red alder	103	50	123		
	Red alder	57	20	---		
	Douglas-fir	---	---	---		
	Western redcedar	---	---	---		
Skymo	Western hemlock	---	---	---	F003XN921WA *Tsuga heterophylla-Thuja plicata/Acer circinatum-Vaccinium parvifolium/Linnaea borealis-Polystichum munitum*	Vine maple (ACCI) Red huckleberry (VAPA) Cascade Oregongrape (MANE2) Twinflower (LIBO3) Western swordfern (POMU) Prince's pine (CHUM) Western rattlesnake plantain (GOOB2) Salal (GASH)
	Western redcedar	---	---	---		
	Douglas-fir	---	---	---		
	Paper birch	---	---	---		
	Grand fir	---	---	---		
	Bigleaf maple	---	---	---		
Deerlick	Western hemlock	---	---	---	F003XN921WA *Tsuga heterophylla-Thuja plicata/Acer circinatum-Vaccinium parvifolium/Linnaea borealis-Polystichum munitum*	Vine maple (ACCI) Red huckleberry (VAPA) Cascade Oregongrape (MANE2) Twinflower (LIBO3) Western swordfern (POMU) Prince's pine (CHUM) Western rattlesnake plantain (GOOB2) Salal (GASH)
	Western redcedar	64	50	---		
	Douglas-fir	74	50	86		
	Paper birch	---	---	---		
	Grand fir	---	---	---		
	Bigleaf maple	---	---	---		
	Red alder	40	20	---		
	Red alder	58	50	50		

Table 12.—Forestland Productivity, Ecological Site, and Understory Vegetation—Continued

Map symbol and soil name	Potential productivity				Ecological site number and name	Common understory vegetation
	Common trees	Site index	Site index base age	Volume of wood fiber (CMAI)		
		Ft	*Yrs*	*Cu ft/ac/yr*		
6014:						
Thorton	Western hemlock	82	50	199	F003XN921WA *Tsuga heterophylla-Thuja plicata/Acer circinatum-Vaccinium parvifolium/Linnaea borealis-Polystichum munitum*	Vine maple (ACCI) Red huckleberry (VAPA) Cascade Oregongrape (MANE2) Twinflower (LIBO3) Western swordfern (POMU) Prince's pine (CHUM) Western rattlesnake plantain (GOOB2) Salal (GASH)
	Western redcedar	66	50	---		
	Douglas-fir	83	50	103		
	Paper birch	---	---	---		
	Grand fir	---	---	---		
	Bigleaf maple	---	---	---		
	Lodgepole pine	92	100	112		
Ragged	Western hemlock	---	---	---	F003XN921WA *Tsuga heterophylla-Thuja plicata/Acer circinatum-Vaccinium parvifolium/Linnaea borealis-Polystichum munitum*	Vine maple (ACCI) Red huckleberry (VAPA) Cascade Oregongrape (MANE2) Twinflower (LIBO3) Western swordfern (POMU) Prince's pine (CHUM) Western rattlesnake plantain (GOOB2) Salal (GASH)
	Western redcedar	85	50	---		
	Douglas-fir	113	50	160		
	Paper birch	---	---	---		
	Grand fir	---	---	---		
	Bigleaf maple	---	---	---		
	Red alder	61	20	---		
	Red alder	92	50	104		
Ledeir	Western hemlock	61	50	166	F003XN921WA *Tsuga heterophylla-Thuja plicata/Acer circinatum-Vaccinium parvifolium/Linnaea borealis-Polystichum munitum*	Vine maple (ACCI) Red huckleberry (VAPA) Cascade Oregongrape (MANE2) Twinflower (LIBO3) Western swordfern (POMU) Prince's pine (CHUM) Western rattlesnake plantain (GOOB2) Salal (GASH)
	Western redcedar	---	---	---		
	Douglas-fir	144	50	222		
	Paper birch	---	---	---		
	Grand fir	---	---	---		
	Bigleaf maple	---	---	---		
6015:						
Tricouni	Western hemlock	---	---	---	F003XN921WA *Tsuga heterophylla-Thuja plicata/Acer circinatum-Vaccinium parvifolium/Linnaea borealis-Polystichum munitum*	Vine maple (ACCI) Red huckleberry (VAPA) Cascade Oregongrape (MANE2) Twinflower (LIBO3) Western swordfern (POMU) Prince's pine (CHUM) Western rattlesnake plantain (GOOB2) Salal (GASH)
	Western redcedar	---	---	---		
	Douglas-fir	102	50	140		
	Paper birch	---	---	---		
	Grand fir	---	---	---		
	Bigleaf maple	---	---	---		
	Lodgepole pine	80	100	88		

Table 12.—Forestland Productivity, Ecological Site, and Understory Vegetation—Continued

Map symbol and soil name	Potential productivity				Ecological site number and name	Common understory vegetation
	Common trees	Site index	Site index base age	Volume of wood fiber (CMAI)		
		Ft	*Yrs*	*Cu ft/ac/yr*		
6015:						
Ragged	Western hemlock	---	---	---	F003XN921WA *Tsuga heterophylla-Thuja plicata/Acer circinatum-Vaccinium parvifolium/Linnaea borealis-Polystichum munitum*	Vine maple (ACCI) Red huckleberry (VAPA) Cascade Oregongrape (MANE2) Twinflower (LIBO3) Western swordfern (POMU) Prince's pine (CHUM) Western rattlesnake plantain (GOOB2) Salal (GASH)
	Western redcedar	85	50	---		
	Douglas-fir	113	50	160		
	Paper birch	---	---	---		
	Grand fir	---	---	---		
	Bigleaf maple	---	---	---		
	Red alder	61	20	---		
	Red alder	92	50	104		
Easy	Western hemlock	81	50	197	F003XN921WA *Tsuga heterophylla-Thuja plicata/Acer circinatum-Vaccinium parvifolium/Linnaea borealis-Polystichum munitum*	Vine maple (ACCI) Red huckleberry (VAPA) Cascade Oregongrape (MANE2) Twinflower (LIBO3) Western swordfern (POMU) Prince's pine (CHUM) Western rattlesnake plantain (GOOB2) Salal (GASH)
	Western redcedar	---	---	---		
	Douglas-fir	96	100	78		
	Paper birch	---	---	---		
	Grand fir	---	---	---		
	Bigleaf maple	---	---	---		
6500:						
Sandalee	Black cottonwood	---	---	---	F003XN920WA *Populus balsamifera ssp. trichocarpa-Alnus rubra/Acer circinatum-Rubus spectabilis/Asarum caudatum-Athyrium filix-femina*	Vine maple (ACCI) Common ladyfern (ATFI) Western brackenfern (PTAQ) Devilsclub (OPHO) Prickly currant (RILA) Salmonberry (RUSP) Red elderberry (SARA2) Wild ginger (ASCA2)
	Red alder	---	---	---		
	Douglas-fir	114	50	162		
	Western redcedar	---	---	---		
Kettling	Douglas-fir	---	---	---	F003XN927WA *Pseudotsuga menziesii-Pinus ponderosa/Paxistima myrsinites-Amelanchier alnifolia/Calamagrostis rubescens-Collomia linearis*	Myrtle pachistima (PAMY) Saskatoon serviceberry (AMAL2) Tall Oregongrape (MAAQ2) Shinyleaf spirea (SPBEL) Baldhip rose (ROGY) Pinegrass (CARU) Narrow-leaved collomia (COLI2) Western rattlesnake plantain (GOOB2)
	Ponderosa pine	---	---	---		
	Bigleaf maple	---	---	---		
	Grand fir	---	---	---		

Table 12.—Forestland Productivity, Ecological Site, and Understory Vegetation—Continued

Map symbol and soil name	Potential productivity				Ecological site number and name	Common understory vegetation
	Common trees	Site index	Site index base age	Volume of wood fiber (CMAI)		
		Ft	*Yrs*	*Cu ft/ac/yr*		
6500:						
Torment	Douglas-fir	89	50	114	F003XN927WA *Pseudotsuga menziesii-Pinus ponderosa/Paxistima myrsinites-Amelanchier alnifolia/Calamagrostis rubescens-Collomia linearis*	Myrtle pachistima (PAMY) Saskatoon serviceberry (AMAL2) Tall Oregongrape (MAAQ2) Shinyleaf spirea (SPBEL) Baldhip rose (ROGY) Pinegrass (CARU) Narrow-leaved collomia (COLI2) Western rattlesnake plantain (GOOB2)
	Ponderosa pine	---	---	---		
	Bigleaf maple	---	---	---		
	Grand fir	---	---	---		
6502:						
Mesahchie	Bigleaf maple	---	---	---	F003XN928WA *Acer macrophyllum-Prunus emarginata/Corylus cornuta var. californica-Acer circinatum/Maianthemum stellatum-Streptopus amplexifolius*	California hazelnut (COCOC) Vine maple (ACCI) Sitka willow (SASI2) Starry false Solomon's seal (MAST4) Claspleaf twistedstalk (STAM2) Broadleaf starflower (TRBOL)
	Bitter cherry	---	---	---		
	Douglas-fir	86	50	109		
	Ponderosa pine	97	100	97		
Inspiration	Bigleaf maple	---	---	---	F003XN928WA *Acer macrophyllum-Prunus emarginata/Corylus cornuta var. californica-Acer circinatum/Maianthemum stellatum-Streptopus amplexifolius*	California hazelnut (COCOC) Vine maple (ACCI) Sitka willow (SASI2) Starry false Solomon's seal (MAST4) Claspleaf twistedstalk (STAM2) Broadleaf starflower (TRBOL)
	Bitter cherry	---	---	---		
	Douglas-fir	90	50	116		
Lyall	Douglas-fir	108	50	150	F003XN927WA *Pseudotsuga menziesii-Pinus ponderosa/Paxistima myrsinites-Amelanchier alnifolia/Calamagrostis rubescens-Collomia linearis*	Myrtle pachistima (PAMY) Saskatoon serviceberry (AMAL2) Tall Oregongrape (MAAQ2) Shinyleaf spirea (SPBEL) Baldhip rose (ROGY) Pinegrass (CARU) Narrow-leaved collomia (COLI2) Western rattlesnake plantain (GOOB2)
	Ponderosa pine	---	---	---		
	Bigleaf maple	---	---	---		
	Grand fir	---	---	---		

Table 12.—Forestland Productivity, Ecological Site, and Understory Vegetation—Continued

Map symbol and soil name	Potential productivity				Ecological site number and name	Common understory vegetation
	Common trees	Site index	Site index base age	Volume of wood fiber (CMAI)		
		Ft	*Yrs*	*Cu ft/ac/yr*		
6505:						
Farway	Douglas-fir	93	50	122	F003XN927WA *Pseudotsuga menziesii-Pinus ponderosa/Paxistima myrsinites-Amelanchier alnifolia/Calamagrostis rubescens-Collomia linearis*	Myrtle pachistima (PAMY) Saskatoon serviceberry (AMAL2) Tall Oregongrape (MAAQ2) Shinyleaf spirea (SPBEL) Baldhip rose (ROGY) Pinegrass (CARU) Narrow-leaved collomia (COLI2) Western rattlesnake plantain (GOOB2)
	Ponderosa pine	---	---	---		
	Bigleaf maple	---	---	---		
	Grand fir	---	---	---		
	Lodgepole pine	77	100	83		
Lyall	Douglas-fir	108	50	150	F003XN927WA *Pseudotsuga menziesii-Pinus ponderosa/Paxistima myrsinites-Amelanchier alnifolia/Calamagrostis rubescens-Collomia linearis*	Myrtle pachistima (PAMY) Saskatoon serviceberry (AMAL2) Tall Oregongrape (MAAQ2) Shinyleaf spirea (SPBEL) Baldhip rose (ROGY) Pinegrass (CARU) Narrow-leaved collomia (COLI2) Western rattlesnake plantain (GOOB2)
	Ponderosa pine	---	---	---		
	Bigleaf maple	---	---	---		
	Grand fir	---	---	---		
Inspiration	Bigleaf maple	---	---	---	F003XN928WA *Acer macrophyllum-Prunus emarginata/Corylus cornuta var. californica-Acer circinatum/Maianthemum stellatum-Streptopus amplexifolius*	California hazelnut (COCOC) Vine maple (ACCI) Sitka willow (SASI2) Starry false Solomon's seal (MAST4) Claspleaf twistedstalk (STAM2) Broadleaf starflower (TRBOL)
	Bitter cherry	---	---	---		
	Douglas-fir	90	50	116		
7003:						
Damnation	Western hemlock	55	50	157	F003XN921WA *Tsuga heterophylla-Thuja plicata/Acer circinatum-Vaccinium parvifolium/Linnaea borealis-Polystichum munitum*	Vine maple (ACCI) Red huckleberry (VAPA) Cascade Oregongrape (MANE2) Twinflower (LIBO3) Western swordfern (POMU) Prince's pine (CHUM) Western rattlesnake plantain (GOOB2) Salal (GASH)
	Western redcedar	---	---	---		
	Douglas-fir	86	50	109		
	Paper birch	---	---	---		
	Grand fir	---	---	---		
	Bigleaf maple	---	---	---		

Table 12.—Forestland Productivity, Ecological Site, and Understory Vegetation—Continued

Map symbol and soil name	Potential productivity				Ecological site number and name	Common understory vegetation
	Common trees	Site index	Site index base age	Volume of wood fiber (CMAI)		
		Ft	*Yrs*	*Cu ft/ac/yr*		
7003:						
Ragged	Western hemlock	---	---	---	F003XN921WA *Tsuga heterophylla-Thuja plicata/Acer circinatum-Vaccinium parvifolium/Linnaea borealis-Polystichum munitum*	Vine maple (ACCI) Red huckleberry (VAPA) Cascade Oregongrape (MANE2) Twinflower (LIBO3) Western swordfern (POMU) Prince's pine (CHUM) Western rattlesnake plantain (GOOB2) Salal (GASH)
	Western redcedar	85	50	---		
	Douglas-fir	113	50	160		
	Paper birch	---	---	---		
	Grand fir	---	---	---		
	Bigleaf maple	---	---	---		
	Red alder	61	20	---		
	Red alder	92	50	104		
7015:						
Thorton	Western hemlock	82	50	199	F003XN921WA *Tsuga heterophylla-Thuja plicata/Acer circinatum-Vaccinium parvifolium/Linnaea borealis-Polystichum munitum*	Vine maple (ACCI) Red huckleberry (VAPA) Cascade Oregongrape (MANE2) Twinflower (LIBO3) Western swordfern (POMU) Prince's pine (CHUM) Western rattlesnake plantain (GOOB2) Salal (GASH)
	Western redcedar	66	50	---		
	Douglas-fir	83	50	103		
	Paper birch	---	---	---		
	Grand fir	---	---	---		
	Bigleaf maple	---	---	---		
	Lodgepole pine	92	100	112		
Ragged	Western hemlock	---	---	---	F003XN921WA *Tsuga heterophylla-Thuja plicata/Acer circinatum-Vaccinium parvifolium/Linnaea borealis-Polystichum munitum*	Vine maple (ACCI) Red huckleberry (VAPA) Cascade Oregongrape (MANE2) Twinflower (LIBO3) Western swordfern (POMU) Prince's pine (CHUM) Western rattlesnake plantain (GOOB2) Salal (GASH)
	Western redcedar	85	50	---		
	Douglas-fir	113	50	160		
	Paper birch	---	---	---		
	Grand fir	---	---	---		
	Bigleaf maple	---	---	---		
	Red alder	61	20	---		
	Red alder	92	50	104		
Damnation	Western hemlock	55	50	157	F003XN921WA *Tsuga heterophylla-Thuja plicata/Acer circinatum-Vaccinium parvifolium/Linnaea borealis-Polystichum munitum*	Vine maple (ACCI) Red huckleberry (VAPA) Cascade Oregongrape (MANE2) Twinflower (LIBO3) Western swordfern (POMU) Prince's pine (CHUM) Western rattlesnake plantain (GOOB2) Salal (GASH)
	Western redcedar	---	---	---		
	Douglas-fir	86	50	109		
	Paper birch	---	---	---		
	Grand fir	---	---	---		
	Bigleaf maple	---	---	---		

Table 12.—Forestland Productivity, Ecological Site, and Understory Vegetation—Continued

Map symbol and soil name	Potential productivity: Common trees	Site index	Site index base age	Volume of wood fiber (CMAI)	Ecological site number and name	Common understory vegetation
		Ft	*Yrs*	*Cu ft/ac/yr*		
7500:						
Inspiration	Bigleaf maple	---	---	---	F003XN928WA *Acer macrophyllum-Prunus emarginata/Corylus cornuta var. californica-Acer circinatum/Maianthemum stellatum-Streptopus amplexifolius*	California hazelnut (COCOC) Vine maple (ACCI) Sitka willow (SASI2) Starry false Solomon's seal (MAST4) Claspleaf twistedstalk (STAM2) Broadleaf starflower (TRBOL)
	Bitter cherry	---	---	---		
	Douglas-fir	90	50	116		
Mesahchie	Bigleaf maple	---	---	---	F003XN928WA *Acer macrophyllum-Prunus emarginata/Corylus cornuta var. californica-Acer circinatum/Maianthemum stellatum-Streptopus amplexifolius*	California hazelnut (COCOC) Vine maple (ACCI) Sitka willow (SASI2) Starry false Solomon's seal (MAST4) Claspleaf twistedstalk (STAM2) Broadleaf starflower (TRBOL)
	Bitter cherry	---	---	---		
	Douglas-fir	86	50	109		
	Ponderosa pine	97	100	97		
Sawtooth	Douglas-fir	105	100	91	F003XN927WA *Pseudotsuga menziesii-Pinus ponderosa/Paxistima myrsinites-Amelanchier alnifolia/Calamagrostis rubescens-Collomia linearis*	Myrtle pachistima (PAMY) Saskatoon serviceberry (AMAL2) Tall Oregongrape (MAAQ2) Shinyleaf spirea (SPBEL) Baldhip rose (ROGY) Pinegrass (CARU) Narrow-leaved collomia (COLI2) Western rattlesnake plantain (GOOB2)
	Ponderosa pine	76	100	63		
	Bigleaf maple	---	---	---		
	Grand fir	---	---	---		
7501:						
Despair	Douglas-fir	86	50	109	F003XN927WA *Pseudotsuga menziesii-Pinus ponderosa/Paxistima myrsinites-Amelanchier alnifolia/Calamagrostis rubescens-Collomia linearis*	Myrtle pachistima (PAMY) Saskatoon serviceberry (AMAL2) Tall Oregongrape (MAAQ2) Shinyleaf spirea (SPBEL) Baldhip rose (ROGY) Pinegrass (CARU) Narrow-leaved collomia (COLI2) Western rattlesnake plantain (GOOB2)
	Ponderosa pine	---	---	---		
	Bigleaf maple	---	---	---		
	Grand fir	---	---	---		

Table 12.—Forestland Productivity, Ecological Site, and Understory Vegetation—Continued

Map symbol and soil name	Potential productivity: Common trees	Site index	Site index base age	Volume of wood fiber (CMAI)	Ecological site number and name	Common understory vegetation
		Ft	*Yrs*	*Cu ft/ac/yr*		
7501:						
Goode	Douglas-fir	80	50	98	F003XN927WA *Pseudotsuga menziesii-Pinus ponderosa/Paxistima myrsinites-Amelanchier alnifolia/Calamagrostis rubescens-Collomia linearis*	Myrtle pachistima (PAMY) Saskatoon serviceberry (AMAL2) Tall Oregongrape (MAAQ2) Shinyleaf spirea (SPBEL) Baldhip rose (ROGY) Pinegrass (CARU) Narrow-leaved collomia (COLI2) Western rattlesnake plantain (GOOB2)
	Ponderosa pine	125	100	154		
	Bigleaf maple	---	---	---		
	Grand fir	---	---	---		
7502:						
Farway	Douglas-fir	93	50	122	F003XN927WA *Pseudotsuga menziesii-Pinus ponderosa/Paxistima myrsinites-Amelanchier alnifolia/Calamagrostis rubescens-Collomia linearis*	Myrtle pachistima (PAMY) Saskatoon serviceberry (AMAL2) Tall Oregongrape (MAAQ2) Shinyleaf spirea (SPBEL) Baldhip rose (ROGY) Pinegrass (CARU) Narrow-leaved collomia (COLI2) Western rattlesnake plantain (GOOB2)
	Ponderosa pine	---	---	---		
	Bigleaf maple	---	---	---		
	Grand fir	---	---	---		
	Lodgepole pine	77	100	83		
Sawtooth	Douglas-fir	105	100	91	F003XN927WA *Pseudotsuga menziesii-Pinus ponderosa/Paxistima myrsinites-Amelanchier alnifolia/Calamagrostis rubescens-Collomia linearis*	Myrtle pachistima (PAMY) Saskatoon serviceberry (AMAL2) Tall Oregongrape (MAAQ2) Shinyleaf spirea (SPBEL) Baldhip rose (ROGY) Pinegrass (CARU) Narrow-leaved collomia (COLI2) Western rattlesnake plantain (GOOB2)
	Ponderosa pine	76	100	63		
	Bigleaf maple	---	---	---		
	Grand fir	---	---	---		
Despair	Douglas-fir	86	50	109	F003XN927WA *Pseudotsuga menziesii-Pinus ponderosa/Paxistima myrsinites-Amelanchier alnifolia/Calamagrostis rubescens-Collomia linearis*	Myrtle pachistima (PAMY) Saskatoon serviceberry (AMAL2) Tall Oregongrape (MAAQ2) Shinyleaf spirea (SPBEL) Baldhip rose (ROGY) Pinegrass (CARU) Narrow-leaved collomia (COLI2) Western rattlesnake plantain (GOOB2)
	Ponderosa pine	---	---	---		
	Bigleaf maple	---	---	---		
	Grand fir	---	---	---		

Table 12.—Forestland Productivity, Ecological Site, and Understory Vegetation—Continued

Map symbol and soil name	Potential productivity				Ecological site number and name	Common understory vegetation
	Common trees	Site index	Site index base age	Volume of wood fiber (CMAI)		
		Ft	*Yrs*	*Cu ft/ac/yr*		
8006:						
Stetattle, deciduous	Sitka alder	---	---	---	F003XN926WA *Alnus viridis ssp. sinuata/Sambucus racemosa/Veratrum viride-Athyrium filix-femina*	Red elderberry (SARA2) Salmonberry (RUSP) Sitka mountain-ash (SOSIS2) Prickly currant (RILA) False hellebore (VEVI) Common ladyfern (ATFI) Fireweed (CHANA2) Sitka valerian (VASI)
	Subalpine fir	66	100	58		
Forbidden	Western hemlock	---	---	---	F003XN924WA *Abies amabilis-Tsuga heterophylla/Vaccinium membranaceum-Menziesia ferruginea/Gymnocarpium dryopteris-Clintonia uniflora*	Big huckleberry (VAME) Rusty menziesia (MEFE) Devilsclub (OPHO) Strawberryleaf raspberry (RUPE) Western oakfern (GYDR) Queencup bead lily (CLUN2) Fringecup (TEGR2) Common ladyfern (ATFI)
	Pacific silver fir	---	---	---		
	Western redcedar	---	---	---		
8007:						
Kimtah	Western hemlock	---	---	---	F003XN924WA *Abies amabilis-Tsuga heterophylla/Vaccinium membranaceum-Menziesia ferruginea/Gymnocarpium dryopteris-Clintonia uniflora*	Big huckleberry (VAME) Rusty menziesia (MEFE) Devilsclub (OPHO) Strawberryleaf raspberry (RUPE) Western oakfern (GYDR) Queencup bead lily (CLUN2) Fringecup (TEGR2) Common ladyfern (ATFI)
	Pacific silver fir	120	100	---		
	Western redcedar	---	---	---		
	Engelmann spruce	110	100	127		
Yawning	Western hemlock	---	---	---	F003XN924WA *Abies amabilis-Tsuga heterophylla/Vaccinium membranaceum-Menziesia ferruginea/Gymnocarpium dryopteris-Clintonia uniflora*	Big huckleberry (VAME) Rusty menziesia (MEFE) Devilsclub (OPHO) Strawberryleaf raspberry (RUPE) Western oakfern (GYDR) Queencup bead lily (CLUN2) Fringecup (TEGR2) Common ladyfern (ATFI)
	Pacific silver fir	78	100	---		
	Western redcedar	---	---	---		

Table 12.—Forestland Productivity, Ecological Site, and Understory Vegetation—Continued

Map symbol and soil name	Potential productivity				Ecological site number and name	Common understory vegetation
	Common trees	Site index	Site index base age	Volume of wood fiber (CMAI)		
		Ft	*Yrs*	*Cu ft/ac/yr*		
8009:						
Chilliwack, warm-----	Western hemlock-----	---	---	---	F003XN924WA *Abies amabilis-Tsuga heterophylla/Vaccinium membranaceum-Menziesia ferruginea/Gymnocarpium dryopteris-Clintonia uniflora*	Big huckleberry (VAME) Rusty menziesia (MEFE) Devilsclub (OPHO) Strawberryleaf raspberry (RUPE) Western oakfern (GYDR) Queencup bead lily (CLUN2) Fringecup (TEGR2) Common ladyfern (ATFI)
	Pacific silver fir--	71	100	---		
	Western redcedar----	---	---	---		
Perfect-----	Western hemlock-----	---	---	---	F003XN924WA *Abies amabilis-Tsuga heterophylla/Vaccinium membranaceum-Menziesia ferruginea/Gymnocarpium dryopteris-Clintonia uniflora*	Big huckleberry (VAME) Rusty menziesia (MEFE) Devilsclub (OPHO) Strawberryleaf raspberry (RUPE) Western oakfern (GYDR) Queencup bead lily (CLUN2) Fringecup (TEGR2) Common ladyfern (ATFI)
	Pacific silver fir--	103	100	---		
	Western redcedar----	---	---	---		
Terror-----	Western hemlock-----	---	---	---	F003XN924WA *Abies amabilis-Tsuga heterophylla/Vaccinium membranaceum-Menziesia ferruginea/Gymnocarpium dryopteris-Clintonia uniflora*	Big huckleberry (VAME) Rusty menziesia (MEFE) Devilsclub (OPHO) Strawberryleaf raspberry (RUPE) Western oakfern (GYDR) Queencup bead lily (CLUN2) Fringecup (TEGR2) Common ladyfern (ATFI)
	Pacific silver fir--	---	---	---		
	Western redcedar----	---	---	---		
8010:						
Perfect-----	Western hemlock-----	---	---	---	F003XN924WA *Abies amabilis-Tsuga heterophylla/Vaccinium membranaceum-Menziesia ferruginea/Gymnocarpium dryopteris-Clintonia uniflora*	Big huckleberry (VAME) Rusty menziesia (MEFE) Devilsclub (OPHO) Strawberryleaf raspberry (RUPE) Western oakfern (GYDR) Queencup bead lily (CLUN2) Fringecup (TEGR2) Common ladyfern (ATFI)
	Pacific silver fir--	103	100	---		
	Western redcedar----	---	---	---		

Table 12.—Forestland Productivity, Ecological Site, and Understory Vegetation—Continued

Map symbol and soil name	Potential productivity				Ecological site number and name	Common understory vegetation
	Common trees	Site index	Site index base age	Volume of wood fiber (CMAI)		
		Ft	*Yrs*	*Cu ft/ac/yr*		
8010:						
Spickard	Western hemlock	---	---	---	F003XN924WA *Abies amabilis-Tsuga heterophylla/Vaccinium membranaceum-Menziesia ferruginea/Gymnocarpium dryopteris-Clintonia uniflora*	Big huckleberry (VAME) Rusty menziesia (MEFE) Devilsclub (OPHO) Strawberryleaf raspberry (RUPE) Western oakfern (GYDR) Queencup bead lily (CLUN2) Fringecup (TEGR2) Common ladyfern (ATFI)
	Pacific silver fir	---	---	---		
	Western redcedar	---	---	---		
Stetattle, deciduous	Sitka alder	---	---	---	F003XN926WA *Alnus viridis ssp. sinuata/Sambucus racemosa/Veratrum viride-Athyrium filix-femina*	Red elderberry (SARA2) Salmonberry (RUSP) Sitka mountain-ash (SOSIS2) Prickly currant (RILA) False hellebore (VEVI) Common ladyfern (ATFI) Fireweed (CHANA2) Sitka valerian (VASI)
	Subalpine fir	66	100	58		
8011:						
Chilliwack	Mountain hemlock	---	---	---	F003XN925WA *Tsuga mertensiana-Abies lasiocarpa/Phyllodoce empetriformis-Vaccinium membranaceum/Valeriana sitchensis-Veratrum viride*	Pink mountain-heather (PHEM) Big huckleberry (VAME) Cascade huckleberry (VADE) Sitka mountain-ash (SOSIS2) Sitka valerian (VASI) False hellebore (VEVI)
	Subalpine fir	60	100	50		
	Pacific silver fir	61	100	---		
	Alaska yellow-cedar	---	---	---		
	Engelmann spruce	105	100	118		
Forbidden, cold	Mountain hemlock	---	---	---	F003XN925WA *Tsuga mertensiana-Abies lasiocarpa/Phyllodoce empetriformis-Vaccinium membranaceum/Valeriana sitchensis-Veratrum viride*	Pink mountain-heather (PHEM) Big huckleberry (VAME) Cascade huckleberry (VADE) Sitka mountain-ash (SOSIS2) Sitka valerian (VASI) False hellebore (VEVI)
	Subalpine fir	---	---	---		
	Pacific silver fir	---	---	---		
	Alaska yellow-cedar	---	---	---		
	Engelmann spruce	---	---	---		
Stetattle, deciduous	Sitka alder	---	---	---	F003XN926WA *Alnus viridis ssp. sinuata/Sambucus racemosa/Veratrum viride-Athyrium filix-femina*	Red elderberry (SARA2) Salmonberry (RUSP) Sitka mountain-ash (SOSIS2) Prickly currant (RILA) False hellebore (VEVI) Common ladyfern (ATFI) Fireweed (CHANA2) Sitka valerian (VASI)
	Subalpine fir	66	100	58		

Table 12.—Forestland Productivity, Ecological Site, and Understory Vegetation—Continued

Map symbol and soil name	Potential productivity				Ecological site number and name	Common understory vegetation
	Common trees	Site index	Site index base age	Volume of wood fiber (CMAI)		
		Ft	*Yrs*	*Cu ft/ac/yr*		
8014:						
Chilliwack, dry	Pacific silver fir	---	---	---	F003XN929WA *Abies amabilis-Picea engelmannii/Vaccinium membranaceum-Paxistima myrsinites/Clintonia uniflora-Orthilia secunda*	Big huckleberry (VAME) Myrtle pachistima (PAMY) Dwarf bramble (RULA2) Utah honeysuckle (LOUT2) Queencup bead lily (CLUN2) Sidebells wintergreen (ORSE) Threeleaf foamflower (TITR) Western rattlesnake plantain (GOOB2)
	Engelmann spruce	---	---	---		
	Subalpine fir	---	---	---		
	Douglas-fir	---	---	---		
	Western hemlock	---	---	---		
Tepeh	Pacific silver fir	---	---	---	F003XN929WA *Abies amabilis-Picea engelmannii/Vaccinium membranaceum-Paxistima myrsinites/Clintonia uniflora-Orthilia secunda*	Big huckleberry (VAME) Myrtle pachistima (PAMY) Dwarf bramble (RULA2) Utah honeysuckle (LOUT2) Queencup bead lily (CLUN2) Sidebells wintergreen (ORSE) Threeleaf foamflower (TITR) Western rattlesnake plantain (GOOB2)
	Engelmann spruce	---	---	---		
	Subalpine fir	---	---	---		
	Douglas-fir	---	---	---		
	Western hemlock	---	---	---		
Kimtah, dry	Western hemlock	---	---	---	F003XN929WA *Abies amabilis-Picea engelmannii/Vaccinium membranaceum-Paxistima myrsinites/Clintonia uniflora-Orthilia secunda*	Big huckleberry (VAME) Rusty menziesia (MEFE) Devilsclub (OPHO) Strawberryleaf raspberry (RUPE) Western oakfern (GYDR) Queencup bead lily (CLUN2) Fringecup (TEGR2) Common ladyfern (ATFI)
	Pacific silver fir	120	100	---		
	Western redcedar	---	---	---		
	Engelmann spruce	110	100	127		
8500:						
Primus	Subalpine fir	---	---	---	F003XN923WA *Abies lasiocarpa-Picea engelmannii/Rubus parviflorus-Paxistima myrsinites/Clintonia uniflora*	Thimbleberry (RUPA) Myrtle pachistima (PAMY) Big huckleberry (VAME) Queencup bead lily (CLUN2) Utah honeysuckle (LOUT2)
	Engelmann spruce	55	100	44		
	Douglas-fir	---	---	---		

Table 12.—Forestland Productivity, Ecological Site, and Understory Vegetation—Continued

Map symbol and soil name	Potential productivity				Ecological site number and name	Common understory vegetation
	Common trees	Site index	Site index base age	Volume of wood fiber (CMAI)		
		Ft	*Yrs*	*Cu ft/ac/yr*		
8500:						
Noca	Western hemlock	---	---	---	F003XN929WA *Abies amabilis-Picea engelmannii/Vaccinium membranaceum-Paxistima myrsinites/Clintonia uniflora-Orthilia secunda*	Big huckleberry (VAME) Rusty menziesia (MEFE) Devilsclub (OPHO) Strawberryleaf raspberry (RUPE) Western oakfern (GYDR) Queencup bead lily (CLUN2) Fringecup (TEGR2) Common ladyfern (ATFI)
	Pacific silver fir	46	100	---		
	Western redcedar	---	---	---		
Stehekin	Subalpine fir	---	---	---	F003XN923WA *Abies lasiocarpa-Picea engelmannii/Rubus parviflorus-Paxistima myrsinites/Clintonia uniflora*	Thimbleberry (RUPA) Myrtle pachistima (PAMY) Big huckleberry (VAME) Queencup bead lily (CLUN2) Utah honeysuckle (LOUT2)
	Engelmann spruce	---	---	---		
	Douglas-fir	---	---	---		
8501:						
Stehekin	Subalpine fir	---	---	---	F003XN923WA *Abies lasiocarpa-Picea engelmannii/Rubus parviflorus-Paxistima myrsinites/Clintonia uniflora*	Thimbleberry (RUPA) Myrtle pachistima (PAMY) Big huckleberry (VAME) Queencup bead lily (CLUN2) Utah honeysuckle (LOUT2)
	Engelmann spruce	---	---	---		
	Douglas-fir	---	---	---		
Primus	Subalpine fir	---	---	---	F003XN923WA *Abies lasiocarpa-Picea engelmannii/Rubus parviflorus-Paxistima myrsinites/Clintonia uniflora*	Thimbleberry (RUPA) Myrtle pachistima (PAMY) Big huckleberry (VAME) Queencup bead lily (CLUN2) Utah honeysuckle (LOUT2)
	Engelmann spruce	55	100	44		
	Douglas-fir	---	---	---		
9001:						
Noca	Pacific silver fir	---	---	---	F003XN929WA *Abies amabilis-Picea engelmannii/Vaccinium membranaceum-Paxistima myrsinites/Clintonia uniflora-Orthilia secunda*	Big huckleberry (VAME) Myrtle pachistima (PAMY) Dwarf bramble (RULA2) Utah honeysuckle (LOUT2) Queencup bead lily (CLUN2) Sidebells wintergreen (ORSE) Threeleaf foamflower (TITR) Western rattlesnake plantain (GOOB2)
	Engelmann spruce	109	100	125		
	Subalpine fir	---	---	---		
	Douglas-fir	---	---	---		
	Western hemlock	---	---	---		
	Lodgepole pine	93	100	114		

Table 12.—Forestland Productivity, Ecological Site, and Understory Vegetation—Continued

Map symbol and soil name	Potential productivity				Ecological site number and name	Common understory vegetation
	Common trees	Site index	Site index base age	Volume of wood fiber (CMAI)		
		Ft	*Yrs*	*Cu ft/ac/yr*		
9001:						
Perfect, dry	Pacific silver fir	---	---	---	F003XN929WA *Abies amabilis-Picea engelmannii/Vaccinium membranaceum-Paxistima myrsinites/Clintonia uniflora-Orthilia secunda*	Big huckleberry (VAME) Myrtle pachistima (PAMY) Dwarf bramble (RULA2) Utah honeysuckle (LOUT2) Queencup bead lily (CLUN2) Sidebells wintergreen (ORSE) Threeleaf foamflower (TITR) Western rattlesnake plantain (GOOB2)
	Engelmann spruce	---	---	---		
	Subalpine fir	---	---	---		
	Douglas-fir	---	---	---		
	Western hemlock	---	---	---		
9008:						
Mox	Mountain hemlock	---	---	---	F003XN925WA *Tsuga mertensiana-Abies lasiocarpa/Phyllodoce empetriformis-Vaccinium membranaceum/Valeriana sitchensis-Veratrum viride*	Pink mountain-heather (PHEM) Big huckleberry (VAME) Cascade huckleberry (VADE) Sitka mountain-ash (SOSIS2) Sitka valerian (VASI) False hellebore (VEVI)
	Subalpine fir	---	---	---		
	Pacific silver fir	---	---	---		
	Alaska yellow-cedar	---	---	---		
	Engelmann spruce	---	---	---		
Perfect, cold	Mountain hemlock	---	---	---	F003XN925WA *Tsuga mertensiana-Abies lasiocarpa/Phyllodoce empetriformis-Vaccinium membranaceum/Valeriana sitchensis-Veratrum viride*	Pink mountain-heather (PHEM) Big huckleberry (VAME) Cascade huckleberry (VADE) Sitka mountain-ash (SOSIS2) Sitka valerian (VASI) False hellebore (VEVI)
	Subalpine fir	---	---	---		
	Pacific silver fir	---	---	---		
	Alaska yellow-cedar	---	---	---		
	Engelmann spruce	---	---	---		
9012:						
Spickard	Western hemlock	---	---	---	F003XN924WA *Abies amabilis-Tsuga heterophylla/Vaccinium membranaceum-Menziesia ferruginea/Gymnocarpium dryopteris-Clintonia uniflora*	Big huckleberry (VAME) Rusty menziesia (MEFE) Devilsclub (OPHO) Strawberryleaf raspberry (RUPE) Western oakfern (GYDR) Queencup bead lily (CLUN2) Fringecup (TEGR2) Common ladyfern (ATFI)
	Pacific silver fir	---	---	---		
	Western redcedar	---	---	---		
Tepeh, moist	Western hemlock	86	50	206	F003XN924WA *Abies amabilis-Tsuga heterophylla/Vaccinium membranaceum-Menziesia ferruginea/Gymnocarpium dryopteris-Clintonia uniflora*	Big huckleberry (VAME) Rusty menziesia (MEFE) Devilsclub (OPHO) Strawberryleaf raspberry (RUPE) Western oakfern (GYDR) Queencup bead lily (CLUN2) Fringecup (TEGR2) Common ladyfern (ATFI)
	Pacific silver fir	82	100	---		
	Western redcedar	---	---	---		

Table 12.—Forestland Productivity, Ecological Site, and Understory Vegetation—Continued

Map symbol and soil name	Potential productivity				Ecological site number and name	Common understory vegetation
	Common trees	Site index	Site index base age	Volume of wood fiber (CMAI)		
		Ft	*Yrs*	*Cu ft/ac/yr*		
9012:						
Maggib	Mountain hemlock	---	---	---	F003XN925WA *Tsuga mertensiana-Abies lasiocarpa/Phyllodoce empetriformis-Vaccinium membranaceum/Valeriana sitchensis-Veratrum viride*	Pink mountain-heather (PHEM) Big huckleberry (VAME) Cascade huckleberry (VADE) Sitka mountain-ash (SOSIS2) Sitka valerian (VASI) False hellebore (VEVI)
	Subalpine fir	---	---	---		
	Pacific silver fir	---	---	---		
	Alaska yellow-cedar	---	---	---		
	Engelmann spruce	---	---	---		
9016:						
Perfect, cold	Mountain hemlock	---	---	---	F003XN925WA *Tsuga mertensiana-Abies lasiocarpa/Phyllodoce empetriformis-Vaccinium membranaceum/Valeriana sitchensis-Veratrum viride*	Pink mountain-heather (PHEM) Big huckleberry (VAME) Cascade huckleberry (VADE) Sitka mountain-ash (SOSIS2) Sitka valerian (VASI) False hellebore (VEVI)
	Subalpine fir	---	---	---		
	Pacific silver fir	---	---	---		
	Alaska yellow-cedar	---	---	---		
	Engelmann spruce	---	---	---		
9501:						
Stehekin	Subalpine fir	---	---	---	F003XN923WA *Abies lasiocarpa-Picea engelmannii/Rubus parviflorus-Paxistima myrsinites/Clintonia uniflora*	Thimbleberry (RUPA) Myrtle pachistima (PAMY) Big huckleberry (VAME) Queencup bead lily (CLUN2) Utah honeysuckle (LOUT2)
	Engelmann spruce	---	---	---		
	Douglas-fir	---	---	---		
Primus	Subalpine fir	---	---	---	F003XN923WA *Abies lasiocarpa-Picea engelmannii/Rubus parviflorus-Paxistima myrsinites/Clintonia uniflora*	Thimbleberry (RUPA) Myrtle pachistima (PAMY) Big huckleberry (VAME) Queencup bead lily (CLUN2) Utah honeysuckle (LOUT2)
	Engelmann spruce	55	100	44		
	Douglas-fir	---	---	---		
9997:						
Despair	Douglas-fir	86	50	109	F003XN927WA *Pseudotsuga menziesii-Pinus ponderosa/Paxistima myrsinites-Amelanchier alnifolia/Calamagrostis rubescens-Collomia linearis*	Myrtle pachistima (PAMY) Saskatoon serviceberry (AMAL2) Tall Oregongrape (MAAQ2) Shinyleaf spirea (SPBEL) Baldhip rose (ROGY) Pinegrass (CARU) Narrow-leaved collomia (COLI2) Western rattlesnake plantain (GOOB2)
	Ponderosa pine	---	---	---		
	Bigleaf maple	---	---	---		
	Grand fir	---	---	---		

Table 13.—Setting, Parent Material, and Ecological Site

(Miscellaneous land types are not shown in this table. Only the major components are shown; therefore, the map unit composition percentages do not equal 100 percent.)

Map unit symbol and soil name	Pct. of map unit	Slope	Elevation	Mean annual precipitation	Landscape	Landform	Parent material	Ecological site name and number
	Pct	*Pct*	*m*	*mm*				
6000:								
Manlywham	60	0-2	125-695	1,245-2,311	Valleys	Depressions, flood plains	Alluvium	Low Mountain Unforested Wetlands R003XN613WA
Nohokomeen	15	0-5	125-695	1,245-2,311	Valleys	Fan terraces on mountain slopes, debris aprons on mountain slopes, terraces	Volcanic ash and alluvium over glacial drift	*Populus balsamifera ssp. trichocarpa-Alnus rubra/Acer circinatum-Rubus spectabilis/Asarum caudatum-Athyrium filix-femina* F003XN920WA
Roland	15	0-5	125-695	1,245-2,311	Valleys	Fan terraces on mountain slopes, debris aprons on mountain slopes, terraces	Volcanic ash and alluvium over glacial drift	*Populus balsamifera ssp. trichocarpa-Alnus rubra/Acer circinatum-Rubus spectabilis/Asarum caudatum-Athyrium filix-femina* F003XN920WA
6009:								
Ragged, deciduous	50	15-65	120-1,420	1,143-2,565	Mountains	Debris cones on mountain slopes	Volcanic ash mixed with alluvium	*Acer circinatum/Ribes lacustre-Vaccinium parvifolium/Polystichum munitum-Pteridium aquilinum* F003XN922WA
Tricouni, deciduous	30	15-65	120-1,420	1,143-2,565	Mountains	Debris cones on mountain slopes	Volcanic ash mixed with alluvium	*Acer circinatum/Ribes lacustre-Vaccinium parvifolium/Polystichum munitum-Pteridium aquilinum* F003XN922WA

Table 13.—Setting, Parent Material, and Ecological Site—Continued

Map unit symbol and soil name	Pct. of map unit	Slope	Elevation	Mean annual precipitation	Landscape	Landform	Parent material	Ecological site name and number
	Pct	*Pct*	*m*	*mm*				
6009:								
Cosho	15	15-65	120-1,420	1,143-2,565	Mountains	Debris cones on mountain slopes	Volcanic ash over glacial drift	*Tsuga heterophylla-Thuja plicata/Acer circinatum-Vaccinium parvifolium/Linnaea borealis-Polystichum munitum* F003XN921WA
6010:								
Roland	40	0-25	105-865	1,143-2,565	Valleys	Fan terraces on mountain slopes, debris aprons on mountain slopes, terraces	Volcanic ash and alluvium over glacial drift	*Populus balsamifera ssp. trichocarpa-Alnus rubra/Acer circinatum-Rubus spectabilis/Asarum caudatum-Athyrium filix-femina* F003XN920WA
Skymo	25	0-25	105-865	1,143-2,565	Valleys	Debris cones on mountain slopes, terraces	Volcanic ash mixed with alluvium	*Tsuga heterophylla-Thuja plicata/Acer circinatum-Vaccinium parvifolium/Linnaea borealis-Polystichum munitum* F003XN921WA
Deerlick	20	0-15	105-865	1,143-2,565	Valleys	Alluvial fans, flood plains, terraces	Volcanic ash and alluvium over alluvium and glacial drift	*Tsuga heterophylla-Thuja plicata/Acer circinatum-Vaccinium parvifolium/Linnaea borealis-Polystichum munitum* F003XN921WA
6014:								
Thorton	40	15-65	110-1,535	889-2,565	Mountains	Debris aprons on mountain slopes	Volcanic ash over glacial drift	*Tsuga heterophylla-Thuja plicata/Acer circinatum-Vaccinium parvifolium/Linnaea borealis-Polystichum munitum* F003XN921WA

Table 13.—Setting, Parent Material, and Ecological Site—Continued

Map unit symbol and soil name	Pct. of map unit	Slope	Elevation	Mean annual precipi-tation	Landscape	Landform	Parent material	Ecological site name and number
	Pct	*Pct*	*m*	*mm*				
6014:								
Ragged	25	15-65	110-1,535	889-2,565	Mountains	Debris cones on mountain slopes	Volcanic ash mixed with alluvium	*Tsuga heterophylla-Thuja plicata/Acer circinatum-Vaccinium parvifolium/Linnaea borealis-Polystichum munitum* F003XN921WA
Ledeir	15	15-35	110-1,535	889-2,565	Mountains	Debris aprons on mountain slopes, valley walls of mountain slopes, terraces	Volcanic ash over alluvium	*Tsuga heterophylla-Thuja plicata/Acer circinatum-Vaccinium parvifolium/Linnaea borealis-Polystichum munitum* F003XN921WA
6015:								
Tricouni	50	5-50	105-1,490	991-2,464	Mountains	Debris cones on mountain slopes	Volcanic ash mixed with alluvium	*Tsuga heterophylla-Thuja plicata/Acer circinatum-Vaccinium parvifolium/Linnaea borealis-Polystichum munitum* F003XN921WA
Ragged	25	5-50	105-1,490	991-2,464	Mountains	Debris cones on mountain slopes	Volcanic ash mixed with alluvium	*Tsuga heterophylla-Thuja plicata/Acer circinatum-Vaccinium parvifolium/Linnaea borealis-Polystichum munitum* F003XN921WA
Easy	15	5-35	105-1,490	991-2,464	Mountains	Mountain slopes	Mixed volcanic ash over glacial drift	*Tsuga heterophylla-Thuja plicata/Acer circinatum-Vaccinium parvifolium/Linnaea borealis-Polystichum munitum* F003XN921WA

Table 13.—Setting, Parent Material, and Ecological Site—Continued

Map unit symbol and soil name	Pct. of map unit	Slope	Elevation	Mean annual precipitation	Landscape	Landform	Parent material	Ecological site name and number
	Pct	*Pct*	*m*	*mm*				
6500:								
Sandalee	40	0-15	335-980	635-1,448	River valleys	Flood plains, terraces	Alluvium	*Populus balsamifera ssp. trichocarpa-Alnus rubra/Acer circinatum-Rubus spectabilis/Asarum caudatum-Athyrium filix-femina* F003XN920WA
Kettling	25	0-15	335-980	635-1,448	Mountains	Debris aprons on mountain slopes	Volcanic ash and alluvium over glacial drift	*Pseudotsuga menziesii-Pinus ponderosa/Paxistima myrsinites-Amelanchier alnifolia/Calamagrostis rubescens-Collomia linearis* F003XN927WA
Torment	20	0-10	335-980	635-1,448	Mountains	Terraces	Minor amount of volcanic ash mixed with alluvium and glacial drift	*Pseudotsuga menziesii-Pinus ponderosa/Paxistima myrsinites-Amelanchier alnifolia/Calamagrostis rubescens-Collomia linearis* F003XN927WA
6502:								
Mesahchie	50	15-65	340-1,400	533-1,702	Mountains	Valley walls of mountain slopes, debris cones on mountain slopes	Volcanic ash mixed with glacial drift over glacial drift	*Acer macrophyllum-Prunus emarginata/Corylus cornuta var. californica-Acer circinatum/Maianthemum stellatum-Streptopus amplexifolius* F003XN928WA
Inspiration	25	15-65	340-1,400	533-1,702	Mountains	Debris aprons on mountain slopes	Volcanic ash over glacial drift	*Acer macrophyllum-Prunus emarginata/Corylus cornuta var. californica-Acer circinatum/Maianthemum stellatum-Streptopus amplexifolius* F003XN928WA

Table 13.—Setting, Parent Material, and Ecological Site—Continued

Map unit symbol and soil name	Pct. of map unit	Slope	Elevation	Mean annual precipi-tation	Landscape	Landform	Parent material	Ecological site name and number
	Pct	*Pct*	*m*	*mm*				
6502:								
Lyall	15	15-65	340-1,400	533-1,702	Mountains	Valley walls of mountain slopes	Minor amount of volcanic ash mixed with alluvium and glacial drift	*Pseudotsuga menziesii-Pinus ponderosa/Paxistima myrsinites-Amelanchier alnifolia/Calamagrostis rubescens-Collomia linearis* F003XN927WA
6505:								
Farway	50	5-65	335-1,045	483-1,702	Mountains	Debris aprons on mountain slopes	Volcanic ash over colluvium and reworked glacial drift	*Pseudotsuga menziesii-Pinus ponderosa/Paxistima myrsinites-Amelanchier alnifolia/Calamagrostis rubescens-Collomia linearis* F003XN927WA
Lyall	30	5-65	335-1,045	483-1,702	Mountains	Valley walls of mountain slopes	Minor amount of volcanic ash mixed with alluvium and glacial drift	*Pseudotsuga menziesii-Pinus ponderosa/Paxistima myrsinites-Amelanchier alnifolia/Calamagrostis rubescens-Collomia linearis* F003XN927WA
Inspiration	15	5-65	335-1,045	483-1,702	Mountains	Debris aprons on mountain slopes	Volcanic ash over glacial drift	*Acer macrophyllum-Prunus emarginata/Corylus cornuta var. californica-Acer circinatum/Maianthemum stellatum-Streptopus amplexifolius* F003XN928WA
7003:								
Damnation	50	35-100	155-1,800	1,143-2,515	Mountains	Bedrock benches on mountain slopes	Volcanic ash over glacial drift	*Tsuga heterophylla-Thuja plicata/Acer circinatum-Vaccinium parvifolium/Linnaea borealis-Polystichum munitum* F003XN921WA

Table 13.—Setting, Parent Material, and Ecological Site—Continued

Map unit symbol and soil name	Pct. of map unit	Slope	Elevation	Mean annual precipitation	Landscape	Landform	Parent material	Ecological site name and number
	Pct	*Pct*	*m*	*mm*				
7003:								
Ragged	25	35-100	155-1,800	1,143-2,515	Mountains	Valley walls of mountain slopes	Volcanic ash mixed with alluvium	*Tsuga heterophylla-Thuja plicata/Acer circinatum-Vaccinium parvifolium/Linnaea borealis-Polystichum munitum* F003XN921WA
7015:								
Thorton	40	35-100	110-1,685	1,016-2,515	Mountains	Valley walls of mountain slopes	Volcanic ash over glacial drift	*Tsuga heterophylla-Thuja plicata/Acer circinatum-Vaccinium parvifolium/Linnaea borealis-Polystichum munitum* F003XN921WA
Ragged	25	35-100	110-1,685	1,016-2,515	Mountains	Valley walls of mountain slopes	Volcanic ash mixed with alluvium	*Tsuga heterophylla-Thuja plicata/Acer circinatum-Vaccinium parvifolium/Linnaea borealis-Polystichum munitum* F003XN921WA
Damnation	15	35-100	110-1,685	1,016-2,515	Mountains	Bedrock benches on mountain slopes	Volcanic ash over glacial drift	*Tsuga heterophylla-Thuja plicata/Acer circinatum-Vaccinium parvifolium/Linnaea borealis-Polystichum munitum* F003XN921WA
7500:								
Inspiration	50	35-100	350-1,795	584-1,702	Mountains	Valley walls of mountain slopes, debris aprons on mountain slopes	Volcanic ash over glacial drift	*Acer macrophyllum-Prunus emarginata/Corylus cornuta var. californica-Acer circinatum/Maianthemum stellatum-Streptopus amplexifolius* F003XN928WA

Table 13.—Setting, Parent Material, and Ecological Site—Continued

Map unit symbol and soil name	Pct. of map unit	Slope	Elevation	Mean annual precipitation	Landscape	Landform	Parent material	Ecological site name and number
	Pct	*Pct*	*m*	*mm*				
7500:								
Mesahchie	25	35-100	350-1,795	584-1,702	Mountains	Valley walls of mountain slopes	Volcanic ash mixed with glacial drift over glacial drift	*Acer macrophyllum-Prunus emarginata/Corylus cornuta var. californica-Acer circinatum/Maianthemum stellatum-Streptopus amplexifolius* F003XN928WA
Sawtooth	15	35-100	350-1,795	584-1,702	Mountains	Valley walls of mountain slopes, bedrock benches on mountain slopes	Volcanic ash over glacial drift	*Pseudotsuga menziesii-Pinus ponderosa/Paxistima myrsinites-Amelanchier alnifolia/Calamagrostis rubescens-Collomia linearis* F003XN927WA
7501:								
Despair	40	35-100	270-2,060	483-2,159	Mountains	Bedrock benches on mountain slopes	Volcanic ash over glacial drift	*Pseudotsuga menziesii-Pinus ponderosa/Paxistima myrsinites-Amelanchier alnifolia/Calamagrostis rubescens-Collomia linearis* F003XN927WA
Goode	30	35-100	270-2,060	483-2,159	Mountains	Alluvial fans, valley walls of mountain slopes	Volcanic ash mixed with colluvium and glacial drift over glacial drift	*Pseudotsuga menziesii-Pinus ponderosa/Paxistima myrsinites-Amelanchier alnifolia/Calamagrostis rubescens-Collomia linearis* F003XN927WA
7502:								
Farway	50	35-100	335-1,900	483-2,210	Mountains	Valley walls of mountain slopes, debris aprons on mountain slopes	Volcanic ash over colluvium and reworked glacial drift	*Pseudotsuga menziesii-Pinus ponderosa/Paxistima myrsinites-Amelanchier alnifolia/Calamagrostis rubescens-Collomia linearis* F003XN927WA

Table 13.—Setting, Parent Material, and Ecological Site—Continued

Map unit symbol and soil name	Pct. of map unit	Slope	Elevation	Mean annual precipi-tation	Landscape	Landform	Parent material	Ecological site name and number
	Pct	*Pct*	*m*	*mm*				
7502:								
Sawtooth	25	35-100	335-1,900	483-2,210	Mountains	Valley walls of mountain slopes, bedrock benches on mountain slopes	Volcanic ash over glacial drift	*Pseudotsuga menziesii-Pinus ponderosa/Paxistima myrsinites-Amelanchier alnifolia/Calamagrostis rubescens-Collomia linearis* F003XN927WA
Despair	15	35-100	335-1,900	483-2,210	Mountains	Bedrock benches on mountain slopes	Volcanic ash over glacial drift	*Pseudotsuga menziesii-Pinus ponderosa/Paxistima myrsinites-Amelanchier alnifolia/Calamagrostis rubescens-Collomia linearis* F003XN927WA
8000:								
Beaverpass	40	0-5	545-1,745	1,397-2,616	Valleys	Depressions, flood plains, terraces	Highly decomposed plant material	High Mountain Unforested Wetlands R003XN603WA
Purple	30	0-15	545-1,745	1,397-2,616	Valleys	Depressions, flood plains	Highly decomposed plant material over alluvium	High Mountain Unforested Wetlands R003XN603WA
Bacon	15	0-15	545-1,745	1,397-2,616	Valleys	Depressions, flood plains, terraces	Alluvium	High Mountain Unforested Wetlands R003XN603WA
8006:								
Stetattle, deciduous	60	15-65	325-2,000	1,245-2,921	Mountains	Debris cones on mountain slopes	Volcanic ash mixed with glacial drift	*Alnus viridis ssp. sinuata/Sambucus racemosa/Veratrum viride-Athyrium filix-femina* F003XN926WA
Forbidden	15	15-65	325-2,000	1,245-2,921	Mountains	Valley walls of mountain slopes	Volcanic ash mixed with glacial drift over glacial drift	*Abies amabilis-Tsuga heterophylla/Vaccinium membranaceum-Menziesia ferruginea/Gymnocarpium dryopteris-Clintonia uniflora* F003XN924WA

Table 13.—Setting, Parent Material, and Ecological Site—Continued

Map unit symbol and soil name	Pct. of map unit	Slope	Elevation	Mean annual precipitation	Landscape	Landform	Parent material	Ecological site name and number
	Pct	*Pct*	*m*	*mm*				
8006:								
Triumph	15	15-65	325-2,000	1,245-2,921	Mountains	Debris aprons of mountain slopes	Minor amount of volcanic ash mixed with colluvium and residuum	Subalpine Parkland - Active Natural Soil Disturbance Complex R003XN512WA
8007:								
Kimtah	40	0-35	510-2,110	1,194-2,921	Mountains	Valley walls of mountain slopes	Mixed volcanic ash over colluvium and glacial drift	*Abies amabilis-Tsuga heterophylla/Vaccinium membranaceum-Menziesia ferruginea/Gymnocarpium dryopteris-Clintonia uniflora* F003XN924WA
Bacon	30	0-15	510-2,110	1,194-2,921	Valleys	Depressions, flood plains, terraces	Alluvium	High Mountain Unforested Wetlands R003XN603WA
Yawning	15	5-35	510-2,110	1,194-2,921	Mountains	Mountain slopes, terraces	Thin volcanic ash over glacial drift and colluvium	*Abies amabilis-Tsuga heterophylla/Vaccinium membranaceum-Menziesia ferruginea/Gymnocarpium dryopteris-Clintonia uniflora* F003XN924WA
8009:								
Chilliwack, warm	40	15-65	490-1,645	1,194-2,515	Mountains	Debris aprons on mountain slopes	Volcanic ash over glacial drift	*Abies amabilis-Tsuga heterophylla/Vaccinium membranaceum-Menziesia ferruginea/Gymnocarpium dryopteris-Clintonia uniflora* F003XN924WA
Perfect	30	15-65	490-1,645	1,194-2,515	Mountains	Valley walls of mountain slopes	Minor amount of volcanic ash mixed with colluvium and reworked glacial drift	*Abies amabilis-Tsuga heterophylla/Vaccinium membranaceum-Menziesia ferruginea/Gymnocarpium dryopteris-Clintonia uniflora* F003XN924WA

Table 13.—Setting, Parent Material, and Ecological Site—Continued

Map unit symbol and soil name	Pct. of map unit	Slope	Elevation	Mean annual precipitation	Landscape	Landform	Parent material	Ecological site name and number
	Pct	*Pct*	*m*	*mm*				
8009:								
Terror	15	15-35	490-1,645	1,194-2,515	Mountains	Valley walls of mountain slopes	Mixed volcanic ash over colluvium and glacial drift	*Abies amabilis-Tsuga heterophylla/Vaccinium membranaceum-Menziesia ferruginea/Gymnocarpium dryopteris-Clintonia uniflora* F003XN924WA
8010:								
Perfect	50	15-65	415-1,695	1,448-2,769	Mountains	Valley walls of mountain slopes	Minor amount of volcanic ash mixed with colluvium and reworked glacial drift	*Abies amabilis-Tsuga heterophylla/Vaccinium membranaceum-Menziesia ferruginea/Gymnocarpium dryopteris-Clintonia uniflora* F003XN924WA
Spickard	20	15-65	415-1,695	1,448-2,769	Mountains	Debris cones on mountain valleys	Volcanic ash over glacial drift	*Abies amabilis-Tsuga heterophylla/Vaccinium membranaceum-Menziesia ferruginea/Gymnocarpium dryopteris-Clintonia uniflora* F003XN924WA
Stetattle, deciduous	15	15-65	415-1,695	1,448-2,769	Mountains	Debris cones on mountain slopes	Volcanic ash mixed with glacial drift	*Alnus viridis ssp. sinuata/Sambucus racemosa/Veratrum viride-Athyrium filix-femina* F003XN926WA
8011:								
Chilliwack	50	15-65	715-2,155	1,346-2,769	Mountains	Debris aprons on mountain slopes	Volcanic ash over glacial drift	*Tsuga mertensiana-Abies lasiocarpa/Phyllodoce empetriformis-Vaccinium membranaceum/Valeriana sitchensis-Veratrum viride* F003XN925WA
Forbidden, cold	30	15-65	715-2,155	1,346-2,769	Mountains	Valley walls of mountain slopes	Volcanic ash mixed with glacial drift over glacial drift	*Tsuga mertensiana-Abies lasiocarpa/Phyllodoce empetriformis-Vaccinium membranaceum/Valeriana sitchensis-Veratrum viride* F003XN925WA

Table 13.—Setting, Parent Material, and Ecological Site—Continued

Map unit symbol and soil name	Pct. of map unit	Slope	Elevation	Mean annual precipitation	Landscape	Landform	Parent material	Ecological site name and number
	Pct	*Pct*	*m*	*mm*				
8011:								
Stetattle, deciduous	15	15-65	715-2,155	1,346-2,769	Mountains	Debris cones on mountain slopes	Volcanic ash mixed with glacial drift	*Alnus viridis ssp. sinuata/Sambucus racemosa/Veratrum viride-Athyrium filix-femina* F003XN926WA
8014:								
Chilliwack, dry	40	15-65	680-2,160	1,143-1,803	Mountains	Debris aprons on mountain slopes	Volcanic ash over glacial drift	*Abies amabilis-Picea engelmannii/Vaccinium membranaceum-Paxistima myrsinites/Clintonia uniflora-Orthilia secunda* F003XN929WA
Tepeh	30	15-65	680-2,160	1,143-1,803	Mountains	Debris aprons on mountain slopes	Volcanic ash over glacial drift	*Abies amabilis-Picea engelmannii/Vaccinium membranaceum-Paxistima myrsinites/Clintonia uniflora-Orthilia secunda* F003XN929WA
Kimtah, dry	15	15-35	680-2,160	1,143-1,803	Mountains	Valley walls of mountain slopes	Mixed volcanic ash over colluvium and glacial drift	*Abies amabilis-Picea engelmannii/Vaccinium membranaceum-Paxistima myrsinites/Clintonia uniflora-Orthilia secunda* F003XN929WA
8500:								
Primus	50	15-65	535-1,750	838-1,803	Mountains	Debris cones on mountain valleys, fan terraces on mountain valleys	Volcanic ash mixed with glacial drift over glacial drift	*Abies lasiocarpa-Picea engelmannii/Rubus parviflorus-Paxistima myrsinites/Clintonia uniflora* F003XN923WA

Table 13.—Setting, Parent Material, and Ecological Site—Continued

Map unit symbol and soil name	Pct. of map unit	Slope	Elevation	Mean annual precipitation	Landscape	Landform	Parent material	Ecological site name and number
	Pct	*Pct*	*m*	*mm*				
8500:								
Noca	20	15-65	535-1,750	838-1,803	Mountains	Debris aprons on mountain slopes, valley walls of mountain slopes	Volcanic ash over glacial drift	*Abies amabilis-Picea engelmannii/Vaccinium membranaceum-Paxistima myrsinites/Clintonia uniflora-Orthilia secunda* F003XN929WA
Stehekin	20	15-65	535-1,750	838-1,803	Mountains	Debris cones and aprons on mountain slopes, valley walls of mountain slopes	Mixed volcanic ash over colluvium and glacial drift	*Abies lasiocarpa-Picea engelmannii/Rubus parviflorus-Paxistima myrsinites/Clintonia uniflora* F003XN923WA
8501:								
Stehekin	50	15-65	595-1,835	889-1,753	Mountains	Debris cones and aprons on mountains slopes, valley walls of mountain slopes	Mixed volcanic ash over colluvium and glacial drift	*Abies lasiocarpa-Picea engelmannii/Rubus parviflorus-Paxistima myrsinites/Clintonia uniflora* F003XN923WA
Primus	30	15-65	595-1,835	889-1,753	Mountains	Fan terraces on mountain valleys	Volcanic ash mixed with glacial drift over glacial drift	*Abies lasiocarpa-Picea engelmannii/Rubus parviflorus-Paxistima myrsinites/Clintonia uniflora* F003XN923WA
9001:								
Noca	40	35-100	620-2,145	940-2,159	Mountains	Valley walls of mountain slopes	Volcanic ash over glacial drift	*Abies amabilis-Picea engelmannii/Vaccinium membranaceum-Paxistima myrsinites/Clintonia uniflora-Orthilia secunda* F003XN929WA
Perfect, dry	30	35-100	620-2,145	940-2,159	Mountains	Valley walls of mountain slopes	Minor amount of volcanic ash mixed with colluvium and reworked glacial drift	*Abies amabilis-Picea engelmannii/Vaccinium membranaceum-Paxistima myrsinites/Clintonia uniflora-Orthilia secunda* F003XN929WA

Table 13.—Setting, Parent Material, and Ecological Site—Continued

Map unit symbol and soil name	Pct. of map unit	Slope	Elevation	Mean annual precipi-tation	Landscape	Landform	Parent material	Ecological site name and number
	Pct	*Pct*	*m*	*mm*				
9003:								
Stetattle	30	35-100	450-2,270	940-2,870	Mountains	Valley walls and ridges on mountain slopes	Volcanic ash mixed with glacial drift	Subalpine Parkland - Active Natural Soil Disturbance Complex R003XN512WA
Doubtful	25	35-100	450-2,270	940-2,870	Mountains	Bedrock benches on mountain slopes, valley walls of mountain slopes, ridges	Volcanic ash over glacial drift	Subalpine Parkland - Minor Natural Soil Disturbance Complex R003XN502WA
Arriva	20	15-65	450-2,270	940-2,870	Mountains	Valley walls of mountain slopes	Volcanic ash over glacial drift	Subalpine Parkland - Minor Natural Soil Disturbance Complex R003XN502WA
9008:								
Mox	30	35-100	485-2,085	991-2,870	Mountains	Valley walls of mountain slopes, debris aprons on mountain slopes	Volcanic ash over glacial drift	*Tsuga mertensiana-Abies lasiocarpa/Phyllodoce empetriformis-Vaccinium membranaceum/Valeriana sitchensis-Veratrum viride* F003XN925WA
Doubtful	20	35-100	485-2,085	991-2,870	Mountains	Bedrock benches on mountain slopes, valley walls of mountain slopes, ridges	Volcanic ash over glacial drift	Subalpine Parkland - Minor Natural Soil Disturbance Complex R003XN502WA
Perfect, cold	15	35-100	485-2,085	991-2,870	Mountains	Valley walls of mountain slopes	Minor amount of volcanic ash mixed with colluvium and reworked glacial drift	*Tsuga mertensiana-Abies lasiocarpa/Phyllodoce empetriformis-Vaccinium membranaceum/Valeriana sitchensis-Veratrum viride* F003XN925WA

Table 13.—Setting, Parent Material, and Ecological Site—Continued

Map unit symbol and soil name	Pct. of map unit	Slope	Elevation	Mean annual precipitation	Landscape	Landform	Parent material	Ecological site name and number
	Pct	*Pct*	*m*	*mm*				
9010:								
Doubtful	30	35-100	410-2,355	838-2,870	Mountains	Bedrock benches on mountain slopes, valley walls of mountain slopes, ridges	Volcanic ash over glacial drift	Subalpine Parkland - Minor Natural Soil Disturbance Complex R003XN502WA
Treen	25	35-100	410-2,355	838-2,870	Mountains	Valley walls and ridges on mountain slopes	Volcanic ash and colluvium	Subalpine Parkland - Active Natural Soil Disturbance Complex R003XN512WA
9012:								
Spickard	40	35-100	265-1,975	1,245-2,718	Mountains	Valley walls of mountain slopes	Volcanic ash over glacial drift	*Abies amabilis-Tsuga heterophylla/Vaccinium membranaceum-Menziesia ferruginea/Gymnocarpium dryopteris-Clintonia uniflora* F003XN924WA
Tepeh, moist	25	35-100	265-1,975	1,245-2,718	Mountains	Valley walls of mountain slopes	Volcanic ash over glacial drift	*Abies amabilis-Tsuga heterophylla/Vaccinium membranaceum-Menziesia ferruginea/Gymnocarpium dryopteris-Clintonia uniflora* F003XN924WA
Maggib	15	15-65	265-1,975	1,245-2,718	Mountains	Valley walls of mountain slopes	Volcanic ash over glacial drift	*Tsuga mertensiana-Abies lasiocarpa/Phyllodoce empetriformis-Vaccinium membranaceum/Valeriana sitchensis-Veratrum viride* F003XN925WA
9016:								
Doubtful	30	35-100	385-2,275	838-2,819	Mountains	Bedrock benches on mountain slopes, valley walls of mountain slopes, ridges	Volcanic ash over glacial drift	Subalpine Parkland - Minor Natural Soil Disturbance Complex R003XN502WA

Table 13.—Setting, Parent Material, and Ecological Site—Continued

Map unit symbol and soil name	Pct. of map unit	Slope	Elevation	Mean annual precipi-tation	Landscape	Landform	Parent material	Ecological site name and number
	Pct	*Pct*	*m*	*mm*				
9016:								
Triumph	20	35-100	385-2,275	838-2,819	Mountains	Valley walls of mountain slopes	Minor amount of volcanic ash mixed with colluvium and residuum	Subalpine Parkland - Active Natural Soil Disturbance Complex R003XN512WA
Perfect, cold	15	35-100	385-2,275	838-2,819	Mountains	Valley walls of mountain slopes	Minor amount of volcanic ash mixed with colluvium and reworked glacial drift	*Tsuga mertensiana-Abies lasiocarpa/Phyllodoce empetriformis-Vaccinium membranaceum/Valeriana sitchensis-Veratrum viride* F003XN925WA
9501:								
Stehekin	40	35-100	530-2,210	686-1,803	Mountains	Debris aprons on mountain slopes, valley walls of mountain slopes	Mixed volcanic ash over colluvium and glacial drift	*Abies lasiocarpa-Picea engelmannii/Rubus parviflorus-Paxistima myrsinites/Clintonia uniflora* F003XN923WA
Primus	25	35-100	530-2,210	686-1,803	Mountains	Valley walls of mountain slopes, debris aprons on mountain valleys	Volcanic ash mixed with glacial drift over glacial drift	*Abies lasiocarpa-Picea engelmannii/Rubus parviflorus-Paxistima myrsinites/Clintonia uniflora* F003XN923WA
Stetattle	15	35-100	530-2,210	686-1,803	Mountains	Valley walls and ridges on mountain slopes	Volcanic ash mixed with glacial drift	Subalpine Parkland - Active Natural Soil Disturbance Complex R003XN512WA
9997:								
Despair	15	35-100	260-2,710	483-2,565	Mountains	Mountain slopes	Volcanic ash over glacial drift	*Pseudotsuga menziesii-Pinus ponderosa/Paxistima myrsinites-Amelanchier alnifolia/Calamagrostis rubescens-Collomia linearis* F003XN927WA

Table 13.—Setting, Parent Material, and Ecological Site—Continued

Map unit symbol and soil name	Pct. of map unit	Slope	Elevation	Mean annual precipi-tation	Landscape	Landform	Parent material	Ecological site name and number
	Pct	*Pct*	*m*	*mm*				
9998: Harlequin	15	25-100	505-2,810	1,245-3,937	Mountains	Cirques, mountain slopes	Colluvium and glacial drift over residuum	Subalpine Parkland - Active Natural Soil Disturbance Complex R003XN512WA

Table 14.—Planting and Soil Rutting Hazard

(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		Soil rutting hazard	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
6000:							
Manlywham	60	Moderately suited Wetness	 0.50	Moderately suited Wetness Rock fragments	 0.50 0.50	Moderate Low strength Wetness	 0.50 0.50
Nohokomeen	15	Well suited		Well suited		Moderate Low strength	 0.50
Roland	15	Well suited		Well suited		Severe Low strength	 1.00
6009:							
Ragged, deciduous	50	Moderately suited Rock fragments Slope	 0.50 0.50	Unsuited Slope Rock fragments	 1.00 0.75	Moderate Low strength	 0.50
Tricouni, deciduous	30	Moderately suited Rock fragments Slope	 0.50 0.50	Unsuited Slope Rock fragments	 1.00 0.75	Slight Strength	 0.10
Cosho	15	Poorly suited Rock fragments Slope	 0.75 0.50	Unsuited Slope Rock fragments	 1.00 1.00	Slight Strength	 0.10
6010:							
Roland	40	Well suited		Moderately suited Slope	 0.50	Severe Low strength	 1.00
Skymo	25	Moderately suited Sandiness	 0.50	Moderately suited Slope Rock fragments Sandiness	 0.50 0.50 0.50	Moderate Low strength	 0.50
Deerlick	20	Moderately suited Rock fragments	 0.50	Poorly suited Rock fragments	 0.75	Severe Low strength	 1.00
6014:							
Thorton	40	Moderately suited Rock fragments Slope	 0.50 0.50	Unsuited Slope Rock fragments	 1.00 0.75	Slight Strength	 0.10
Ragged	25	Moderately suited Rock fragments Slope	 0.50 0.50	Unsuited Slope Rock fragments	 1.00 0.75	Moderate Low strength	 0.50
Ledeir	15	Moderately suited Slope Rock fragments	 0.50 0.50	Unsuited Slope Rock fragments	 1.00 0.75	Severe Low strength	 1.00
6015:							
Tricouni	50	Moderately suited Rock fragments	 0.50	Poorly suited Slope Rock fragments	 0.75 0.75	Slight Strength	 0.10

Table 14.—Planting and Soil Rutting Hazard—Continued

Map symbol and soil name	Pct. of map unit	Suitability for hand planting		Suitability for mechanical planting		Soil rutting hazard	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
6015:							
Ragged	25	Moderately suited Rock fragments	 0.50	Poorly suited Slope Rock fragments	 0.75 0.75	Moderate Low strength	 0.50
Easy	15	Moderately suited Rock fragments	 0.50	Poorly suited Rock fragments Slope	 0.75 0.50	Moderate Low strength	 0.50
6500:							
Sandalee	40	Well suited		Moderately suited Slope	 0.50	Moderate Low strength	 0.50
Kettling	25	Well suited		Moderately suited Slope	 0.50	Moderate Low strength	 0.50
Torment	20	Moderately suited Rock fragments	 0.50	Poorly suited Rock fragments Slope	 0.75 0.50	Moderate Low strength	 0.50
6502:							
Mesahchie	50	Moderately suited Slope Rock fragments	 0.50 0.50	Unsuited Slope Rock fragments	 1.00 0.75	Moderate Low strength	 0.50
Inspiration	25	Poorly suited Rock fragments Slope	 0.75 0.50	Unsuited Slope Rock fragments	 1.00 1.00	Slight Strength	 0.10
Lyall	15	Moderately suited Rock fragments Slope	 0.50 0.50	Unsuited Slope Rock fragments	 1.00 0.75	Moderate Low strength	 0.50
6505:							
Farway	50	Moderately suited Slope Rock fragments	 0.50 0.50	Unsuited Slope Rock fragments	 1.00 0.75	Moderate Low strength	 0.50
Lyall	30	Moderately suited Rock fragments Slope	 0.50 0.50	Unsuited Slope Rock fragments	 1.00 0.75	Moderate Low strength	 0.50
Inspiration	15	Poorly suited Rock fragments Slope	 0.75 0.50	Unsuited Slope Rock fragments	 1.00 1.00	Slight Strength	 0.10
7003:							
Damnation	50	Poorly suited Rock fragments Slope	 0.75 0.50	Unsuited Slope Rock fragments	 1.00 1.00	Moderate Low strength	 0.50
Ragged	25	Moderately suited Slope Rock fragments	 0.50 0.50	Unsuited Slope Rock fragments	 1.00 0.75	Moderate Low strength	 0.50
Rock outcrop	15	Not rated		Not rated		Not rated	

Table 14.—Planting and Soil Rutting Hazard—Continued

Map symbol and soil name	Pct. of map unit	Suitability for hand planting		Suitability for mechanical planting		Soil rutting hazard	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
7015:							
Thorton	40	Moderately suited		Unsuited		Slight	
		Slope	0.50	Slope	1.00	Strength	0.10
		Rock fragments	0.50	Rock fragments	0.75		
Ragged	25	Moderately suited		Unsuited		Moderate	
		Slope	0.50	Slope	1.00	Low strength	0.50
		Rock fragments	0.50	Rock fragments	0.75		
Damnation	15	Poorly suited		Unsuited		Moderate	
		Rock fragments	0.75	Slope	1.00	Low strength	0.50
		Slope	0.50	Rock fragments	1.00		
7500:							
Inspiration	50	Poorly suited		Unsuited		Slight	
		Rock fragments	0.75	Slope	1.00	Strength	0.10
		Slope	0.50	Rock fragments	1.00		
Mesahchie	25	Moderately suited		Unsuited		Moderate	
		Slope	0.50	Slope	1.00	Low strength	0.50
		Rock fragments	0.50	Rock fragments	0.75		
Sawtooth	15	Poorly suited		Unsuited		Slight	
		Rock fragments	0.75	Slope	1.00	Strength	0.10
		Slope	0.50	Rock fragments	1.00		
		Sandiness	0.50	Sandiness	0.50		
7501:							
Despair	40	Poorly suited		Unsuited		Moderate	
		Rock fragments	0.75	Slope	1.00	Low strength	0.50
		Slope	0.50	Rock fragments	1.00		
Goode	30	Poorly suited		Unsuited		Moderate	
		Rock fragments	0.75	Slope	1.00	Low strength	0.50
		Slope	0.50	Rock fragments	1.00		
Rock outcrop	15	Not rated		Not rated		Not rated	
7502:							
Farway	50	Moderately suited		Unsuited		Moderate	
		Slope	0.50	Slope	1.00	Low strength	0.50
		Rock fragments	0.50	Rock fragments	0.75		
Sawtooth	25	Poorly suited		Unsuited		Slight	
		Rock fragments	0.75	Slope	1.00	Strength	0.10
		Slope	0.50	Rock fragments	1.00		
		Sandiness	0.50	Sandiness	0.50		
Despair	15	Poorly suited		Unsuited		Moderate	
		Rock fragments	0.75	Slope	1.00	Low strength	0.50
		Slope	0.50	Rock fragments	1.00		
8000:							
Beaverpass	40	Moderately suited		Moderately suited		Severe	
		Sandiness	0.50	Sandiness	0.50	Low strength	1.00
				Rock fragments	0.50		
Purple	30	Well suited		Moderately suited		Severe	
				Slope	0.50	Low strength	1.00

Table 14.—Planting and Soil Rutting Hazard—Continued

Map symbol and soil name	Pct. of map unit	Suitability for hand planting		Suitability for mechanical planting		Soil rutting hazard	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
8000:							
Bacon	15	Moderately suited		Moderately suited		Moderate	
		Wetness	0.50	Wetness	0.50	Low strength	0.50
				Slope	0.50	Wetness	0.50
8006:							
Stetattle, deciduous	60	Moderately suited		Unsuited		Slight	
		Rock fragments	0.50	Slope	1.00	Strength	0.10
		Slope	0.50	Rock fragments	1.00		
Forbidden	15	Moderately suited		Unsuited		Severe	
		Slope	0.50	Slope	1.00	Low strength	1.00
		Rock fragments	0.50	Rock fragments	0.75		
Triumph	15	Unsuited		Unsuited		Moderate	
		Rock fragments	1.00	Rock fragments	1.00	Low strength	0.50
		Slope	0.50	Slope	1.00		
8007:							
Kimtah	40	Well suited		Moderately suited		Severe	
				Slope	0.50	Low strength	1.00
				Rock fragments	0.50		
Bacon	30	Moderately suited		Moderately suited		Moderate	
		Wetness	0.50	Wetness	0.50	Low strength	0.50
				Slope	0.50	Wetness	0.50
Yawning	15	Moderately suited		Unsuited		Severe	
		Rock fragments	0.50	Rock fragments	1.00	Low strength	1.00
				Slope	0.50		
8009:							
Chilliwack, warm	40	Moderately suited		Unsuited		Moderate	
		Rock fragments	0.50	Slope	1.00	Low strength	0.50
		Slope	0.50	Rock fragments	0.75		
Perfect	30	Moderately suited		Unsuited		Moderate	
		Rock fragments	0.50	Slope	1.00	Low strength	0.50
		Slope	0.50	Rock fragments	0.75		
Terror	15	Moderately suited		Poorly suited		Moderate	
		Rock fragments	0.50	Slope	0.75	Low strength	0.50
				Rock fragments	0.75		
8010:							
Perfect	50	Moderately suited		Unsuited		Moderate	
		Rock fragments	0.50	Slope	1.00	Low strength	0.50
		Slope	0.50	Rock fragments	0.75		
Spickard	20	Moderately suited		Unsuited		Severe	
		Slope	0.50	Slope	1.00	Low strength	1.00
		Rock fragments	0.50	Rock fragments	0.75		
Stetattle, deciduous	15	Moderately suited		Unsuited		Slight	
		Rock fragments	0.50	Slope	1.00	Strength	0.10
		Slope	0.50	Rock fragments	1.00		
8011:							
Chilliwack	50	Moderately suited		Unsuited		Moderate	
		Rock fragments	0.50	Slope	1.00	Low strength	0.50
		Slope	0.50	Rock fragments	0.75		

Table 14.—Planting and Soil Rutting Hazard—Continued

Map symbol and soil name	Pct. of map unit	Suitability for hand planting		Suitability for mechanical planting		Soil rutting hazard	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
8011:							
Forbidden, cold	30	Moderately suited		Unsuited		Severe	
		Slope	0.50	Slope	1.00	Low strength	1.00
		Rock fragments	0.50	Rock fragments	0.75		
Stetattle, deciduous	15	Moderately suited		Unsuited		Slight	
		Rock fragments	0.50	Slope	1.00	Strength	0.10
		Slope	0.50	Rock fragments	1.00		
8014:							
Chilliwack, dry	40	Moderately suited		Unsuited		Moderate	
		Rock fragments	0.50	Slope	1.00	Low strength	0.50
		Slope	0.50	Rock fragments	0.75		
Tepeh	30	Moderately suited		Unsuited		Slight	
		Slope	0.50	Slope	1.00	Strength	0.10
		Rock fragments	0.50	Rock fragments	0.75		
Kimtah, dry	15	Well suited		Poorly suited		Severe	
				Slope	0.75	Low strength	1.00
				Rock fragments	0.50		
8500:							
Primus	50	Poorly suited		Unsuited		Slight	
		Rock fragments	0.75	Rock fragments	1.00	Strength	0.10
		Slope	0.50	Slope	1.00		
Noca	20	Moderately suited		Unsuited		Slight	
		Rock fragments	0.50	Slope	1.00	Strength	0.10
		Slope	0.50	Rock fragments	0.75		
Stehekin	20	Moderately suited		Poorly suited		Moderate	
		Rock fragments	0.50	Slope	0.75	Low strength	0.50
				Rock fragments	0.75		
8501:							
Stehekin	50	Moderately suited		Unsuited		Moderate	
		Slope	0.50	Slope	1.00	Low strength	0.50
		Rock fragments	0.50	Rock fragments	0.75		
Primus	30	Poorly suited		Unsuited		Slight	
		Rock fragments	0.75	Rock fragments	1.00	Strength	0.10
		Slope	0.50	Slope	1.00		
9001:							
Noca	40	Moderately suited		Unsuited		Slight	
		Slope	0.50	Slope	1.00	Strength	0.10
		Rock fragments	0.50	Rock fragments	0.75		
Perfect, dry	30	Moderately suited		Unsuited		Moderate	
		Slope	0.50	Slope	1.00	Low strength	0.50
		Rock fragments	0.50	Rock fragments	0.75		
9003:							
Stetattle	30	Moderately suited		Unsuited		Slight	
		Slope	0.50	Slope	1.00	Strength	0.10
		Rock fragments	0.50	Rock fragments	1.00		
Doubtful	25	Moderately suited		Unsuited		Moderate	
		Slope	0.50	Slope	1.00	Low strength	0.50
		Rock fragments	0.50	Rock fragments	0.75		

Table 14.—Planting and Soil Rutting Hazard—Continued

Map symbol and soil name	Pct. of map unit	Suitability for hand planting		Suitability for mechanical planting		Soil rutting hazard	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
9003:							
Arriva	20	Poorly suited		Unsuited		Severe	
		Rock fragments	0.75	Rock fragments	1.00	Low strength	1.00
				Slope	0.75		
9008:							
Mox	30	Moderately suited		Unsuited		Severe	
		Slope	0.50	Slope	1.00	Low strength	1.00
		Rock fragments	0.50	Rock fragments	0.75		
Doubtful	20	Moderately suited		Unsuited		Moderate	
		Slope	0.50	Slope	1.00	Low strength	0.50
		Rock fragments	0.50	Rock fragments	0.75		
Perfect, cold	15	Moderately suited		Unsuited		Moderate	
		Slope	0.50	Slope	1.00	Low strength	0.50
		Rock fragments	0.50	Rock fragments	0.75		
9010:							
Doubtful	30	Moderately suited		Unsuited		Moderate	
		Slope	0.50	Slope	1.00	Low strength	0.50
		Rock fragments	0.50	Rock fragments	0.75		
Treen	25	Moderately suited		Unsuited		Severe	
		Slope	0.50	Slope	1.00	Low strength	1.00
		Rock fragments	0.50	Rock fragments	0.75		
Rock outcrop	15	Not rated		Not rated		Not rated	
9012:							
Spickard	40	Moderately suited		Unsuited		Severe	
		Slope	0.50	Slope	1.00	Low strength	1.00
		Rock fragments	0.50	Rock fragments	0.75		
Tepeh, moist	25	Moderately suited		Unsuited		Slight	
		Slope	0.50	Slope	1.00	Strength	0.10
		Rock fragments	0.50	Rock fragments	0.75		
Maggib	15	Poorly suited		Unsuited		Slight	
		Rock fragments	0.75	Slope	1.00	Strength	0.10
		Slope	0.50	Rock fragments	1.00		
9016:							
Doubtful	30	Moderately suited		Unsuited		Moderate	
		Slope	0.50	Slope	1.00	Low strength	0.50
		Rock fragments	0.50	Rock fragments	0.75		
Triumph	20	Unsuited		Unsuited		Moderate	
		Rock fragments	1.00	Slope	1.00	Low strength	0.50
		Slope	0.50	Rock fragments	1.00		
Perfect, cold	15	Moderately suited		Unsuited		Moderate	
		Slope	0.50	Slope	1.00	Low strength	0.50
		Rock fragments	0.50	Rock fragments	0.75		
9501:							
Stehekin	40	Moderately suited		Unsuited		Moderate	
		Slope	0.50	Slope	1.00	Low strength	0.50
		Rock fragments	0.50	Rock fragments	0.75		

Table 14.—Planting and Soil Rutting Hazard—Continued

Map symbol and soil name	Pct. of map unit	Suitability for hand planting		Suitability for mechanical planting		Soil rutting hazard	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
9501:							
Primus	25	Poorly suited		Unsuited		Slight	
		Rock fragments	0.75	Slope	1.00	Strength	0.10
		Slope	0.50	Rock fragments	1.00		
Stetattle	15	Moderately suited		Unsuited		Slight	
		Slope	0.50	Slope	1.00	Strength	0.10
		Rock fragments	0.50	Rock fragments	1.00		
9997:							
Rock outcrop	70	Not rated		Not rated		Not rated	
Despair	15	Poorly suited		Unsuited		Moderate	
		Rock fragments	0.75	Slope	1.00	Low strength	0.50
		Slope	0.50	Rock fragments	1.00		
9998:							
Rock outcrop	60	Not rated		Not rated		Not rated	
Glaciers	15	Not rated		Not rated		Not rated	
Harlequin	15	Moderately suited		Unsuited		Moderate	
		Slope	0.50	Slope	1.00	Low strength	0.50
		Rock fragments	0.50	Rock fragments	0.75		
9999:							
Water, freshwater	100	Not rated		Not rated		Not rated	

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
6000:							
Manlywham	60	Slight		Slight		Poorly suited	
						Ponding	1.00
						Flooding	1.00
						Wetness	1.00
Nohokomeen	15	Slight		Slight		Moderately suited	
						Flooding	0.50
Roland	15	Slight		Slight		Moderately suited	
						Low strength	0.50
						Flooding	0.50
6009:							
Ragged, deciduous	50	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Rock fragments	0.50
Tricouni, deciduous	30	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Rock fragments	0.50
Cosho	15	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Rock fragments	0.50
6010:							
Roland	40	Slight		Severe		Moderately suited	
				Slope/erodibility	0.95	Slope	0.50
						Low strength	0.50
						Flooding	0.50
Skymo	25	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
						Flooding	0.50
Deerlick	20	Slight		Slight		Moderately suited	
						Flooding	0.50
						Rock fragments	0.50
6014:							
Thorton	40	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Rock fragments	0.50
Ragged	25	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Rock fragments	0.50
Ledeir	15	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Low strength	1.00

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
6015:							
Tricouni	50	Moderate Slope/erodibility	0.50	Severe Slope/erodibility	0.95	Poorly suited Slope Rock fragments	1.00 0.50
Ragged	25	Moderate Slope/erodibility	0.50	Severe Slope/erodibility	0.95	Poorly suited Slope Rock fragments	1.00 0.50
Easy	15	Moderate Slope/erodibility	0.50	Moderate Slope/erodibility	0.50	Poorly suited Slope Rock fragments	1.00 0.50
6500:							
Sandalee	40	Slight		Moderate Slope/erodibility	0.50	Moderately suited Flooding	0.50
Kettling	25	Slight		Moderate Slope/erodibility	0.50	Moderately suited Flooding	0.50
Torment	20	Slight		Slight		Moderately suited Flooding Rock fragments	0.50 0.50
6502:							
Mesahchie	50	Moderate Slope/erodibility	0.50	Severe Slope/erodibility	0.95	Poorly suited Slope	1.00
Inspiration	25	Moderate Slope/erodibility	0.50	Severe Slope/erodibility	0.95	Poorly suited Slope Sandiness Rock fragments	1.00 0.50 0.50
Lyall	15	Moderate Slope/erodibility	0.50	Severe Slope/erodibility	0.95	Poorly suited Slope Rock fragments	1.00 0.50
6505:							
Farway	50	Moderate Slope/erodibility	0.50	Severe Slope/erodibility	0.95	Poorly suited Slope	1.00
Lyall	30	Moderate Slope/erodibility	0.50	Severe Slope/erodibility	0.95	Poorly suited Slope Rock fragments	1.00 0.50
Inspiration	15	Moderate Slope/erodibility	0.50	Severe Slope/erodibility	0.95	Poorly suited Slope Sandiness Rock fragments	1.00 0.50 0.50
7003:							
Damnation	50	Very severe Slope/erodibility	0.95	Severe Slope/erodibility	0.95	Poorly suited Slope Rock fragments	1.00 0.50
Ragged	25	Very severe Slope/erodibility	0.95	Severe Slope/erodibility	0.95	Poorly suited Slope Rock fragments	1.00 0.50
Rock outcrop	15	Not rated		Not rated		Not rated	

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
7015:							
Thorton	40	Very severe		Severe		Poorly suited	
		Slope/erodibility	0.95	Slope/erodibility	0.95	Slope	1.00
						Rock fragments	0.50
Ragged	25	Very severe		Severe		Poorly suited	
		Slope/erodibility	0.95	Slope/erodibility	0.95	Slope	1.00
						Rock fragments	0.50
Damnation	15	Very severe		Severe		Poorly suited	
		Slope/erodibility	0.95	Slope/erodibility	0.95	Slope	1.00
						Rock fragments	0.50
7500:							
Inspiration	50	Very severe		Severe		Poorly suited	
		Slope/erodibility	0.95	Slope/erodibility	0.95	Slope	1.00
						Sandiness	0.50
						Rock fragments	0.50
Mesahchie	25	Very severe		Severe		Poorly suited	
		Slope/erodibility	0.95	Slope/erodibility	0.95	Slope	1.00
Sawtooth	15	Very severe		Severe		Poorly suited	
		Slope/erodibility	0.95	Slope/erodibility	0.95	Slope	1.00
						Sandiness	0.50
						Rock fragments	0.50
7501:							
Despair	40	Very severe		Severe		Poorly suited	
		Slope/erodibility	0.95	Slope/erodibility	0.95	Slope	1.00
						Rock fragments	0.50
Goode	30	Very severe		Severe		Poorly suited	
		Slope/erodibility	0.95	Slope/erodibility	0.95	Slope	1.00
						Rock fragments	1.00
Rock outcrop	15	Not rated		Not rated		Not rated	
7502:							
Farway	50	Very severe		Severe		Poorly suited	
		Slope/erodibility	0.95	Slope/erodibility	0.95	Slope	1.00
Sawtooth	25	Very severe		Severe		Poorly suited	
		Slope/erodibility	0.95	Slope/erodibility	0.95	Slope	1.00
						Sandiness	0.50
						Rock fragments	0.50
Despair	15	Very severe		Severe		Poorly suited	
		Slope/erodibility	0.95	Slope/erodibility	0.95	Slope	1.00
						Rock fragments	0.50
8000:							
Beaverpass	40	Slight		Slight		Poorly suited	
						Low strength	1.00
						Ponding	1.00
						Flooding	1.00
						Wetness	1.00
						Sandiness	0.50

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
8000:							
Purple	30	Slight		Moderate		Poorly suited	
				Slope/erodibility	0.50	Low strength	1.00
						Ponding	1.00
						Flooding	1.00
						Wetness	1.00
Bacon	15	Slight		Moderate		Poorly suited	
				Slope/erodibility	0.50	Ponding	1.00
						Flooding	1.00
						Wetness	1.00
8006:							
Stetattle, deciduous	60	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Rock fragments	1.00
Forbidden	15	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
Triumph	15	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Rock fragments	1.00
8007:							
Kimtah	40	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
Bacon	30	Slight		Moderate		Poorly suited	
				Slope/erodibility	0.50	Ponding	1.00
						Flooding	1.00
						Wetness	1.00
Yawning	15	Moderate		Moderate		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.50	Slope	1.00
8009:							
Chilliwack, warm	40	Severe		Severe		Poorly suited	
		Slope/erodibility	0.75	Slope/erodibility	0.95	Slope	1.00
						Rock fragments	0.50
Perfect	30	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Rock fragments	0.50
Terror	15	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Flooding	0.50
8010:							
Perfect	50	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Rock fragments	0.50
Spickard	20	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Rock fragments	0.50
Stetattle, deciduous	15	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Rock fragments	1.00

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
8011:							
Chilliwack	50	Severe		Severe		Poorly suited	
		Slope/erodibility	0.75	Slope/erodibility	0.95	Slope	1.00
						Rock fragments	0.50
Forbidden, cold	30	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
Stetattle, deciduous	15	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Rock fragments	1.00
8014:							
Chilliwack, dry	40	Severe		Severe		Poorly suited	
		Slope/erodibility	0.75	Slope/erodibility	0.95	Slope	1.00
						Rock fragments	0.50
Tepeh	30	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
Kimtah, dry	15	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
8500:							
Primus	50	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Rock fragments	0.50
Noca	20	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Rock fragments	0.50
Stehekin	20	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
8501:							
Stehekin	50	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
Primus	30	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Rock fragments	0.50
9001:							
Noca	40	Very severe		Severe		Poorly suited	
		Slope/erodibility	0.95	Slope/erodibility	0.95	Slope	1.00
						Rock fragments	0.50
Perfect, dry	30	Very severe		Severe		Poorly suited	
		Slope/erodibility	0.95	Slope/erodibility	0.95	Slope	1.00
						Rock fragments	0.50
9003:							
Stetattle	30	Very severe		Severe		Poorly suited	
		Slope/erodibility	0.95	Slope/erodibility	0.95	Slope	1.00
						Rock fragments	1.00
Doubtful	25	Very severe		Severe		Poorly suited	
		Slope/erodibility	0.95	Slope/erodibility	0.95	Slope	1.00

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
9003:							
Arriva	20	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Low strength	1.00
						Rock fragments	1.00
9008:							
Mox	30	Very severe		Severe		Poorly suited	
		Slope/erodibility	0.95	Slope/erodibility	0.95	Slope	1.00
						Low strength	1.00
						Rock fragments	0.50
Doubtful	20	Very severe		Severe		Poorly suited	
		Slope/erodibility	0.95	Slope/erodibility	0.95	Slope	1.00
Perfect, cold	15	Very severe		Severe		Poorly suited	
		Slope/erodibility	0.95	Slope/erodibility	0.95	Slope	1.00
						Rock fragments	0.50
9010:							
Doubtful	30	Very severe		Severe		Poorly suited	
		Slope/erodibility	0.95	Slope/erodibility	0.95	Slope	1.00
Treen	25	Very severe		Severe		Poorly suited	
		Slope/erodibility	0.95	Slope/erodibility	0.95	Slope	1.00
						Low strength	1.00
						Rock fragments	0.50
Rock outcrop	15	Not rated		Not rated		Not rated	
9012:							
Spickard	40	Very severe		Severe		Poorly suited	
		Slope/erodibility	0.95	Slope/erodibility	0.95	Slope	1.00
						Rock fragments	0.50
Tepeh, moist	25	Very severe		Severe		Poorly suited	
		Slope/erodibility	0.95	Slope/erodibility	0.95	Slope	1.00
Maggib	15	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Rock fragments	1.00
9016:							
Doubtful	30	Very severe		Severe		Poorly suited	
		Slope/erodibility	0.95	Slope/erodibility	0.95	Slope	1.00
Triumph	20	Very severe		Severe		Poorly suited	
		Slope/erodibility	0.95	Slope/erodibility	0.95	Slope	1.00
						Rock fragments	1.00
Perfect, cold	15	Very severe		Severe		Poorly suited	
		Slope/erodibility	0.95	Slope/erodibility	0.95	Slope	1.00
						Rock fragments	0.50
9501:							
Stehekin	40	Very severe		Severe		Poorly suited	
		Slope/erodibility	0.95	Slope/erodibility	0.95	Slope	1.00
Primus	25	Very severe		Severe		Poorly suited	
		Slope/erodibility	0.95	Slope/erodibility	0.95	Slope	1.00
						Rock fragments	0.50

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
9501:							
Stetattle	15	Very severe Slope/erodibility	 0.95	Severe Slope/erodibility	 0.95	Poorly suited Slope Rock fragments	 1.00 1.00
9997:							
Rock outcrop	70	Not rated		Not rated		Not rated	
Despair	15	Very severe Slope/erodibility	 0.95	Severe Slope/erodibility	 0.95	Poorly suited Slope Rock fragments	 1.00 0.50
9998:							
Rock outcrop	60	Not rated		Not rated		Not rated	
Glaciers	15	Not rated		Not rated		Not rated	
Harlequin	15	Very severe Slope/erodibility	 0.95	Severe Slope/erodibility	 0.95	Poorly suited Slope	 1.00
9999:							
Water, freshwater	100	Not rated		Not rated		Not rated	

Table 16.—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	Suitability for mechanical site preparation (deep)		Suitability for mechanical site preparation (surface)	
		Rating class and limiting features	Value	Rating class and limiting features	Value
6000:					
Manlywham	60	Unsuited		Poorly suited	
		Wetness	1.00	Wetness	0.50
Nohokomeen	15	Unsuited		Well suited	
		Wetness	1.00		
Roland	15	Unsuited		Well suited	
		Wetness	1.00		
6009:					
Ragged, deciduous	50	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
		Rock fragments	0.50	Rock fragments	0.50
Tricouni, deciduous	30	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
		Rock fragments	0.50	Rock fragments	0.50
Cosho	15	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
		Restrictive layer	0.50	Rock fragments	0.50
6010:					
Roland	40	Unsuited		Well suited	
		Wetness	1.00		
Skymo	25	Well suited		Well suited	
Deerlick	20	Unsuited		Poorly suited	
		Wetness	1.00	Rock fragments	0.50
		Rock fragments	0.50		
6014:					
Thorton	40	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
		Rock fragments	0.50	Rock fragments	0.50
Ragged	25	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
		Rock fragments	0.50	Rock fragments	0.50
Ledeir	15	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
6015:					
Tricouni	50	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
		Rock fragments	0.50	Rock fragments	0.50
Ragged	25	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
		Rock fragments	0.50	Rock fragments	0.50

Table 16.—Site Preparation—Continued

Map symbol and soil name	Pct. of map unit	Suitability for mechanical site preparation (deep)		Suitability for mechanical site preparation (surface)	
		Rating class and limiting features	Value	Rating class and limiting features	Value
6015:					
Easy	15	Poorly suited		Poorly suited	
		Rock fragments	0.50	Rock fragments	0.50
		Slope	0.50	Slope	0.50
6500:					
Sandalee	40	Unsuited		Well suited	
		Wetness	1.00		
Kettling	25	Unsuited		Well suited	
		Wetness	1.00		
Torment	20	Well suited		Poorly suited	
				Rock fragments	0.50
6502:					
Mesahchie	50	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
Inspiration	25	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
		Rock fragments	0.50	Rock fragments	0.50
Lyall	15	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
				Rock fragments	0.50
6505:					
Farway	50	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
Lyall	30	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
				Rock fragments	0.50
Inspiration	15	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
		Rock fragments	0.50	Rock fragments	0.50
7003:					
Damnation	50	Unsuited		Unsuited	
		Restrictive layer	1.00	Slope	1.00
		Slope	1.00	Rock fragments	0.50
Ragged	25	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
		Rock fragments	0.50	Rock fragments	0.50
Rock outcrop	15	Not rated		Not rated	
7015:					
Thorton	40	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
		Rock fragments	0.50	Rock fragments	0.50
Ragged	25	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
		Rock fragments	0.50	Rock fragments	0.50

Table 16.—Site Preparation—Continued

Map symbol and soil name	Pct. of map unit	Suitability for mechanical site preparation (deep)		Suitability for mechanical site preparation (surface)	
		Rating class and limiting features	Value	Rating class and limiting features	Value
7015:					
Damnation	15	Unsuited		Unsuited	
		Restrictive layer	1.00	Slope	1.00
		Slope	1.00	Rock fragments	0.50
7500:					
Inspiration	50	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
		Rock fragments	0.50	Rock fragments	0.50
Mesahchie	25	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
Sawtooth	15	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
		Restrictive layer	0.50	Rock fragments	0.50
7501:					
Despair	40	Unsuited		Unsuited	
		Restrictive layer	1.00	Slope	1.00
		Slope	1.00	Rock fragments	0.50
Goode	30	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
		Rock fragments	1.00	Rock fragments	1.00
Rock outcrop	15	Not rated		Not rated	
7502:					
Farway	50	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
Sawtooth	25	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
		Restrictive layer	0.50	Rock fragments	0.50
Despair	15	Unsuited		Unsuited	
		Restrictive layer	1.00	Slope	1.00
		Slope	1.00	Rock fragments	0.50
8000:					
Beaverpass	40	Unsuited		Well suited	
		Wetness	1.00		
Purple	30	Unsuited		Well suited	
		Wetness	1.00		
Bacon	15	Unsuited		Poorly suited	
		Wetness	1.00	Wetness	0.50
8006:					
Stetattle, deciduous	60	Poorly suited		Unsuited	
		Slope	0.50	Rock fragments	1.00
		Rock fragments	0.50	Slope	0.50
Forbidden	15	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50

Table 16.—Site Preparation—Continued

Map symbol and soil name	Pct. of map unit	Suitability for mechanical site preparation (deep)		Suitability for mechanical site preparation (surface)	
		Rating class and limiting features	Value	Rating class and limiting features	Value
8006:					
Triumph	15	Unsuited		Unsuited	
		Rock fragments	1.00	Rock fragments	1.00
		Slope	0.50	Slope	0.50
8007:					
Kimtah	40	Unsuited		Poorly suited	
		Wetness	1.00	Slope	0.50
		Slope	0.50		
Bacon	30	Unsuited		Poorly suited	
		Wetness	1.00	Wetness	0.50
Yawning	15	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
		Rock fragments	0.50	Rock fragments	0.50
8009:					
Chilliwack, warm	40	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
		Rock fragments	0.50	Rock fragments	0.50
Perfect	30	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
		Rock fragments	0.50	Rock fragments	0.50
Terror	15	Unsuited		Poorly suited	
		Wetness	1.00	Slope	0.50
		Slope	0.50		
8010:					
Perfect	50	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
		Rock fragments	0.50	Rock fragments	0.50
Spickard	20	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
		Rock fragments	0.50	Rock fragments	0.50
Stetattle, deciduous	15	Poorly suited		Unsuited	
		Slope	0.50	Rock fragments	1.00
		Rock fragments	0.50	Slope	0.50
8011:					
Chilliwack	50	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
		Rock fragments	0.50	Rock fragments	0.50
Forbidden, cold	30	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
Stetattle, deciduous	15	Poorly suited		Unsuited	
		Slope	0.50	Rock fragments	1.00
		Rock fragments	0.50	Slope	0.50
8014:					
Chilliwack, dry	40	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
		Rock fragments	0.50	Rock fragments	0.50

Table 16.—Site Preparation—Continued

Map symbol and soil name	Pct. of map unit	Suitability for mechanical site preparation (deep)		Suitability for mechanical site preparation (surface)	
		Rating class and limiting features	Value	Rating class and limiting features	Value
8014:					
Tepeh	30	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
				Rock fragments	0.50
Kimtah, dry	15	Unsuited		Poorly suited	
		Wetness	1.00	Slope	0.50
		Slope	0.50		
8500:					
Primus	50	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
				Rock fragments	0.50
Noca	20	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
		Rock fragments	0.50	Rock fragments	0.50
Stehekin	20	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
				Rock fragments	0.50
8501:					
Stehekin	50	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
				Rock fragments	0.50
Primus	30	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
				Rock fragments	0.50
9001:					
Noca	40	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
		Rock fragments	0.50	Rock fragments	0.50
Perfect, dry	30	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
		Rock fragments	0.50	Rock fragments	0.50
9003:					
Stetattle	30	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
		Rock fragments	0.50	Rock fragments	1.00
Doubtful	25	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
		Restrictive layer	0.50		
Arriva	20	Unsuited		Unsuited	
		Rock fragments	1.00	Rock fragments	1.00
		Slope	0.50	Slope	0.50
9008:					
Mox	30	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
		Rock fragments	0.50	Rock fragments	0.50

Table 16.—Site Preparation—Continued

Map symbol and soil name	Pct. of map unit	Suitability for mechanical site preparation (deep)		Suitability for mechanical site preparation (surface)	
		Rating class and limiting features	Value	Rating class and limiting features	Value
9008:					
Doubtful	20	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
		Restrictive layer	0.50		
Perfect, cold	15	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
		Rock fragments	0.50	Rock fragments	0.50
9010:					
Doubtful	30	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
		Restrictive layer	0.50		
Treen	25	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
		Restrictive layer	1.00	Rock fragments	0.50
		Rock fragments	0.50		
Rock outcrop	15	Not rated		Not rated	
9012:					
Spickard	40	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
		Rock fragments	0.50	Rock fragments	0.50
Tepeh, moist	25	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
				Rock fragments	0.50
Maggib	15	Unsuited		Unsuited	
		Rock fragments	1.00	Rock fragments	1.00
		Slope	0.50	Slope	0.50
		Restrictive layer	0.50		
9016:					
Doubtful	30	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
		Restrictive layer	0.50		
Triumph	20	Unsuited		Unsuited	
		Rock fragments	1.00	Rock fragments	1.00
		Slope	1.00	Slope	1.00
Perfect, cold	15	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
		Rock fragments	0.50	Rock fragments	0.50
9501:					
Stehekin	40	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
				Rock fragments	0.50
Primus	25	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
				Rock fragments	0.50
Stetattle	15	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
		Rock fragments	0.50	Rock fragments	1.00

Table 16.—Site Preparation—Continued

Map symbol and soil name	Pct. of map unit	Suitability for mechanical site preparation (deep)		Suitability for mechanical site preparation (surface)	
		Rating class and limiting features	Value	Rating class and limiting features	Value
9997:					
Rock outcrop	70	Not rated		Not rated	
Despair	15	Unsuited		Unsuited	
		Restrictive layer	1.00	Slope	1.00
		Slope	1.00	Rock fragments	0.50
9998:					
Rock outcrop	60	Not rated		Not rated	
Glaciers	15	Not rated		Not rated	
Harlequin	15	Unsuited		Unsuited	
		Restrictive layer	1.00	Slope	1.00
		Slope	1.00		
9999:					
Water, freshwater	100	Not rated		Not rated	

Table 17.—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 unit 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
6000:					
Manlywham	60	Low Texture/surface depth/rock fragments	0.10	High Wetness	1.00
Nohokomeen	15	Low Texture/rock fragments	0.10	Moderate Wetness	0.50
Roland	15	Low Texture/rock fragments	0.10	Moderate Wetness	0.50
6009:					
Ragged, deciduous	50	High Texture/slope/rock fragments	1.00	Low	
Tricouni, deciduous	30	Moderate Texture/slope/ surface depth/ rock fragments	0.50	Low	
Cosho	15	High Texture/slope/ surface depth	1.00	Low	
6010:					
Roland	40	Low Texture/rock fragments	0.10	Moderate Wetness	0.50
Skymo	25	High Texture/surface depth/rock fragments	1.00	Low	
Deerlick	20	Low Texture/surface depth/rock fragments	0.10	Low	
6014:					
Thorton	40	Moderate Texture/slope/ surface depth/ rock fragments	0.50	Low	
Ragged	25	High Texture/slope/rock fragments	1.00	Low	

Table 17.—Site Restoration—Continued

Map unit 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
6014:					
Ledeir	15	Moderate Texture/slope/ surface depth/ rock fragments	0.50	Low	
6015:					
Tricouni	50	Low Texture/surface depth/rock fragments	0.10	Low	
Ragged	25	High Texture/rock fragments	1.00	Low	
Easy	15	Moderate Texture/surface depth/rock fragments	0.50	Low	
6500:					
Sandalee	40	Low Texture/surface depth/rock fragments	0.10	Moderate Wetness Available water	0.50 0.50
Kettling	25	Low Texture/surface depth/rock fragments	0.10	Low	
Torment	20	High Texture/rock fragments	1.00	Moderate Available water	0.50
6502:					
Mesahchie	50	Moderate Texture/slope/rock fragments	0.50	Low	
Inspiration	25	Moderate Texture/slope/ surface depth/ rock fragments	0.50	Low	
Lyall	15	Low Texture/slope/rock fragments	0.10	Low	
6505:					
Farway	50	Low Texture/rock fragments	0.10	Low	
Lyall	30	Low Texture/slope/rock fragments	0.10	Low	

Table 17.—Site Restoration—Continued

Map unit 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
6505:					
Inspiration	15	Moderate Texture/slope/ surface depth/ rock fragments	0.50	Low	
7003:					
Damnation	50	Moderate Texture/slope/ surface depth/ rock fragments	0.50	Low	
Ragged	25	High Texture/slope/rock fragments	1.00	Low	
Rock outcrop	15	Not rated		Not rated	
7015:					
Thorton	40	Moderate Texture/slope/ surface depth/ rock fragments	0.50	Low	
Ragged	25	High Texture/slope/rock fragments	1.00	Low	
Damnation	15	Moderate Texture/slope/ surface depth/ rock fragments	0.50	Low	
7500:					
Inspiration	50	Moderate Texture/slope/ surface depth/ rock fragments	0.50	Low	
Mesahchie	25	Low Texture/slope/rock fragments	0.10	Low	
Sawtooth	15	Low Texture/slope/rock fragments	0.10	Low	
7501:					
Despair	40	Low Texture/slope/rock fragments	0.10	Low	
Goode	30	Low Texture/rock fragments	0.10	Low	
Rock outcrop	15	Not rated		Not rated	

Table 17.—Site Restoration—Continued

Map unit 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
7502:					
Farway	50	Low Texture/rock fragments	0.10	Low	
Sawtooth	25	Low Texture/slope/rock fragments	0.10	Low	
Despair	15	Low Texture/slope/rock fragments	0.10	Low	
8000:					
Beaverpass	40	Low		High Wetness Soil reaction	1.00 0.50
Purple	30	Low Texture/rock fragments	0.10	High Wetness	1.00
Bacon	15	Low Texture/rock fragments	0.10	High Wetness	1.00
8006:					
Stetattle, deciduous	60	Moderate Texture/slope/rock fragments	0.50	Low	
Forbidden	15	Moderate Texture/slope/ surface depth/ rock fragments	0.50	Low	
Triumph	15	Low Texture/slope/rock fragments	0.10	Low	
8007:					
Kimtah	40	Moderate Texture/surface depth/rock fragments	0.50	Moderate Wetness Soil reaction	0.50 0.50
Bacon	30	Low Texture/rock fragments	0.10	High Wetness	1.00
Yawning	15	Low Texture/surface depth/rock fragments	0.10	Moderate Soil reaction	0.50
8009:					
Chilliwack, warm	40	Moderate Texture/slope/ surface depth/ rock fragments	0.50	Low	

Table 17.—Site Restoration—Continued

Map unit 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
8009:					
Perfect	30	High Texture/slope/surface depth	1.00	Low	
Terror	15	Low Texture/surface depth/rock fragments	0.10	Low	
8010:					
Perfect	50	High Texture/slope/surface depth	1.00	Low	
Spickard	20	Moderate Texture/slope/surface depth/rock fragments	0.50	Low	
Stetattle, deciduous	15	Moderate Texture/slope/rock fragments	0.50	Low	
8011:					
Chilliwack	50	Moderate Texture/slope/surface depth/rock fragments	0.50	Low	
Forbidden, cold	30	Moderate Texture/slope/surface depth/rock fragments	0.50	Low	
Stetattle, deciduous	15	Moderate Texture/slope/rock fragments	0.50	Low	
8014:					
Chilliwack, dry	40	Moderate Texture/slope/surface depth/rock fragments	0.50	Low	
Tepeh	30	Moderate Texture/slope/surface depth/rock fragments	0.50	Low	
Kimtah, dry	15	Moderate Texture/surface depth/rock fragments	0.50	Moderate Wetness Soil reaction	 0.50 0.50
8500:					
Primus	50	Low Texture/rock fragments	0.10	Low	

Table 17.—Site Restoration—Continued

Map unit 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
8500:					
Noca	20	Moderate Texture/slope/surface depth/rock fragments	0.50	Low	
Stehekin	20	Low Texture/rock fragments	0.10	Low	
8501:					
Stehekin	50	Low Texture/slope/rock fragments	0.10	Low	
Primus	30	Low Texture/rock fragments	0.10	Low	
9001:					
Noca	40	Moderate Texture/slope/surface depth/rock fragments	0.50	Low	
Perfect, dry	30	High Texture/slope/surface depth	1.00	Low	
9003:					
Stetattle	30	Moderate Texture/slope/rock fragments	0.50	Low	
Doubtful	25	Moderate Texture/slope/surface depth/rock fragments	0.50	Low	
Arriva	20	Low Texture/surface depth/rock fragments	0.10	Low	
9008:					
Mox	30	Low Texture/slope/rock fragments	0.10	Low	
Doubtful	20	Moderate Texture/slope/surface depth/rock fragments	0.50	Low	
Perfect, cold	15	High Texture/slope/surface depth	1.00	Low	

Table 17.—Site Restoration—Continued

Map unit 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
9010:					
Doubtful	30	Moderate Texture/slope/ surface depth/ rock fragments	0.50	Low	
Treen	25	Moderate Texture/slope/ surface depth/ rock fragments	0.50	Low	
Rock outcrop	15	Not rated		Not rated	
9012:					
Spickard	40	Moderate Texture/slope/ surface depth/ rock fragments	0.50	Low	
Tepeh, moist	25	Moderate Texture/slope/ surface depth/ rock fragments	0.50	Low	
Maggib	15	High Texture/slope/ surface depth	1.00	Low	
9016:					
Doubtful	30	Moderate Texture/slope/ surface depth/ rock fragments	0.50	Low	
Triumph	20	Low Texture/slope/rock fragments	0.10	Low	
Perfect, cold	15	High Texture/slope/ surface depth	1.00	Low	
9501:					
Stehekin	40	Low Texture/slope/rock fragments	0.10	Low	
Primus	25	Low Texture/rock fragments	0.10	Low	
Stetattle	15	Moderate Texture/slope/rock fragments	0.50	Low	
9997:					
Rock outcrop	70	Not rated		Not rated	
Despair	15	Low Texture/slope/rock fragments	0.10	Low	

Table 17.—Site Restoration—Continued

Map unit 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
9998:					
Rock outcrop	60	Not rated		Not rated	
Glaciers	15	Not rated		Not rated	
Harlequin	15	Low Texture/slope/rock fragments	0.10	Low	
9999:					
Water, freshwater	100	Not rated		Not rated	

Table 18.—Camp and Picnic Areas

(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	Camp areas		Picnic areas	
		Rating class and limiting features	Value	Rating class and limiting features	Value
6000:					
Manlywham	60	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Flooding	1.00		
Nohokomeen	15	Very limited		Somewhat limited	
		Depth to saturated zone	1.00	Depth to saturated zone	0.90
		Flooding	1.00		
Roland	15	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Flooding	1.00		
6009:					
Ragged, deciduous	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Large stones content	1.00	Large stones content	1.00
		Too sandy	0.12	Too sandy	0.12
Tricouni, deciduous	30	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Large stones content	1.00	Large stones content	1.00
Cosho	15	Very limited		Very limited	
		Slope	1.00	Slope	1.00
6010:					
Roland	40	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Flooding	1.00	Slope	0.16
		Slope	0.16		
Skymo	25	Very limited		Very limited	
		Flooding	1.00	Too sandy	1.00
		Too sandy	1.00	Large stones content	0.19
		Large stones content	0.19	Slope	0.16
		Slope	0.16		
Deerlick	20	Very limited		Somewhat limited	
		Flooding	1.00	Depth to saturated zone	0.22
		Depth to saturated zone	0.44		

Table 18.—Camp and Picnic Areas—Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas	
		Rating class and limiting features	Value	Rating class and limiting features	Value
6014:					
Thorton	40	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Large stones content	1.00	Large stones content	1.00
Ragged	25	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Large stones content	1.00	Large stones content	1.00
		Too sandy	0.12	Too sandy	0.12
Ledeir	15	Very limited		Very limited	
		Slope	1.00	Slope	1.00
6015:					
Tricouni	50	Very limited		Very limited	
		Slope	1.00	Large stones content	1.00
		Large stones content	1.00	Slope	1.00
Ragged	25	Very limited		Very limited	
		Slope	1.00	Large stones content	1.00
		Large stones content	1.00	Slope	1.00
		Too sandy	0.12	Too sandy	0.12
Easy	15	Very limited		Very limited	
		Slope	1.00	Large stones content	1.00
		Large stones content	1.00	Slope	1.00
6500:					
Sandalee	40	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Flooding	1.00		
Kettling	25	Very limited		Somewhat limited	
		Flooding	1.00	Depth to saturated zone	0.22
		Depth to saturated zone	0.44		
Torment	20	Very limited		Somewhat limited	
		Flooding	1.00	Too sandy	0.88
		Too sandy	0.88		
6502:					
Mesahchie	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
Inspiration	25	Very limited		Very limited	
		Slope	1.00	Slope	1.00
Lyall	15	Very limited		Very limited	
		Slope	1.00	Slope	1.00
6505:					
Farway	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00

Table 18.—Camp and Picnic Areas—Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas	
		Rating class and limiting features	Value	Rating class and limiting features	Value
6505:					
Lyall	30	Very limited Slope	 1.00	Very limited Slope	 1.00
Inspiration	15	Very limited Slope	 1.00	Very limited Slope	 1.00
7003:					
Damnation	50	Very limited Slope Depth to bedrock	 1.00 1.00	Very limited Slope Depth to bedrock	 1.00 1.00
Ragged	25	Very limited Slope Large stones content Too sandy	 1.00 1.00 0.12	Very limited Slope Large stones content Too sandy	 1.00 1.00 0.12
Rock outcrop	15	Not rated		Not rated	
7015:					
Thorton	40	Very limited Slope Large stones content	 1.00 1.00	Very limited Slope Large stones content	 1.00 1.00
Ragged	25	Very limited Slope Large stones content Too sandy	 1.00 1.00 0.12	Very limited Slope Large stones content Too sandy	 1.00 1.00 0.12
Damnation	15	Very limited Slope Depth to bedrock	 1.00 1.00	Very limited Slope Depth to bedrock	 1.00 1.00
7500:					
Inspiration	50	Very limited Slope	 1.00	Very limited Slope	 1.00
Mesahchie	25	Very limited Slope	 1.00	Very limited Slope	 1.00
Sawtooth	15	Very limited Slope	 1.00	Very limited Slope	 1.00
7501:					
Despair	40	Very limited Slope Depth to bedrock	 1.00 1.00	Very limited Slope Depth to bedrock	 1.00 1.00
Goode	30	Very limited Slope Large stones content	 1.00 1.00	Very limited Slope Large stones content	 1.00 1.00
Rock outcrop	15	Not rated		Not rated	

Table 18.—Camp and Picnic Areas—Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas	
		Rating class and limiting features	Value	Rating class and limiting features	Value
7502:					
Farway	50	Very limited Slope	 1.00	Very limited Slope	 1.00
Sawtooth	25	Very limited Slope	 1.00	Very limited Slope	 1.00
Despair	15	Very limited Slope Depth to bedrock	 1.00 1.00	Very limited Slope Depth to bedrock	 1.00 1.00
8000:					
Beaverpass	40	Very limited Depth to saturated zone Flooding Ponding	 1.00 1.00 1.00	Very limited Ponding Depth to saturated zone	 1.00 1.00
Purple	30	Very limited Depth to saturated zone Flooding Ponding	 1.00 1.00 1.00	Very limited Ponding Depth to saturated zone	 1.00 1.00
Bacon	15	Very limited Depth to saturated zone Flooding	 1.00 1.00	Very limited Depth to saturated zone	 1.00
8006:					
Stetattle, deciduous	60	Very limited Slope Large stones content	 1.00 1.00	Very limited Slope Large stones content	 1.00 1.00
Forbidden	15	Very limited Slope	 1.00	Very limited Slope	 1.00
Triumph	15	Very limited Slope Large stones content Gravel	 1.00 1.00 0.41	Very limited Large stones content Slope Gravel	 1.00 1.00 0.41
8007:					
Kimtah	40	Very limited Slope Depth to saturated zone	 1.00 0.90	Very limited Slope Depth to saturated zone	 1.00 0.60
Bacon	30	Very limited Depth to saturated zone Flooding Ponding	 1.00 1.00 1.00	Very limited Ponding Depth to saturated zone	 1.00 1.00
Yawning	15	Very limited Slope	 1.00	Very limited Slope	 1.00

Table 18.—Camp and Picnic Areas—Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas	
		Rating class and limiting features	Value	Rating class and limiting features	Value
8009:					
Chilliwack, warm----	40	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Large stones content	1.00	Large stones content	1.00
Perfect----------	30	Not rated		Not rated	
Terror----------	15	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Flooding	1.00	Depth to saturated zone	0.22
		Depth to saturated zone	0.44		
8010:					
Perfect----------	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Large stones content	1.00	Large stones content	1.00
Spickard----------	20	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Large stones content	1.00	Large stones content	1.00
Stetattle, deciduous	15	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Large stones content	1.00	Large stones content	1.00
8011:					
Chilliwack----------	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Large stones content	1.00	Large stones content	1.00
Forbidden, cold-----	30	Very limited		Very limited	
		Slope	1.00	Slope	1.00
Stetattle, deciduous	15	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Large stones content	1.00	Large stones content	1.00
8014:					
Chilliwack, dry-----	40	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Large stones content	1.00	Large stones content	1.00
Tepeh----------	30	Very limited		Very limited	
		Slope	1.00	Slope	1.00
Kimtah, dry---------	15	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Depth to saturated zone	0.90	Depth to saturated zone	0.60

Table 18.—Camp and Picnic Areas—Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas	
		Rating class and limiting features	Value	Rating class and limiting features	Value
8500:					
Primus	50	Very limited Slope	 1.00	Very limited Slope	 1.00
Noca	20	Very limited Slope Large stones content	 1.00 1.00	Very limited Slope Large stones content	 1.00 1.00
Stehekin	20	Very limited Slope	 1.00	Very limited Slope	 1.00
8501:					
Stehekin	50	Very limited Slope	 1.00	Very limited Slope	 1.00
Primus	30	Very limited Slope	 1.00	Very limited Slope	 1.00
9001:					
Noca	40	Very limited Slope Large stones content	 1.00 1.00	Very limited Slope Large stones content	 1.00 1.00
Perfect, dry	30	Very limited Slope Large stones content	 1.00 1.00	Very limited Slope Large stones content	 1.00 1.00
9003:					
Stetattle	30	Very limited Slope Large stones content	 1.00 1.00	Very limited Slope Large stones content	 1.00 1.00
Doubtful	25	Very limited Slope	 1.00	Very limited Slope	 1.00
Arriva	20	Very limited Slope Large stones content	 1.00 1.00	Very limited Slope Large stones content	 1.00 1.00
9008:					
Mox	30	Very limited Slope Large stones content	 1.00 1.00	Very limited Slope Large stones content	 1.00 1.00
Doubtful	20	Very limited Slope	 1.00	Very limited Slope	 1.00
Perfect, cold	15	Very limited Slope Large stones content	 1.00 1.00	Very limited Slope Large stones content	 1.00 1.00

Table 18.—Camp and Picnic Areas—Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas	
		Rating class and limiting features	Value	Rating class and limiting features	Value
9010:					
Doubtful	30	Very limited		Very limited	
		Slope	1.00	Slope	1.00
Treen	25	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Large stones content	1.00	Large stones content	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00
Rock outcrop	15	Not rated		Not rated	
9012:					
Spickard	40	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Large stones content	1.00	Large stones content	1.00
Tepeh, moist	25	Very limited		Very limited	
		Slope	1.00	Slope	1.00
Maggib	15	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Large stones content	1.00	Large stones content	1.00
9016:					
Doubtful	30	Very limited		Very limited	
		Slope	1.00	Slope	1.00
Triumph	20	Very limited		Very limited	
		Slope	1.00	Large stones content	1.00
		Large stones content	1.00	Slope	1.00
		Gravel	0.41	Gravel	0.41
Perfect, cold	15	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Large stones content	1.00	Large stones content	1.00
9501:					
Stehekin	40	Very limited		Very limited	
		Slope	1.00	Slope	1.00
Primus	25	Very limited		Very limited	
		Slope	1.00	Slope	1.00
Stetattle	15	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Large stones content	1.00	Large stones content	1.00
9997:					
Rock outcrop	70	Not rated		Not rated	
Despair	15	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00

Table 18.—Camp and Picnic Areas—Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas	
		Rating class and limiting features	Value	Rating class and limiting features	Value
9998:					
Rock outcrop	60	Not rated		Not rated	
Glaciers	15	Not rated		Not rated	
Harlequin	15	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00
9999:					
Water, freshwater	100	Not rated		Not rated	

Table 19.—Trail 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 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
6000:					
Manlywham	60	Very limited Depth to saturated zone	 1.00	Very limited Depth to saturated zone	 1.00
Nohokomeen	15	Somewhat limited Depth to saturated zone	 0.78	Somewhat limited Depth to saturated zone	 0.78
Roland	15	Very limited Depth to saturated zone	 1.00	Very limited Depth to saturated zone	 1.00
6009:					
Ragged, deciduous	50	Very limited Large stones content Slope Too sandy	 1.00 1.00 0.12	Very limited Large stones content Slope Too sandy	 1.00 0.78 0.12
Tricouni, deciduous	30	Very limited Large stones content Slope	 1.00 1.00	Very limited Large stones content Slope	 1.00 0.78
Cosho	15	Very limited Slope	 1.00	Somewhat limited Slope	 0.78
6010:					
Roland	40	Very limited Depth to saturated zone	 1.00	Very limited Depth to saturated zone	 1.00
Skymo	25	Very limited Too sandy Large stones content	 1.00 0.19	Very limited Too sandy Large stones content	 1.00 0.19
Deerlick	20	Not limited		Not limited	
6014:					
Thorton	40	Very limited Large stones content Slope	 1.00 1.00	Very limited Large stones content Slope	 1.00 0.78
Ragged	25	Very limited Large stones content Slope Too sandy	 1.00 1.00 0.12	Very limited Large stones content Slope Too sandy	 1.00 0.78 0.12
Ledeir	15	Very limited Slope	 1.00	Somewhat limited Slope	 0.78

Table 19.—Trail Management—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
6015:					
Tricouni	50	Very limited		Very limited	
		Large stones content	1.00	Large stones content	1.00
		Slope	1.00		
Ragged	25	Very limited		Very limited	
		Large stones content	1.00	Large stones content	1.00
		Slope	1.00	Too sandy	0.12
		Too sandy	0.12		
Easy	15	Very limited		Very limited	
		Large stones content	1.00	Large stones content	1.00
		Water erosion	1.00	Water erosion	1.00
6500:					
Sandalee	40	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
Kettling	25	Not limited		Not limited	
Torment	20	Somewhat limited		Somewhat limited	
		Too sandy	0.88	Too sandy	0.88
6502:					
Mesahchie	50	Very limited		Somewhat limited	
		Slope	1.00	Slope	0.78
Inspiration	25	Very limited		Somewhat limited	
		Slope	1.00	Slope	0.78
Lyall	15	Very limited		Somewhat limited	
		Slope	1.00	Slope	0.78
6505:					
Farway	50	Very limited		Somewhat limited	
		Slope	1.00	Slope	0.78
Lyall	30	Very limited		Somewhat limited	
		Slope	1.00	Slope	0.78
Inspiration	15	Very limited		Somewhat limited	
		Slope	1.00	Slope	0.78
7003:					
Damnation	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
Ragged	25	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Large stones content	1.00	Large stones content	1.00
		Too sandy	0.12	Too sandy	0.12
Rock outcrop	15	Not rated		Not rated	

Table 19.—Trail Management—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
7015:					
Thorton	40	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Large stones content	1.00	Large stones content	1.00
Ragged	25	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Large stones content	1.00	Large stones content	1.00
		Too sandy	0.12	Too sandy	0.12
Damnation	15	Very limited		Very limited	
		Slope	1.00	Slope	1.00
7500:					
Inspiration	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
Mesahchie	25	Very limited		Very limited	
		Slope	1.00	Slope	1.00
Sawtooth	15	Very limited		Very limited	
		Slope	1.00	Slope	1.00
7501:					
Despair	40	Very limited		Very limited	
		Slope	1.00	Water erosion	1.00
		Water erosion	1.00	Slope	1.00
Goode	30	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Large stones content	1.00	Large stones content	1.00
Rock outcrop	15	Not rated		Not rated	
7502:					
Farway	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
Sawtooth	25	Very limited		Very limited	
		Slope	1.00	Slope	1.00
Despair	15	Very limited		Very limited	
		Slope	1.00	Water erosion	1.00
		Water erosion	1.00	Slope	1.00
8000:					
Beaverpass	40	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00
Purple	30	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00

Table 19.—Trail Management—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
8000:					
Bacon	15	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00
8006:					
Stetattle, deciduous	60	Very limited Large stones content Slope	1.00 1.00	Very limited Large stones content Slope	1.00 0.78
Forbidden	15	Very limited Slope	1.00	Somewhat limited Slope	0.78
Triumph	15	Very limited Large stones content Slope	1.00 1.00	Very limited Large stones content Slope	1.00 0.78
8007:					
Kimtah	40	Very limited Water erosion Depth to saturated zone	1.00 0.22	Very limited Water erosion Depth to saturated zone	1.00 0.22
Bacon	30	Very limited Depth to saturated zone Ponding	1.00 1.00	Very limited Depth to saturated zone Ponding	1.00 1.00
Yawning	15	Not limited		Not limited	
8009:					
Chilliwack, warm	40	Very limited Water erosion Large stones content Slope	1.00 1.00 1.00	Very limited Water erosion Large stones content Slope	1.00 1.00 0.78
Perfect	30	Not rated		Not rated	
Terror	15	Very limited Slope	1.00	Not limited	
8010:					
Perfect	50	Very limited Water erosion Large stones content Slope	1.00 1.00 1.00	Very limited Water erosion Large stones content Slope	1.00 1.00 0.78
Spickard	20	Very limited Large stones content Slope	1.00 1.00	Very limited Large stones content Slope	1.00 0.78
Stetattle, deciduous	15	Very limited Large stones content Slope	1.00 1.00	Very limited Large stones content Slope	1.00 0.78

Table 19.—Trail Management—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
8011:					
Chilliwack	50	Very limited		Very limited	
		Water erosion	1.00	Water erosion	1.00
		Large stones content	1.00	Large stones content	1.00
		Slope	1.00	Slope	0.78
Forbidden, cold	30	Very limited		Somewhat limited	
		Slope	1.00	Slope	0.78
Stetattle, deciduous	15	Very limited		Very limited	
		Large stones content	1.00	Large stones content	1.00
		Slope	1.00	Slope	0.78
8014:					
Chilliwack, dry	40	Very limited		Very limited	
		Water erosion	1.00	Water erosion	1.00
		Large stones content	1.00	Large stones content	1.00
		Slope	1.00	Slope	0.78
Tepeh	30	Very limited		Somewhat limited	
		Slope	1.00	Slope	0.78
Kimtah, dry	15	Very limited		Very limited	
		Water erosion	1.00	Water erosion	1.00
		Slope	1.00	Depth to saturated zone	0.22
		Depth to saturated zone	0.22		
8500:					
Primus	50	Very limited		Somewhat limited	
		Slope	1.00	Slope	0.78
Noca	20	Very limited		Very limited	
		Large stones content	1.00	Large stones content	1.00
		Slope	1.00	Slope	0.78
Stehekin	20	Very limited		Not limited	
		Slope	1.00		
8501:					
Stehekin	50	Very limited		Somewhat limited	
		Slope	1.00	Slope	0.78
Primus	30	Very limited		Somewhat limited	
		Slope	1.00	Slope	0.78
9001:					
Noca	40	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Large stones content	1.00	Large stones content	1.00
Perfect, dry	30	Very limited		Very limited	
		Slope	1.00	Water erosion	1.00
		Water erosion	1.00	Slope	1.00
		Large stones content	1.00	Large stones content	1.00

Table 19.—Trail Management—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
9003:					
Stetattle	30	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Large stones content	1.00	Large stones content	1.00
Doubtful	25	Very limited		Very limited	
		Slope	1.00	Slope	1.00
Arriva	20	Very limited		Very limited	
		Water erosion	1.00	Water erosion	1.00
		Large stones content	1.00	Large stones content	1.00
		Slope	1.00		
9008:					
Mox	30	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Large stones content	1.00	Large stones content	1.00
Doubtful	20	Very limited		Very limited	
		Slope	1.00	Slope	1.00
Perfect, cold	15	Very limited		Very limited	
		Slope	1.00	Water erosion	1.00
		Water erosion	1.00	Slope	1.00
		Large stones content	1.00	Large stones content	1.00
9010:					
Doubtful	30	Very limited		Very limited	
		Slope	1.00	Slope	1.00
Treen	25	Very limited		Very limited	
		Slope	1.00	Water erosion	1.00
		Water erosion	1.00	Slope	1.00
		Large stones content	1.00	Large stones content	1.00
Rock outcrop	15	Not rated		Not rated	
9012:					
Spickard	40	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Large stones content	1.00	Large stones content	1.00
Tepeh, moist	25	Very limited		Very limited	
		Slope	1.00	Slope	1.00
Maggib	15	Very limited		Very limited	
		Large stones content	1.00	Large stones content	1.00
		Slope	1.00	Slope	0.78
9016:					
Doubtful	30	Very limited		Very limited	
		Slope	1.00	Slope	1.00

Table 19.—Trail Management—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
9016:					
Triumph	20	Very limited		Very limited	
		Large stones content	1.00	Large stones content	1.00
		Slope	1.00	Slope	1.00
Perfect, cold	15	Very limited		Very limited	
		Slope	1.00	Water erosion	1.00
		Water erosion	1.00	Slope	1.00
		Large stones content	1.00	Large stones content	1.00
9501:					
Stehekin	40	Very limited		Very limited	
		Slope	1.00	Slope	1.00
Primus	25	Very limited		Very limited	
		Slope	1.00	Slope	1.00
Stetattle	15	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Large stones content	1.00	Large stones content	1.00
9997:					
Rock outcrop	70	Not rated		Not rated	
Despair	15	Very limited		Very limited	
		Slope	1.00	Water erosion	1.00
		Water erosion	1.00	Slope	1.00
9998:					
Rock outcrop	60	Not rated		Not rated	
Glaciers	15	Not rated		Not rated	
Harlequin	15	Very limited		Very limited	
		Slope	1.00	Water erosion	1.00
		Water erosion	1.00	Slope	1.00
9999:					
Water, freshwater	100	Not rated		Not rated	

Table 20.—Sewage Disposal

(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	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
6000:					
Manlywham	60	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Seepage	1.00
		Seepage, bottom layer	1.00	Depth to saturated zone	1.00
Nohokomeen	15	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Seepage	1.00
		Seepage, bottom layer	1.00	Depth to saturated zone	1.00
Roland	15	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Seepage	1.00
		Seepage, bottom layer	1.00	Depth to saturated zone	1.00
6009:					
Ragged, deciduous	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		
		Large stones	0.09		
Tricouni, deciduous	30	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
Cosho	15	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
6010:					
Roland	40	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Seepage	1.00
		Seepage, bottom layer	1.00	Depth to saturated zone	1.00
		Slope	0.16	Slope	1.00

Table 20.—Sewage Disposal—Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
6010:					
Skymo	25	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Seepage	1.00
		Seepage, bottom layer	1.00	Depth to saturated zone	1.00
		Filtering capacity	1.00	Slope	1.00
		Slope	0.16		
Deerlick	20	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Seepage	1.00
		Seepage, bottom layer	1.00	Depth to saturated zone	1.00
				Slope	0.08
6014:					
Thorton	40	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
Ragged	25	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		
		Large stones	0.09		
Ledeir	15	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
6015:					
Tricouni	50	Very limited		Very limited	
		Slope	1.00	Seepage	1.00
		Seepage, bottom layer	1.00	Slope	1.00
Ragged	25	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00	Slope	1.00
		Slope	1.00		
		Large stones	0.09		
Easy	15	Very limited		Very limited	
		Slope	1.00	Seepage	1.00
		Seepage, bottom layer	1.00	Slope	1.00
6500:					
Sandalee	40	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Seepage	1.00
		Seepage, bottom layer	1.00	Depth to saturated zone	1.00
				Slope	0.68

Table 20.—Sewage Disposal—Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
6500:					
Kettling	25	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Seepage	1.00
		Seepage, bottom layer	1.00	Depth to saturated zone	1.00
		Filtering capacity	1.00	Slope	0.68
Torment	20	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Seepage	1.00
		Seepage, bottom layer	1.00	Depth to saturated zone	1.00
		Filtering capacity	1.00	Slope	0.68
6502:					
Mesahchie	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
Inspiration	25	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
Lyall	15	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
6505:					
Farway	50	Very limited		Very limited	
		Slope	1.00	Seepage	1.00
		Seepage, bottom layer	1.00	Slope	1.00
Lyall	30	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
		Slope	1.00	Slope	1.00
Inspiration	15	Very limited		Very limited	
		Slope	1.00	Seepage	1.00
		Seepage, bottom layer	1.00	Slope	1.00
7003:					
Damnation	50	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Large stones	0.06	Large stones	0.73

Table 20.—Sewage Disposal—Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
7003:					
Ragged	25	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		
		Large stones	0.09		
Rock outcrop	15	Not rated		Not rated	
7015:					
Thorton	40	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
Ragged	25	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		
		Large stones	0.09		
Damnation	15	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Large stones	0.06	Large stones	0.73
7500:					
Inspiration	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
Mesahchie	25	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
Sawtooth	15	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
7501:					
Despair	40	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
Goode	30	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
Rock outcrop	15	Not rated		Not rated	

Table 20.—Sewage Disposal—Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
7502:					
Farway	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
Sawtooth	25	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
Despair	15	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
8000:					
Beaverpass	40	Very limited		Very limited	
		Flooding	1.00	Ponding	1.00
		Ponding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Seepage	1.00
				Depth to saturated zone	1.00
		Seepage, bottom layer	1.00		
Purple	30	Very limited		Very limited	
		Flooding	1.00	Ponding	1.00
		Ponding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Seepage	1.00
				Depth to saturated zone	1.00
		Seepage, bottom layer	1.00	Slope	0.68
Bacon	15	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Seepage	1.00
				Depth to saturated zone	1.00
		Seepage, bottom layer	1.00	Slope	0.68
8006:					
Stetattle, deciduous	60	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Large stones	1.00	Large stones	1.00
Forbidden	15	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
Triumph	15	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Large stones	0.99	Depth to soft bedrock	0.68
		Depth to bedrock	0.88	Large stones	0.46

Table 20.—Sewage Disposal—Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
8007:					
Kimtah	40	Very limited		Very limited	
		Depth to saturated zone	1.00	Seepage	1.00
		Slope	1.00	Depth to saturated zone	1.00
		Slow water movement	0.75	Slope	1.00
Bacon	30	Very limited		Very limited	
		Flooding	1.00	Ponding	1.00
		Ponding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Seepage	1.00
		Seepage, bottom layer	1.00	Depth to saturated zone	1.00
				Slope	0.68
Yawning	15	Very limited		Very limited	
		Slope	1.00	Seepage	1.00
		Seepage, bottom layer	1.00	Slope	1.00
		Large stones	0.35		
8009:					
Chilliwack, warm	40	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
Perfect	30	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		
Terror	15	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Slope	1.00
		Slope	1.00	Seepage	1.00
		Seepage, bottom layer	1.00	Depth to saturated zone	1.00
8010:					
Perfect	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		
Spickard	20	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		
Stetattle, deciduous	15	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Large stones	1.00	Large stones	1.00

Table 20.—Sewage Disposal—Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
8011:					
Chilliwack	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
Forbidden, cold	30	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
Stetattle, deciduous	15	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Large stones	1.00	Large stones	1.00
8014:					
Chilliwack, dry	40	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
Tepeh	30	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
Kimtah, dry	15	Very limited		Very limited	
		Depth to saturated zone	1.00	Slope	1.00
		Slope	1.00	Seepage	1.00
		Slow water movement	0.75	Depth to saturated zone	1.00
8500:					
Primus	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
Noca	20	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
Stehekin	20	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Large stones	0.01	Large stones	0.07
8501:					
Stehekin	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Large stones	0.01	Large stones	0.07

Table 20.—Sewage Disposal—Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
8501:					
Primus	30	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
9001:					
Noca	40	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
Perfect, dry	30	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		
9003:					
Stetattle	30	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Large stones	1.00	Large stones	1.00
Doubtful	25	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		
Arriva	20	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		
9008:					
Mox	30	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
Doubtful	20	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		
Perfect, cold	15	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		

Table 20.—Sewage Disposal—Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
9010:					
Doubtful	30	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		
Treen	25	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
				Organic matter content	1.00
Rock outcrop	15	Not rated		Not rated	
9012:					
Spickard	40	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		
Tepeh, moist	25	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
Maggib	15	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
9016:					
Doubtful	30	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		
Triumph	20	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Large stones	0.99	Depth to soft bedrock	0.68
		Depth to bedrock	0.88	Large stones	0.46
Perfect, cold	15	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		

Table 20.—Sewage Disposal—Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
9501:					
Stehekin	40	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Large stones	0.01	Large stones	0.07
Primus	25	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
Stetattle	15	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Large stones	1.00	Large stones	1.00
9997:					
Rock outcrop	70	Not rated		Not rated	
Despair	15	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
9998:					
Rock outcrop	60	Not rated		Not rated	
Glaciers	15	Not rated		Not rated	
Harlequin	15	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
9999:					
Water, freshwater	100	Not rated		Not rated	

Table 21.—Hydric Soils

(Only hydric components are shown in this table. Map units that do not have hydric components are not included in the table. Definitions of hydric criteria codes are given at the end of the table.)

Map symbol and map unit name	Component	Pct. of map unit	Hydric	Landform	Hydric soils criteria			
					Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
6000:								
Manlywham-Nohokomeen-Roland complex, 0 to 5 percent slopes	Manlywham	60	Yes	Depressions, flood plains	2B3, 3	Yes	No	Yes
6010:								
Roland-Skymo-Deerlick complex, 0 to 25 percent slopes	Manlywham	5	Yes	Depressions, flood plains	2B3, 3	Yes	No	Yes
6500:								
Sandalee-Kettling-Torment complex, 0 to 15 percent slopes	Manlywham	10	Yes	Depressions, flood plains	2B3, 3	Yes	No	Yes
8000:								
Beaverpass-Purple-Bacon complex, 0 to 15 percent slopes	Beaverpass	40	Yes	Terraces, flood plains, depressions	1, 3	No	No	Yes
	Purple	30	Yes	Flood plains, depressions	2B3, 3	Yes	No	Yes
	Bacon	15	Yes	Terraces, flood plains, depressions	2B3, 3	Yes	No	Yes
8006:								
Stetattle-Forbidden-Triumph complex, 15 to 65 percent slopes	Bacon	5	Yes	Terraces, flood plains, depressions	2B3, 3	Yes	No	Yes

Table 21.—Hydric Soils—Continued

Map symbol and map unit name	Component	Pct. of map unit	Hydric	Landform	Hydric soils criteria			
					Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
8007:								
Kimtah-Bacon-Yawning complex, 0 to 35 percent slopes	Bacon	30	Yes	Terraces, flood plains, depressions	2B3, 3	Yes	No	Yes
	Purple	10	Yes	Flood plains, depressions	2B3, 3	Yes	No	Yes

Definition of hydric criteria codes:

1. All Histels except for Folistels, and Histosols except for Folists.
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 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 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 inches per hour 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 inches per hour 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 22.—Lab-sampled Pedon Information

Correlated soil name	Pedon type	Soil name of sample	User site identification	User pedon identification	Lab pedon number
Beaverpass	Typical pedon for series	Beaver	07WA073104	07WA073104	08N0357
Beaverpass	Within range of series	Purple	05WA057106	05WA057106	08N0317
Chilliwack	Typical pedon for series	Chilliwack	05WA057101	05WA057101	06N0802
Chilliwack	Within range of series	Chilliwack	07WA007001	07WA007001	08N0358
Deerlick	Within range of series	Deerlick	07WA073101	07WA073101	08N0319
Doubtful	Within range of series	Doubtful	05WA007101	05WA007101	06N0803
Doubtful	Within range of series	Doubtful	09WA073101	09WA073101	10N0842
Easy	Typical pedon for series	Easy	05WA057103	05WA057103	06N0800
Farway	Within range of series	Pasayten	06WA007101	06WA007101	08N0314
Forbidden	Typical pedon for series	Forbidden	05WA057104	05WA057104	06N0801
Inspiration	Within range of series	Inspiration	06WA007102	06WA007102	08N0315
Ragged	Within range of series	Ragged	07WA073103	07WA073103	08N0318
Stetattle	Within range of series	Stetattle	05WA057102	05WA057102	06N0798
Tepeh	Within range of series	Tepeh	05WA057105	05WA057105	06N0799
Treen	Within range of series	Treen	05WA007102	05WA007102	08N0313
Treen	Within range of series	Treen	08WA073101	08WA073101	09N0408
Tricouni	Within range of series	Tricouni	07WA073102	07WA073102	08N0320
Yawning	Within range of series	Yawning	06WA007103	06WA007103	08N0316

Table 23.—Engineering Properties

(Absence of an entry indicates that data were not estimated.)

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
6000:												
Manlywham-------	0-6	Sandy loam, mucky sandy loam, mucky fine sandy loam	OH, SM	A-1, A-2	0	0	55-95	50-90	25-75	10-50	35-75	NP-5
	6-24	Gravelly loamy sand, cobbly fine sandy loam, sandy loam	SM, GP-GM	A-2, A-5, A-1	0	0-25	55-95	50-90	25-75	10-50	30-45	NP-5
	24-60	Cobbly coarse sand, very gravelly loamy coarse sand, gravelly sandy loam	SC-SM, SM, SP-SM	A-2, A-1	0	0-15	60-85	55-80	30-60	5-30	10-20	NP-5
	60-104	Very gravelly coarse sand, cobbly loamy coarse sand	SC-SM, SM, SP	A-2, A-1	0	0-25	55-85	50-80	25-60	0-25	10-20	NP-5
	104-150	Very gravelly coarse sand, cobbly loamy coarse sand, very cobbly loamy coarse sand	SP-SM, SM, SC-SM	A-2, A-1	0	0-25	65-80	60-75	30-60	5-25	10-20	NP-5
Nohokomeen------	0-3	Slightly decomposed plant material	PT	A-8	0	0	100	100	35-95	15-65	---	---
	3-7	Moderately decomposed plant material	PT	A-8	0	0	100	100	35-95	15-65	---	---
	7-30	Ashy sandy loam, gravelly ashy fine sandy loam, ashy very fine sandy loam	SM, CL	A-2, A-1, A-4	0-10	0-30	60-100	55-100	35-95	15-65	10-30	NP-10
	30-73	Ashy sandy loam, gravelly ashy fine sandy loam, ashy silt loam	SM, CL	A-2, A-1, A-4	0-10	0-20	70-100	65-100	40-100	20-100	10-30	NP-10
	73-108	Very fine sandy loam, gravelly fine sandy loam, sandy loam	SM, ML, CL	A-4, A-1, A-2	0-10	0-20	70-100	65-100	40-95	20-65	10-30	NP-10
	108-152	Very gravelly loamy sand, very cobbly sandy loam, extremely gravelly coarse sand	GP, SM, SC-SM	A-1	0-15	10-45	40-65	35-60	20-45	0-20	10-25	NP-5

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
6000:												
Roland----------	0-3	Moderately decomposed plant material	PT	A-8	0	0	100	100	50-85	30-55	---	---
	3-17	Fine sandy loam	ML, SM	A-2, A-4	0	0	75-100	70-100	50-85	30-55	20-40	NP-5
	17-42	Fine sandy loam, gravelly sandy loam, very fine sandy loam	ML, GM	A-1, A-4	0	0-40	55-100	50-100	30-95	15-65	0-30	NP-5
	42-78	Very fine sandy loam, gravelly sandy loam, fine sandy loam	ML, GM	A-1, A-4	0	0-40	55-100	50-100	30-95	15-65	0-30	NP-5
	78-137	Loamy sand, gravelly fine sandy loam, cobbly sandy loam	SM, ML, SP-SM	A-4, A-1, A-2	0	0-40	60-100	55-100	30-85	10-55	0-30	NP-5
	137-152	Sand, gravelly sandy loam, cobbly coarse sand	SP-SM, SC-SM	A-4, A-1, A-3	0	0-40	60-100	55-100	30-70	5-40	0-20	NP-5
6009:												
Ragged, deciduous------	0-2	Slightly decomposed plant material	PT	A-8	0	0	100	100	20-70	5-35	---	---
	2-5	Moderately decomposed plant material	PT	A-8	0	0	100	100	20-70	5-35	---	---
	5-20	Gravelly ashy loamy sand, very gravelly ashy sandy loam, cobbly ashy coarse sandy loam	GP-GM, SC-SM, SC	A-1, A-2	0-20	0-45	45-95	40-90	20-70	5-35	10-25	NP-10
	20-34	Very gravelly ashy loamy sand, very cobbly coarse sandy loam, ashy sandy loam	GP-GM, SC-SM, SC	A-2, A-1	0-20	0-50	45-95	40-90	20-70	5-35	10-25	NP-10
	34-150	Extremely gravelly loamy coarse sand, very cobbly loamy sand, extremely cobbly sand	GW, GP-GM, SC-SM	A-1, A-2	0-20	0-45	30-90	25-85	10-70	0-25	10-25	NP-5

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
6009:												
Tricouni, deciduous	0-3	Slightly decomposed plant material	PT	A-8	0	0	100	100	45-70	25-40	---	---
	3-9	Moderately decomposed plant material	PT	A-8	0	0	100	100	45-70	25-40	---	---
	9-10	Ashy sandy loam	SM	A-2, A-4, A-1	0	0	80-100	75-100	45-70	25-40	15-40	NP-5
	10-28	Gravelly ashy sandy loam, very gravelly ashy sandy loam, gravelly ashy fine sandy loam	GP-GM, GM	A-1, A-4	0	0-25	30-90	25-85	15-75	10-50	15-40	NP-5
	28-60	Very gravelly coarse sandy loam, gravelly sandy loam, very gravelly sandy loam	GP-GM, GM	A-2, A-1	0-5	0-30	25-95	20-90	10-65	5-35	15-35	NP-5
	60-104	Gravelly sandy loam, very gravelly coarse sandy loam, gravelly loamy sand	GP, GM	A-1	0-5	10-30	25-60	20-55	10-45	0-25	15-35	NP-5
	104-152	Gravelly sandy loam, very gravelly coarse sandy loam, very gravelly loamy sand	GW-GM, GP-GM, GC-GM	A-1	0-5	5-25	30-65	25-60	15-45	5-25	10-25	NP-5
Cosho	0-6	Slightly decomposed plant material	PT	A-8	0	0	100	100	20-85	5-55	---	---
	6-14	Moderately decomposed plant material	PT	A-8	0	0	100	100	20-85	5-55	---	---
	14-15	Gravelly ashy sandy loam, gravelly ashy fine sandy loam, ashy loamy sand	GP-GM, SM, CL-ML	A-2, A-4, A-1	0-10	0-25	45-100	40-100	20-85	5-55	0-25	NP-5
	15-53	Gravelly ashy sandy loam, gravelly ashy fine sandy loam, ashy loamy sand	GP-GM, GM, GC-GM	A-1, A-2, A-4	0-10	0-25	45-75	40-70	20-60	5-40	0-25	NP-5
	53-75	Very gravelly loamy sand, very gravelly coarse sandy loam, extremely gravelly loamy coarse sand	GW-GM, GM, GC-GM	A-1	0-15	15-25	30-60	25-55	15-45	5-25	10-20	NP-5
	75-90	Very gravelly loamy sand, very gravelly loamy coarse sand, extremely gravelly sand	GP, GP-GM, GC-GM	A-1	0-15	15-30	25-55	20-50	10-45	0-15	10-20	NP-5
	90-152	Unweathered bedrock			---	---	---	---	---	---	---	---

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
6010:												
Roland	0-3	Moderately decomposed plant material	PT	A-8	0	0	100	100	50-85	30-55	---	---
	3-17	Fine sandy loam	ML, SM	A-2, A-4	0	0	75-100	70-100	50-85	30-55	20-40	NP-5
	17-42	Fine sandy loam, gravelly sandy loam, very fine sandy loam	ML, GM	A-1, A-4	0	0-40	55-100	50-100	30-95	15-65	0-30	NP-5
	42-78	Very fine sandy loam, gravelly sandy loam, fine sandy loam	ML, GM	A-1, A-4	0	0-40	55-100	50-100	30-95	15-65	0-30	NP-5
	78-137	Loamy sand, gravelly fine sandy loam, cobbly sandy loam	SM, ML, SP-SM	A-4, A-1, A-2	0	0-40	60-100	55-100	30-85	10-55	0-30	NP-5
	137-152	Sand, gravelly sandy loam, cobbly coarse sand	SP-SM, SC-SM	A-4, A-1, A-3	0	0-40	60-100	55-100	30-70	5-40	0-20	NP-5
Skymo	0-2	Slightly decomposed plant material	PT	A-8	0	0	100	100	45-70	5-15	---	---
	2-10	Coarse sand	SP-SM, SC-SM	A-2, A-3, A-1	0	0	95-100	85-100	45-70	5-15	0-20	NP-5
	10-16	Gravelly sandy loam, loamy sand, loamy fine sand	SM, GP-GM	A-2, A-1, A-4	0	0-30	55-100	50-100	25-90	10-50	20-40	NP-5
	16-34	Gravelly loamy coarse sand, loamy sand, sand	SP-SM, SC-SM	A-3, A-1, A-2	0	0-25	60-100	55-100	30-75	5-30	0-20	NP-5
	34-40	Sandy loam, gravelly loamy sand, sand	SM, SP	A-2, A-1, A-4	0	0-30	55-100	50-100	25-75	0-40	20-40	NP-5
	40-45	Gravelly sand, loamy coarse sand, loamy sand	SM, SP-SM	A-1, A-2	0	0-25	60-100	55-100	30-75	5-30	0-30	NP-5
	45-66	Loamy sand, loamy coarse sand, gravelly sand	SP-SM, SM	A-1, A-2	0	0-25	60-100	55-100	30-75	5-30	0-30	NP-5
	66-90	Loamy coarse sand, gravelly coarse sand, loamy sand	SP-SM, SC-SM, SM	A-2, A-1	0	0-25	60-100	55-100	30-75	5-30	0-25	NP-5
	90-152	Gravelly loamy sand, gravelly coarse sand, gravelly sand	SP-SM, SC-SM	A-1, A-2	0	0-20	60-100	55-100	30-75	5-30	0-20	NP-5

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
6010:												
Deerlick	0-3	Slightly decomposed plant material	PT	A-8	0	0	100	100	40-100	20-100	---	---
	3-10	Moderately decomposed plant material	PT	A-8	0	0	100	100	40-100	20-100	---	---
	10-14	Ashy silt loam, ashy fine sandy loam, ashy sandy loam	OL, SM, ML	A-5, A-4, A-1	0	0-30	70-100	65-100	40-100	20-100	25-45	NP-5
	14-22	Very cobbly ashy sand, gravelly ashy fine sandy loam, ashy sandy loam	GP-GM, SM, ML	A-1, A-4	0	0-35	45-100	40-100	25-95	10-75	5-30	NP-5
	22-30	Stratified very cobbly ashy sand, stratified gravelly ashy coarse sand, stratified gravelly ashy loamy coarse sand	SC-SM, SM, GP	A-2, A-1	0	0-25	45-80	40-75	20-60	0-25	0-20	NP-5
	30-50	Stratified very cobbly ashy sand, stratified gravelly ashy loamy coarse sand, stratified very gravelly ashy coarse sand	GP, GM, SC-SM	A-2, A-1	0	0-25	45-80	40-75	20-60	0-25	0-20	NP-5
	50-64	Very cobbly loamy sand, gravelly fine sandy loam, very fine sandy loam	CL-ML, SM, SP-SM	A-4, A-2, A-1	0	0-20	60-100	55-100	30-95	10-65	15-20	NP-5
	64-80	Cobbly loamy sand, very gravelly loamy very fine sand, very fine sand	CL-ML, SM, SP-SM	A-4, A-2, A-1	0	0-25	60-100	55-100	30-95	10-65	15-20	NP-5
	80-152	Very gravelly sandy loam, extremely cobbly loamy sand, extremely cobbly sand	GC-GM, GP-GM, GW	A-1	0-10	20-50	30-55	25-50	15-45	0-20	10-20	NP-5

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
6014:												
Thorton	0-4	Slightly decomposed plant material	PT	A-8	0	0	100	100	30-85	15-55	---	---
	4-8	Moderately decomposed plant material	PT	A-8	0	0	100	100	30-85	15-55	---	---
	8-12	Ashy sandy loam, gravelly ashy sandy loam, ashy fine sandy loam	SM, GM, CL-ML	A-4, A-2, A-1	0-15	0-30	55-100	50-100	30-85	15-55	0-25	NP-5
	12-30	Gravelly ashy sandy loam, ashy fine sandy loam, gravelly ashy coarse sandy loam	GM, GP-GM	A-1, A-2, A-4	0-20	0-20	40-75	35-70	25-60	10-40	0-30	NP-5
	30-46	Gravelly ashy sandy loam, gravelly ashy coarse sandy loam, very gravelly ashy sandy loam	GM, GP-GM, SC-SM	A-1, A-2	0-20	0-20	40-75	35-70	25-50	10-30	0-25	NP-5
	46-60	Very gravelly sandy loam, very gravelly loamy sand, extremely gravelly sandy loam	GP-GM, GC-GM	A-1	0-15	5-35	35-60	30-55	15-45	5-25	10-20	NP-5
	60-150	Very gravelly sandy loam, very gravelly loamy sand, extremely gravelly sandy loam	GM, GP-GM, GC-GM	A-1	0-15	5-40	35-60	30-55	15-45	5-25	10-20	NP-5
Ragged	0-2	Slightly decomposed plant material	PT	A-8	0	0	100	100	20-70	5-35	---	---
	2-5	Moderately decomposed plant material	PT	A-8	0	0	100	100	20-70	5-35	---	---
	5-20	Gravelly ashy loamy sand, very gravelly ashy sandy loam, cobbly ashy coarse sandy loam	GP-GM, SC-SM, SC	A-1, A-2	0-20	0-45	45-95	40-90	20-70	5-35	10-25	NP-10
	20-34	Very gravelly ashy loamy sand, very cobbly coarse sandy loam, ashy sandy loam	GP-GM, SC-SM, SC	A-2, A-1	0-20	0-50	45-95	40-90	20-70	5-35	10-25	NP-10
	34-150	Extremely gravelly loamy coarse sand, very cobbly loamy sand, extremely cobbly sand	GW, GP-GM, SC-SM	A-1, A-2	0-20	0-45	30-90	25-85	10-70	0-25	10-25	NP-5

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
6014:												
Ledeir	0-2	Slightly decomposed plant material	PT	A-8	0	0	100	100	25-85	10-55	---	---
	2-12	Moderately decomposed plant material	PT	A-8	0	0	100	100	25-85	10-55	---	---
	12-20	Ashy sandy loam, ashy fine sandy loam, gravelly ashy sandy loam	GP-GM, SM, ML	A-1, A-2, A-4	0-15	0-35	45-100	40-100	25-85	10-55	0-30	NP-5
	20-50	Ashy sandy loam, ashy fine sandy loam, gravelly ashy sandy loam	GP-GM, SM, ML	A-1, A-4, A-2	0-10	0-40	45-100	40-100	25-85	10-55	0-35	NP-5
	50-82	Ashy fine sandy loam, ashy sandy loam, gravelly ashy sandy loam	GM, SM, ML	A-1, A-4, A-2	0-15	0-40	50-100	45-100	30-85	15-55	0-30	NP-5
	82-152	Very gravelly loamy sand, very gravelly loamy coarse sand, very cobbly sand	GP, GP-GM, GC-GM	A-1	0-15	0-25	40-55	35-50	20-45	0-15	0-20	NP-5
6015:												
Tricouni	0-3	Slightly decomposed plant material	PT	A-8	0	0	100	100	45-70	25-40	---	---
	3-9	Moderately decomposed plant material	PT	A-8	0	0	100	100	45-70	25-40	---	---
	9-10	Ashy sandy loam	SM	A-2, A-4, A-1	0	0	80-100	75-100	45-70	25-40	15-40	NP-5
	10-28	Gravelly ashy sandy loam, very gravelly ashy sandy loam, gravelly ashy fine sandy loam	GP-GM, GM	A-1, A-4	0	0-25	30-90	25-85	15-75	10-50	15-40	NP-5
	28-60	Very gravelly coarse sandy loam, gravelly sandy loam, very gravelly sandy loam	GP-GM, GM	A-2, A-1	0-5	0-30	25-95	20-90	10-65	5-35	15-35	NP-5
	60-104	Gravelly sandy loam, very gravelly coarse sandy loam, gravelly loamy sand	GP, GM	A-1	0-5	10-30	25-60	20-55	10-45	0-25	15-35	NP-5
	104-152	Gravelly sandy loam, very gravelly coarse sandy loam, very gravelly loamy sand	GW-GM, GP-GM, GC-GM	A-1	0-5	5-25	30-65	25-60	15-45	5-25	10-25	NP-5

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
6015:												
Ragged----------	0-2	Slightly decomposed plant material	PT	A-8	0	0	100	100	20-70	5-35	---	---
	2-5	Moderately decomposed plant material	PT	A-8	0	0	100	100	20-70	5-35	---	---
	5-20	Gravelly ashy loamy sand, very gravelly ashy sandy loam, cobbly ashy coarse sandy loam	GP-GM, SC-SM, SC	A-1, A-2	0-20	0-45	45-95	40-90	20-70	5-35	10-25	NP-10
	20-34	Very gravelly ashy loamy sand, very cobbly coarse sandy loam, ashy sandy loam	GP-GM, SC-SM, SC	A-2, A-1	0-20	0-50	45-95	40-90	20-70	5-35	10-25	NP-10
	34-150	Extremely gravelly loamy coarse sand, very cobbly loamy sand, extremely cobbly sand	GW, GP-GM, SC-SM	A-1, A-2	0-20	0-45	30-90	25-85	10-70	0-25	10-25	NP-5
Easy----------	0-3	Slightly decomposed plant material	PT	A-8	0	0	100	100	20-85	5-55	---	---
	3-6	Moderately decomposed plant material	PT	A-8	0	0	100	100	20-85	5-55	---	---
	6-12	Gravelly ashy loamy sand, ashy fine sandy loam, ashy sandy loam	GP-GM, SM, ML	A-4, A-1, A-2	0-15	0-25	45-100	40-100	20-85	5-55	15-30	NP-5
	12-28	Gravelly ashy sandy loam, gravelly ashy fine sandy loam, ashy sandy loam	GP-GM, GM	A-2, A-1, A-4	0-10	0-20	40-75	35-70	25-60	10-40	0-30	NP-5
	28-41	Gravelly ashy sandy loam, gravelly ashy fine sandy loam, very gravelly ashy sandy loam	GW-GM, GM	A-2, A-1, A-4	0-10	0-35	35-75	30-70	15-60	10-40	0-30	NP-5
	41-66	Extremely gravelly sandy loam, very gravelly coarse sandy loam, extremely gravelly loamy coarse sand	GP-GM, GW-GM, GM	A-1	0-10	10-25	35-50	30-45	15-35	5-20	10-25	NP
	66-150	Extremely gravelly coarse sandy loam, very gravelly coarse sandy loam, extremely gravelly loamy sand	GP-GM, GW-GM, GM	A-1	0-15	10-30	35-55	30-50	15-35	5-20	10-20	NP

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
6500:												
Sandalee	0-2	Slightly decomposed plant material	PT	A-8	0	0	100	100	45-85	25-55	---	---
	2-11	Sandy loam, fine sandy loam, ashy sandy loam	SM, OL	A-2, A-1, A-5	0	0-10	85-100	80-100	45-85	25-55	15-45	NP-5
	11-40	Fine sandy loam, sandy loam, very fine sandy loam	SM, ML	A-4, A-1, A-2	0	0-20	85-100	80-100	45-95	25-65	15-30	NP-5
	40-56	Fine sandy loam, sandy loam	SM, CL-ML	A-4, A-2	0	0-30	90-100	85-100	55-85	25-55	15-25	NP-5
	56-80	Fine sandy loam, sandy loam, loamy fine sand	SM, CL-ML	A-4, A-2	0	0-15	90-100	85-100	70-90	25-55	15-25	NP-5
	80-152	Loamy coarse sand, loamy sand, coarse sand	SP-SM, SM, SC-SM	A-2, A-1	0-10	0-15	70-100	65-100	35-75	5-30	10-20	NP-5
Kettling	0-2	Slightly decomposed plant material	PT	A-8	0	0	100	100	45-70	25-40	---	---
	2-5	Moderately decomposed plant material	PT	A-8	0	0	100	100	45-70	25-40	---	---
	5-13	Sandy loam	SM	A-2, A-1, A-4	0	0-10	85-100	80-100	45-70	25-40	20-40	NP-5
	13-25	Loam, sandy loam, fine sandy loam	ML, CL-ML, GM	A-1, A-4	0	0-25	50-100	45-100	30-95	15-75	15-30	NP-5
	25-60	Fine sandy loam, sandy loam, loam	GM, ML	A-4, A-1	0	0-20	55-100	50-100	30-95	15-75	15-30	NP-5
	60-90	Coarse sand, loamy coarse sand, loamy sand	GP, SC-SM, SW-SM	A-3, A-2, A-1	0-10	0-35	40-95	35-90	20-70	0-25	0-20	NP-5
	90-152	Sandy loam, loamy fine sand, loamy coarse sand	GP-GM, SM, SC-SM	A-1, A-4, A-2	0-10	0-25	55-95	50-90	25-80	10-40	0-25	NP-5

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
6500:												
Torment	0-2	Slightly decomposed plant material	PT	A-8	0	0	100	100	40-75	15-30	---	---
	2-15	Loamy sand	SM, SC-SM	A-1, A-2	0	0-10	90-100	85-100	40-75	15-30	0-20	NP-5
	15-25	Highly decomposed plant material	PT	A-8	0	0	100	100	25-70	0-25	---	---
	25-35	Gravelly coarse sand, gravelly loamy coarse sand, gravelly loamy sand	SP-SM, SM, SP	A-2, A-1	0	0-20	60-95	55-90	25-70	0-25	0-30	NP-5
	35-70	Very gravelly coarse sand, very gravelly loamy coarse sand, very gravelly loamy sand	SP-SM, SC-SM, GP	A-1	0-5	10-30	35-80	30-75	15-50	0-20	0-25	NP-5
	70-152	Very gravelly loamy sand, very gravelly loamy fine sand, very gravelly loamy coarse sand	SM, SC-SM, GP-GM	A-4, A-1	0-5	0-20	55-95	50-90	25-80	10-40	0-20	NP-5
6502:												
Mesahchie	0-2	Moderately decomposed plant material	PT	A-8	0	0	100	100	25-75	10-50	---	---
	2-20	Gravelly ashy fine sandy loam, very gravelly ashy sandy loam, gravelly ashy coarse sandy loam	GP-GM, SM	A-2, A-1, A-4	0-20	10-35	40-90	35-85	25-75	10-50	25-40	NP-5
	20-44	Gravelly ashy sandy loam, very gravelly ashy fine sandy loam, gravelly ashy coarse sandy loam	SM, GP-GM	A-1, A-5	0-20	10-35	45-90	40-85	25-75	10-50	25-55	NP-5
	44-74	Very cobbly ashy sandy loam, very gravelly ashy coarse sandy loam, gravelly ashy sandy loam	GP-GM, GM, SM	A-1	0-15	10-30	45-90	40-85	25-65	10-35	25-45	NP-5
	74-96	Very gravelly sandy loam, cobbly coarse sandy loam, very cobbly loamy sand	GP-GM, GM	A-1	0-15	15-30	45-60	40-55	20-45	5-25	0-35	NP-5
	96-152	Very gravelly loamy sand, cobbly loamy coarse sand, very cobbly loamy sand	GP-GM, GC-GM	A-1	0-15	15-40	40-60	35-55	20-45	5-20	0-25	NP-5

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
6502:												
Inspiration-----	0-2	Slightly decomposed plant material	PT	A-8	0	0	100	100	15-60	10-40	---	---
	2-9	Moderately decomposed plant material	PT	A-8	0	0	100	100	15-60	10-40	---	---
	9-15	Highly decomposed plant material	PT	A-8	0	0	100	100	15-60	10-40	---	---
	15-25	Very gravelly ashy sandy loam, very gravelly ashy fine sandy loam, gravelly ashy sandy loam	GM, GP-GM	A-1, A-4	0-10	10-50	30-75	25-70	15-60	10-40	25-35	NP-5
	25-37	Extremely cobbly ashy sandy loam, very gravelly ashy fine sandy loam, very gravelly ashy sandy loam	GM, GP-GM	A-1, A-4	0-5	15-50	25-70	20-65	10-60	5-40	25-35	NP-5
	37-64	Very gravelly ashy sandy loam, cobbly ashy fine sandy loam, cobbly ashy sandy loam	GM, GP-GM	A-1, A-2, A-4	0-30	10-45	30-75	25-70	15-60	10-40	25-35	NP-5
	64-150	Extremely gravelly sandy loam, very gravelly coarse sandy loam, very cobbly coarse sandy loam	GM, GP-GM	A-1	0-20	15-35	35-60	30-55	15-40	10-25	10-20	NP-2

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
6502:												
Lyall----------	0-4	Slightly decomposed plant material	PT	A-8	0	0	100	100	35-60	15-40	---	---
	4-7	Moderately decomposed plant material	PT	A-8	0	0	100	100	35-60	15-40	---	---
	7-19	Gravelly ashy coarse sandy loam, very gravelly ashy sandy loam, ashy fine sandy loam	SM	A-5, A-1	0-10	0-25	60-80	55-75	35-60	15-40	20-55	NP-5
	19-44	Very gravelly ashy coarse sandy loam, gravelly ashy loamy sand, gravelly ashy sandy loam	GP-GM, GW-GM, GM	A-1, A-2	0-5	0-35	30-70	25-65	15-50	5-30	20-35	NP-5
	44-75	Very gravelly loamy sand, very gravelly ashy coarse sandy loam, gravelly ashy sandy loam	GP-GM, GW-GM, GM	A-1	0-5	5-35	30-65	25-60	15-45	5-25	20-35	NP-5
	75-120	Very gravelly loamy sand, extremely gravelly coarse sandy loam, extremely gravelly loamy sand	GP-GM, GW-GM, GM	A-1, A-2	0-5	5-35	30-70	25-65	15-50	5-30	15-30	NP-5
	120-150	Extremely gravelly loamy sand, very gravelly coarse sand, very gravelly coarse sandy loam	GW-GM, GW, GC-GM	A-1	0-10	15-40	35-60	20-55	10-45	0-25	10-25	NP-5

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
6505:												
Farway----------	0-3	Moderately decomposed plant material	PT	A-8	0	0	100	100	30-85	15-55	---	---
	3-45	Ashy fine sandy loam, gravelly ashy fine sandy loam	GM, SM, ML	A-1, A-2, A-4	0-15	0-40	50-100	45-100	30-85	15-55	15-35	NP-5
	45-78	Cobbly ashy sandy loam, gravelly ashy fine sandy loam	GP-GM, SM, ML	A-1, A-2, A-4	0-10	0-40	45-100	40-100	25-85	10-55	25-35	NP-5
	78-90	Cobbly ashy sandy loam, gravelly ashy fine sandy loam	GM, SM, ML	A-1, A-4	0-10	0-35	50-100	45-100	30-85	15-55	25-35	NP-5
	90-152	Very gravelly sandy loam, very gravelly fine sandy loam, extremely cobbly coarse sandy loam	GP-GM, GM	A-1, A-2	0-15	10-45	25-60	20-60	10-50	5-35	15-30	NP-5
Lyall----------	0-4	Slightly decomposed plant material	PT	A-8	0	0	100	100	35-60	15-40	---	---
	4-7	Moderately decomposed plant material	PT	A-8	0	0	100	100	35-60	15-40	---	---
	7-19	Gravelly ashy coarse sandy loam, very gravelly ashy sandy loam, ashy fine sandy loam	SM	A-5, A-1	0-10	0-25	60-80	55-75	35-60	15-40	20-55	NP-5
	19-44	Very gravelly ashy coarse sandy loam, gravelly ashy loamy sand, gravelly ashy sandy loam	GP-GM, GW-GM, GM	A-1, A-2	0-5	0-35	30-70	25-65	15-50	5-30	20-35	NP-5
	44-75	Very gravelly loamy sand, very gravelly ashy coarse sandy loam, gravelly ashy sandy loam	GP-GM, GW-GM, GM	A-1	0-5	5-35	30-65	25-60	15-45	5-25	20-35	NP-5
	75-120	Very gravelly loamy sand, extremely gravelly coarse sandy loam, extremely gravelly loamy sand	GP-GM, GW-GM, GM	A-1, A-2	0-5	5-35	30-70	25-65	15-50	5-30	15-30	NP-5
	120-150	Extremely gravelly loamy sand, very gravelly coarse sand, very gravelly coarse sandy loam	GW-GM, GW, GC-GM	A-1	0-10	15-40	35-60	20-55	10-45	0-25	10-25	NP-5

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
6505:												
Inspiration-----	0-2	Slightly decomposed plant material	PT	A-8	0	0	100	100	15-60	10-40	---	---
	2-9	Moderately decomposed plant material	PT	A-8	0	0	100	100	15-60	10-40	---	---
	9-15	Highly decomposed plant material	PT	A-8	0	0	100	100	15-60	10-40	---	---
	15-25	Very gravelly ashy sandy loam, very gravelly ashy fine sandy loam, gravelly ashy sandy loam	GM, GP-GM	A-1, A-4	0-10	10-50	30-75	25-70	15-60	10-40	25-35	NP-5
	25-37	Extremely cobbly ashy sandy loam, very gravelly ashy fine sandy loam, very gravelly ashy sandy loam	GM, GP-GM	A-1, A-4	0-5	15-50	25-70	20-65	10-60	5-40	25-35	NP-5
	37-64	Very gravelly ashy sandy loam, cobbly ashy fine sandy loam, cobbly ashy sandy loam	GM, GP-GM	A-1, A-2, A-4	0-30	10-45	30-75	25-70	15-60	10-40	25-35	NP-5
	64-150	Extremely gravelly sandy loam, very gravelly coarse sandy loam, very cobbly coarse sandy loam	GM, GP-GM	A-1	0-20	15-35	35-60	30-55	15-40	10-25	10-20	NP-2
7003:												
Damnation-------	0-4	Slightly decomposed plant material	PT	A-8	0	0	100	100	15-70	10-40	---	---
	4-6	Highly decomposed plant material	PT	A-8	0	0	100	100	15-70	10-40	---	---
	6-14	Cobbly ashy sandy loam	SC-SM, SM, GW-GM	A-1, A-4	0-15	0-30	35-100	30-100	15-70	10-40	15-25	NP-5
	14-31	Cobbly ashy sandy loam, gravelly ashy sandy loam, ashy fine sandy loam	CL-ML, SM, GW-GM	A-4, A-1	0-15	0-30	35-100	30-100	15-85	10-55	0-25	NP-5
	31-45	Cobbly ashy sandy loam, gravelly ashy sandy loam, gravelly ashy fine sandy loam	CL-ML, SM, GW-GM	A-4, A-1	0-15	0-30	35-100	30-100	15-85	10-55	0-25	NP-5
	45-152	Unweathered bedrock			---	---	---	---	---	---	---	---

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
7003:												
Ragged----------	0-2	Slightly decomposed plant material	PT	A-8	0	0	100	100	20-70	5-35	---	---
	2-5	Moderately decomposed plant material	PT	A-8	0	0	100	100	20-70	5-35	---	---
	5-20	Gravelly ashy loamy sand, very gravelly ashy sandy loam, cobbly ashy coarse sandy loam	GP-GM, SC-SM, SC	A-1, A-2	0-20	0-45	45-95	40-90	20-70	5-35	10-25	NP-10
	20-34	Very gravelly ashy loamy sand, very cobbly coarse sandy loam, ashy sandy loam	GP-GM, SC-SM, SC	A-2, A-1	0-20	0-50	45-95	40-90	20-70	5-35	10-25	NP-10
	34-150	Extremely gravelly loamy coarse sand, very cobbly loamy sand, extremely cobbly sand	GW, GP-GM, SC-SM	A-1, A-2	0-20	0-45	30-90	25-85	10-70	0-25	10-25	NP-5
Rock outcrop----	0-152	Unweathered bedrock			---	---	---	---	---	---	---	---

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
7015:												
Thorton	0-4	Slightly decomposed plant material	PT	A-8	0	0	100	100	30-85	15-55	---	---
	4-8	Moderately decomposed plant material	PT	A-8	0	0	100	100	30-85	15-55	---	---
	8-12	Ashy sandy loam, gravelly ashy sandy loam, ashy fine sandy loam	SM, GM, CL-ML	A-4, A-2, A-1	0-15	0-30	55-100	50-100	30-85	15-55	0-25	NP-5
	12-30	Gravelly ashy sandy loam, ashy fine sandy loam, gravelly ashy coarse sandy loam	GM, GP-GM	A-1, A-2, A-4	0-20	0-20	40-75	35-70	25-60	10-40	0-30	NP-5
	30-46	Gravelly ashy sandy loam, gravelly ashy coarse sandy loam, very gravelly ashy sandy loam	GM, GP-GM, SC-SM	A-1, A-2	0-20	0-20	40-75	35-70	25-50	10-30	0-25	NP-5
	46-60	Very gravelly sandy loam, very gravelly loamy sand, extremely gravelly sandy loam	GP-GM, GC-GM	A-1	0-15	5-35	35-60	30-55	15-45	5-25	10-20	NP-5
	60-150	Very gravelly sandy loam, very gravelly loamy sand, extremely gravelly sandy loam	GM, GP-GM, GC-GM	A-1	0-15	5-40	35-60	30-55	15-45	5-25	10-20	NP-5
Ragged	0-2	Slightly decomposed plant material	PT	A-8	0	0	100	100	20-70	5-35	---	---
	2-5	Moderately decomposed plant material	PT	A-8	0	0	100	100	20-70	5-35	---	---
	5-20	Gravelly ashy loamy sand, very gravelly ashy sandy loam, cobbly ashy coarse sandy loam	GP-GM, SC-SM, SC	A-1, A-2	0-20	0-45	45-95	40-90	20-70	5-35	10-25	NP-10
	20-34	Very gravelly ashy loamy sand, very cobbly coarse sandy loam, ashy sandy loam	GP-GM, SC-SM, SC	A-2, A-1	0-20	0-50	45-95	40-90	20-70	5-35	10-25	NP-10
	34-150	Extremely gravelly loamy coarse sand, very cobbly loamy sand, extremely cobbly sand	GW, GP-GM, SC-SM	A-1, A-2	0-20	0-45	30-90	25-85	10-70	0-25	10-25	NP-5

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
7015:												
Damnation-------	0-4	Slightly decomposed plant material	PT	A-8	0	0	100	100	15-70	10-40	---	---
	4-6	Highly decomposed plant material	PT	A-8	0	0	100	100	15-70	10-40	---	---
	6-14	Cobbly ashy sandy loam	SC-SM, SM, GW-GM	A-1, A-4	0-15	0-30	35-100	30-100	15-70	10-40	15-25	NP-5
	14-31	Cobbly ashy sandy loam, gravelly ashy sandy loam, ashy fine sandy loam	CL-ML, SM, GW-GM	A-4, A-1	0-15	0-30	35-100	30-100	15-85	10-55	0-25	NP-5
	31-45	Cobbly ashy sandy loam, gravelly ashy sandy loam, gravelly ashy fine sandy loam	CL-ML, SM, GW-GM	A-4, A-1	0-15	0-30	35-100	30-100	15-85	10-55	0-25	NP-5
	45-152	Unweathered bedrock			---	---	---	---	---	---	---	---
7500:												
Inspiration-----	0-2	Slightly decomposed plant material	PT	A-8	0	0	100	100	15-60	10-40	---	---
	2-9	Moderately decomposed plant material	PT	A-8	0	0	100	100	15-60	10-40	---	---
	9-15	Highly decomposed plant material	PT	A-8	0	0	100	100	15-60	10-40	---	---
	15-25	Very gravelly ashy sandy loam, very gravelly ashy fine sandy loam, gravelly ashy sandy loam	GM, GP-GM	A-1, A-4	0-10	10-50	30-75	25-70	15-60	10-40	25-35	NP-5
	25-37	Extremely cobbly ashy sandy loam, very gravelly ashy fine sandy loam, very gravelly ashy sandy loam	GM, GP-GM	A-1, A-4	0-5	15-50	25-70	20-65	10-60	5-40	25-35	NP-5
	37-64	Very gravelly ashy sandy loam, cobbly ashy fine sandy loam, cobbly ashy sandy loam	GM, GP-GM	A-1, A-2, A-4	0-30	10-45	30-75	25-70	15-60	10-40	25-35	NP-5
	64-150	Extremely gravelly sandy loam, very gravelly coarse sandy loam, very cobbly coarse sandy loam	GM, GP-GM	A-1	0-20	15-35	35-60	30-55	15-40	10-25	10-20	NP-2

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
7500:												
Mesahchie-------	0-2	Moderately decomposed plant material	PT	A-8	0	0	100	100	25-75	10-50	---	---
	2-20	Gravelly ashy fine sandy loam, very gravelly ashy sandy loam, gravelly ashy coarse sandy loam	GP-GM, SM	A-2, A-1, A-4	0-20	10-35	40-90	35-85	25-75	10-50	25-40	NP-5
	20-44	Gravelly ashy sandy loam, very gravelly ashy fine sandy loam, gravelly ashy coarse sandy loam	SM, GP-GM	A-1, A-5	0-20	10-35	45-90	40-85	25-75	10-50	25-55	NP-5
	44-74	Very cobbly ashy sandy loam, very gravelly ashy coarse sandy loam, gravelly ashy sandy loam	GP-GM, GM, SM	A-1	0-15	10-30	45-90	40-85	25-65	10-35	25-45	NP-5
	74-96	Very gravelly sandy loam, cobbly coarse sandy loam, very cobbly loamy sand	GP-GM, GM	A-1	0-15	15-30	45-60	40-55	20-45	5-25	0-35	NP-5
	96-152	Very gravelly loamy sand, cobbly loamy coarse sand, very cobbly loamy sand	GP-GM, GC-GM	A-1	0-15	15-40	40-60	35-55	20-45	5-20	0-25	NP-5
Sawtooth--------	0-3	Slightly decomposed plant material	PT	A-8	0	0	100	100	25-70	10-40	---	---
	3-15	Gravelly ashy sandy loam	SM, GM, GP-GM	A-4, A-1	0	0-25	40-100	35-100	25-70	10-40	25-35	NP-5
	15-35	Gravelly ashy sandy loam, gravelly ashy fine sandy loam, cobbly ashy sandy loam	ML, GM, GP-GM	A-1, A-4	0	0-25	40-100	35-100	25-85	10-55	25-35	NP-5
	35-45	Gravelly sandy loam, very cobbly coarse sandy loam, very gravelly fine sandy loam	GC-GM, SM, GP-GM	A-4, A-1	0-20	10-45	40-80	35-75	25-65	10-45	0-25	NP-5
	45-60	Very cobbly loamy sand, very cobbly coarse sandy loam, very gravelly sandy loam	SC-SM, SM, GP-GM	A-2, A-1	0-15	5-45	35-75	30-70	15-50	5-30	0-20	NP-5
	60-152	Unweathered bedrock			---	---	---	---	---	---	---	---

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
7501:												
Despair	0-4	Highly decomposed plant material	PT	A-8	0	0	100	100	25-70	10-40	---	---
	4-21	Ashy sandy loam	GP-GM, SM	A-4, A-1	0-15	0-35	40-100	35-100	25-70	10-40	25-35	NP-5
	21-41	Gravelly ashy sandy loam, gravelly ashy fine sandy loam, ashy sandy loam	GP-GM, GM, ML	A-1, A-4	0-10	0-30	40-100	35-100	25-85	10-55	0-30	NP-5
	41-152	Unweathered bedrock			---	---	---	---	---	---	---	---
Goode	0-2	Slightly decomposed plant material	PT	A-8	0	0	100	100	25-75	10-50	---	---
	2-23	Very gravelly ashy sandy loam, cobbly ashy sandy loam, gravelly ashy fine sandy loam	GP-GM, SM	A-1, A-4, A-2	0-20	0-45	45-90	40-85	25-75	10-50	25-35	NP-5
	23-66	Cobbly ashy sandy loam, gravelly ashy sandy loam, very gravelly ashy sandy loam	GP-GM, GM	A-1, A-2	0-15	10-25	40-80	35-75	25-65	10-45	15-35	NP-5
	66-91	Extremely gravelly sandy loam, very gravelly coarse sandy loam, very cobbly fine sandy loam	GW-GM, GM	A-1, A-2	0-15	15-30	35-60	30-55	15-50	10-35	15-30	NP-5
	91-152	Extremely gravelly coarse sand, extremely cobbly sandy loam, very gravelly loamy sand	GP, GP-GM, GC-GM	A-1	0-10	5-25	20-55	15-50	10-45	0-15	0-25	NP-5
Rock outcrop	0-152	Unweathered bedrock			---	---	---	---	---	---	---	---

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
7502:												
Farway----------	0-3	Moderately decomposed plant material	PT	A-8	0	0	100	100	30-85	15-55	---	---
	3-45	Ashy fine sandy loam, gravelly ashy fine sandy loam	GM, SM, ML	A-1, A-2, A-4	0-15	0-40	50-100	45-100	30-85	15-55	15-35	NP-5
	45-78	Cobbly ashy sandy loam, gravelly ashy fine sandy loam	GP-GM, SM, ML	A-1, A-2, A-4	0-10	0-40	45-100	40-100	25-85	10-55	25-35	NP-5
	78-90	Cobbly ashy sandy loam, gravelly ashy fine sandy loam	GM, SM, ML	A-1, A-4	0-10	0-35	50-100	45-100	30-85	15-55	25-35	NP-5
	90-152	Very gravelly sandy loam, very gravelly fine sandy loam, extremely cobbly coarse sandy loam	GP-GM, GM	A-1, A-2	0-15	10-45	25-60	20-60	10-50	5-35	15-30	NP-5
Sawtooth--------	0-3	Slightly decomposed plant material	PT	A-8	0	0	100	100	25-70	10-40	---	---
	3-15	Gravelly ashy sandy loam	SM, GM, GP-GM	A-4, A-1	0	0-25	40-100	35-100	25-70	10-40	25-35	NP-5
	15-35	Gravelly ashy sandy loam, gravelly ashy fine sandy loam, cobbly ashy sandy loam	ML, GM, GP-GM	A-1, A-4	0	0-25	40-100	35-100	25-85	10-55	25-35	NP-5
	35-45	Gravelly sandy loam, very cobbly coarse sandy loam, very gravelly fine sandy loam	GC-GM, SM, GP-GM	A-4, A-1	0-20	10-45	40-80	35-75	25-65	10-45	0-25	NP-5
	45-60	Very cobbly loamy sand, very cobbly coarse sandy loam, very gravelly sandy loam	SC-SM, SM, GP-GM	A-2, A-1	0-15	5-45	35-75	30-70	15-50	5-30	0-20	NP-5
	60-152	Unweathered bedrock			---	---	---	---	---	---	---	---
Despair---------	0-4	Highly decomposed plant material	PT	A-8	0	0	100	100	25-70	10-40	---	---
	4-21	Ashy sandy loam	GP-GM, SM	A-4, A-1	0-15	0-35	40-100	35-100	25-70	10-40	25-35	NP-5
	21-41	Gravelly ashy sandy loam, gravelly ashy fine sandy loam, ashy sandy loam	GP-GM, GM, ML	A-1, A-4	0-10	0-30	40-100	35-100	25-85	10-55	0-30	NP-5
	41-152	Unweathered bedrock			---	---	---	---	---	---	---	---

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
8000:												
Beaverpass	0-18	Moderately decomposed plant material	PT	A-8	0	0	100	100	45-75	5-40	---	---
	18-56	Woody mucky peat	PT	A-8	0	0	100	100	45-75	5-40	---	---
	56-91	Herbaceous muck	PT	A-8	0	0	100	100	45-75	5-40	---	---
	91-107	Loamy coarse sand, sandy loam, coarse sand	SP-SM, SM	A-4, A-1, A-3	0	0	90-100	85-100	45-75	5-40	0-40	NP-5
	107-152	Loamy coarse sand, sandy loam, fine sandy loam	SM, OL	A-1, A-5, A-4	0	0-10	85-100	80-100	40-85	15-55	0-45	NP-5
Purple	0-25	Highly decomposed plant material	PT	A-8	0	0	100	100	45-95	25-55	---	---
	25-45	Mucky sandy loam, mucky fine sandy loam, mucky loam	OH, SM	A-1, A-5	0	0-10	80-100	75-100	45-95	25-55	35-85	NP-10
	45-58	Mucky sandy loam, mucky fine sandy loam, mucky loam	OH, SM	A-1, A-5	0	0-10	75-100	70-100	40-95	20-55	35-85	NP-10
	58-96	Sandy loam, very gravelly sand, extremely cobbly loamy sand	SC, SP-SM, SC-SM	A-1, A-4, A-2	0-20	0-40	60-100	55-100	30-75	5-40	15-30	NP-10
	96-150	Very stony sandy loam, gravelly sand, loamy sand	SP-SM, SC-SM, SM	A-1, A-2, A-4	0-15	0-40	60-100	55-100	30-75	5-40	10-20	NP-5
Bacon	0-2	Moderately decomposed plant material	PT	A-8	0	0	100	100	45-85	25-55	---	---
	2-20	Gravelly sandy loam, sandy loam, fine sandy loam	CL-ML, SM	A-4, A-1	0	0-10	85-100	80-100	45-85	25-55	15-25	NP-5
	20-38	Gravelly sandy loam, cobbly fine sandy loam, very fine sandy loam	CL-ML, SM	A-4, A-1	0	0-15	75-100	70-100	40-95	20-65	10-20	NP-5
	38-43	Very stony loamy sand, very cobbly coarse sandy loam, coarse sand	GP, SM, SC-SM	A-4, A-1	0-50	0-20	50-100	45-100	25-75	0-40	10-20	NP-5
	43-65	Extremely stony sand, very stony loamy coarse sand, very fine sandy loam	GP, SM, CL-ML	A-1, A-2, A-4	0-50	0-20	50-100	45-100	25-95	0-65	10-20	NP-5
	65-150	Extremely gravelly loamy sand, extremely stony loamy coarse sand, gravelly sand	SC-SM, SM, GP	A-1, A-2	0-45	0-20	50-100	45-100	25-75	0-30	10-20	NP-5

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
8006:												
Stetattle, deciduous	0-12	Very stony medial fine sandy loam, very cobbly medial loam, very stony medial sandy loam	GP-GM, SM, GM	A-1, A-2	10-65	10-40	35-70	30-65	15-65	10-50	25-50	NP-10
	12-30	Extremely stony medial sandy loam, very cobbly medial fine sandy loam, extremely cobbly medial sandy loam	GM, GP-GM	A-1	10-55	5-30	30-70	25-65	15-60	10-40	25-45	NP-5
	30-55	Extremely stony medial sandy loam, very cobbly medial sandy loam, extremely cobbly medial sandy loam	GM, GP-GM	A-1	5-50	5-25	25-60	20-55	10-40	5-25	25-35	NP-5
	55-100	Extremely stony medial sandy loam, extremely cobbly medial loamy sand, very stony medial sandy loam	GP-GM, GM	A-1	5-50	10-40	35-70	30-65	15-50	5-30	20-35	NP-5
	100-152	Cobbles, gravel, stones		A-1	10-30	15-40	35-55	30-50	15-30	5-15	0-0	NP

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
8006:												
Forbidden-------	0-4	Slightly decomposed plant material	PT	A-8	0	0	100	100	25-85	10-55	---	---
	4-14	Moderately decomposed plant material	PT	A-8	0	0	100	100	25-85	10-55	---	---
	14-16	Very gravelly ashy loamy sand, ashy sandy loam	SM, CL-ML, GP-GM	A-2	0-30	0-55	40-100	35-100	25-85	10-55	0-25	NP-5
	16-46	Gravelly ashy loamy sand, ashy sandy loam, very gravelly ashy sandy loam	GM, GC-GM, GW	A-1	0-40	0-45	10-45	10-45	5-40	0-25	0-25	NP-5
	46-68	Very gravelly loamy sand, very gravelly sandy loam, extremely gravelly loamy sand	GW-GM, GM, GP	A-1	0-30	0-30	15-60	10-55	5-45	0-25	10-20	NP-5
	68-90	Very gravelly loamy sand, very gravelly sandy loam, extremely gravelly loamy sand	GP, GW-GM, GM	A-1	0-15	15-55	25-65	20-60	10-45	0-20	10-20	NP
	90-150	Extremely gravelly loamy sand, very gravelly loamy sand, extremely gravelly coarse sand	GP-GM, GP, GM	A-1	0-10	20-55	25-60	20-55	10-45	0-20	10-20	NP
Triumph---------	0-15	Gravelly ashy sandy loam, very gravelly ashy fine sandy loam, cobbly sandy loam	SM, GP-GM, GM	A-1, A-5	0-10	5-70	30-80	25-75	15-65	10-45	35-65	NP-5
	15-50	Very cobbly ashy sandy loam, gravelly ashy fine sandy loam, very gravelly sandy loam	GM, GP-GM	A-1, A-5	0-5	10-65	25-75	20-70	10-60	5-40	25-50	NP-5
	50-120	Extremely cobbly ashy sandy loam, very cobbly ashy fine sandy loam, extremely gravelly sandy loam	GP-GM, GM	A-1, A-2	0-5	10-70	20-60	15-55	10-55	5-35	20-45	NP-5
	120-152	Weathered bedrock			---	---	---	---	---	---	---	---

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
8007:												
Kimtah	0-2	Slightly decomposed plant material	PT	A-8	0	0	100	100	40-95	20-75	---	---
	2-7	Moderately decomposed plant material	PT	A-8	0	0	100	100	40-95	20-75	---	---
	7-12	Ashy loam, gravelly ashy sandy loam, ashy fine sandy loam	ML, SM	A-4, A-1	0	0-15	75-100	70-100	40-95	20-75	15-35	NP-5
	12-33	Cobbly ashy loamy coarse sand, gravelly ashy fine sandy loam, ashy sandy loam	ML, SM, SP-SM	A-4, A-2, A-1	0	0-20	60-100	55-100	30-85	10-55	0-30	NP-5
	33-51	Cobbly ashy loamy coarse sand, gravelly ashy fine sandy loam, ashy sandy loam	SM, ML, SP-SM	A-4, A-2, A-1	0	0-20	60-100	55-100	30-85	10-55	0-30	NP-5
	51-90	Very gravelly loamy fine sand, cobbly coarse sandy loam, gravelly sandy loam	SC-SM, SM	A-4, A-2, A-1	0	0-15	65-100	60-100	35-90	15-50	15-20	NP-5
	90-150	Very gravelly loamy fine sand, cobbly coarse sandy loam, gravelly sandy loam	SM, SC-SM, GM	A-1, A-4	0	0-15	55-95	50-90	30-80	15-40	15-20	NP-5
Bacon	0-2	Moderately decomposed plant material	PT	A-8	0	0	100	100	45-85	25-55	---	---
	2-20	Gravelly sandy loam, sandy loam, fine sandy loam	CL-ML, SM	A-4, A-1	0	0-10	85-100	80-100	45-85	25-55	15-25	NP-5
	20-38	Gravelly sandy loam, cobbly fine sandy loam, very fine sandy loam	CL-ML, SM	A-4, A-1	0	0-15	75-100	70-100	40-95	20-65	10-20	NP-5
	38-43	Very stony loamy sand, very cobbly coarse sandy loam, coarse sand	GP, SM, SC-SM	A-4, A-1	0-50	0-20	50-100	45-100	25-75	0-40	10-20	NP-5
	43-65	Extremely stony sand, very stony loamy coarse sand, very fine sandy loam	GP, SM, CL-ML	A-1, A-2, A-4	0-50	0-20	50-100	45-100	25-95	0-65	10-20	NP-5
	65-150	Extremely gravelly loamy sand, extremely stony loamy coarse sand, gravelly sand	SC-SM, SM, GP	A-1, A-2	0-45	0-20	50-100	45-100	25-75	0-30	10-20	NP-5

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
8007:												
Yawning	0-2	Slightly decomposed plant material	PT	A-8	0	0	100	100	35-85	15-55	---	---
	2-8	Highly decomposed plant material	PT	A-8	0	0	100	100	35-85	15-55	---	---
	8-14	Ashy fine sandy loam, ashy sandy loam	ML, SM	A-4, A-2, A-1	0	0	65-100	60-100	35-85	15-55	15-30	NP-5
	14-32	Cobbly ashy loam, gravelly ashy fine sandy loam, very gravelly ashy sandy loam	GP-GM, GM	A-1, A-5	0-10	0-25	30-75	25-70	15-65	10-50	25-45	NP-5
	32-50	Very cobbly coarse sandy loam, very gravelly coarse sandy loam, extremely cobbly sandy loam	SC-SM, GM, GW-GM	A-1, A-2	0-5	5-45	35-80	30-75	15-55	10-30	5-25	NP-5
	50-100	Very cobbly coarse sandy loam, very gravelly coarse sandy loam, extremely cobbly sandy loam	GC-GM, GW-GM, GP-GM	A-1	0-25	10-35	20-45	15-40	10-30	5-15	0-20	NP-5
	100-150	Very stony coarse sandy loam, very gravelly coarse sandy loam, extremely cobbly sandy loam	GM, GC-GM, GP-GM	A-1	0-25	0-35	20-65	15-60	10-45	5-25	0-20	NP-5

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
8009:												
Chilliwack, warm	0-3	Slightly decomposed plant material	PT	A-8	0	0	100	100	25-75	10-50	---	---
	3-13	Medial sandy loam, gravelly medial fine sandy loam, gravelly medial sandy loam	SM, GP-GM	A-1, A-2, A-4	0-15	0-25	45-90	40-85	25-75	10-50	0-30	NP
	13-34	Gravelly medial sandy loam, gravelly medial coarse sandy loam, very gravelly medial sandy loam	SM, GP-GM	A-1, A-2	0-25	0-25	40-75	35-70	25-55	10-30	25-35	NP
	34-46	Gravelly medial sandy loam, very gravelly medial loamy sand	GM, GP-GM, SM	A-1, A-2	0-20	0-25	40-80	35-75	25-50	10-30	0-25	NP
	46-70	Extremely gravelly loamy sand, extremely gravelly sandy loam, very gravelly loamy coarse sand	GW-GM, GM	A-1, A-2	0-10	5-25	30-70	25-65	10-50	5-30	0-20	NP
	70-150	Extremely gravelly loamy sand, very gravelly loamy coarse sand, extremely gravelly coarse sand	GP, GW-GM, GM	A-1	0-20	10-20	20-60	15-55	10-45	0-20	0-20	NP

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
8009:												
Perfect---	0-3	Slightly decomposed plant material			0	0	100	100	10-75	0-40	---	---
	3-4	Moderately decomposed plant material			0	0	100	100	10-75	0-40	---	---
	4-7	Ashy sandy loam, gravelly loamy sand, gravelly ashy coarse sandy loam			0-20	0-45	25-100	20-100	10-75	0-40	0-25	NP-5
	7-11	Moderately decomposed plant material			0	0	100	100	10-75	0-40	---	---
	11-13	Ashy sandy loam, gravelly loamy sand, gravelly ashy coarse sandy loam	GP, SM, SC-SM	A-1, A-2, A-4	0-20	0-50	25-100	20-100	10-75	0-40	0-25	NP-5
	13-39	Gravelly ashy sandy loam, very gravelly loamy sand, very gravelly coarse sandy loam	GP, SM, SC-SM	A-1, A-2	0-15	0-45	25-85	20-80	10-60	0-30	0-25	NP-5
	39-73	Extremely cobbly loamy sand, very gravelly loamy coarse sand, extremely gravelly loamy fine sand	GW, GP-GM, GC-GM	A-1	0-10	0-40	10-45	5-40	0-35	0-15	0-20	NP-5
	73-752	Extremely gravelly loamy coarse sand, very cobbly loamy sand, very gravelly loamy fine sand	GW, GP-GM, GC-GM	A-1	0-10	0-40	10-50	5-45	0-45	0-20	0-20	NP-5

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
8009:												
Terror	0-5	Moderately decomposed plant material	PT	A-8	0	0	100	100	25-95	10-75	---	---
	5-8	Highly decomposed plant material	PT	A-8	0	0	100	100	25-95	10-75	---	---
	8-17	Gravelly ashy loam, cobbly ashy loamy sand, ashy sandy loam	OL, SM, GP-GM	A-5, A-4, A-1	0	0-30	55-100	50-100	25-95	10-75	20-45	NP-5
	17-28	Gravelly ashy sandy loam, cobbly ashy sandy loam, ashy fine sandy loam	OL, SM, GM	A-4, A-2, A-1	0	0-30	55-100	50-100	30-85	15-55	25-35	NP-5
	28-36	Gravelly ashy loamy sand, cobbly ashy loam, ashy sandy loam	ML, SM, GP-GM	A-1, A-4	0	0-25	50-100	45-100	25-95	10-75	0-35	NP-5
	36-52	Cobbly loamy sand, cobbly sandy loam	SM, GP-GM	A-4, A-1	0-10	0-25	55-100	50-100	25-75	10-40	15-30	NP-5
	52-60	Very gravelly loamy coarse sand, very cobbly sandy loam, gravelly coarse sandy loam	SC-SM, SM, SP-SM	A-2, A-1	0-5	5-20	60-95	55-90	30-70	10-35	10-20	NP-5
	60-80	Cobbly loamy coarse sand, gravelly sandy loam, gravelly coarse sandy loam	SC-SM, SM, SP-SM	A-2, A-1	0-5	5-20	60-95	55-90	30-70	10-35	10-20	NP-5
	80-150	Very cobbly loamy coarse sand, very gravelly sandy loam, very gravelly coarse sandy loam	SC-SM, GM, SP-SM	A-2, A-1	0-5	5-20	60-95	55-90	30-70	10-35	10-20	NP-5

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
8010:												
Perfect---	0-3	Slightly decomposed plant material	PT	A-8	0	0	100	100	10-75	0-40	---	---
	3-4	Moderately decomposed plant material	PT	A-8	0	0	100	100	10-75	0-40	---	---
	4-7	Ashy sandy loam, gravelly loamy sand, gravelly ashy coarse sandy loam	GP, SM, SC-SM	A-1, A-2, A-4	0-20	0-45	25-100	20-100	10-75	0-40	0-25	NP-5
	7-11	Moderately decomposed plant material	PT	A-8	0	0	100	100	10-75	0-40	---	---
	11-13	Ashy sandy loam, gravelly loamy sand, gravelly ashy coarse sandy loam	GP, SM, SC-SM	A-1, A-2, A-4	0-20	0-50	25-100	20-100	10-75	0-40	0-25	NP-5
	13-39	Gravelly ashy sandy loam, very gravelly loamy sand, very gravelly coarse sandy loam	GP, SM, SC-SM	A-1, A-2	0-15	0-45	25-85	20-80	10-60	0-30	0-25	NP-5
	39-73	Extremely cobbly loamy sand, very gravelly loamy coarse sand, extremely gravelly loamy fine sand	GW, GP-GM, GC-GM	A-1	0-10	0-40	10-45	5-40	0-35	0-15	0-20	NP-5
	73-752	Extremely gravelly loamy coarse sand, very cobbly loamy sand, very gravelly loamy fine sand	GW, GP-GM, GC-GM	A-1	0-10	0-40	10-50	5-45	0-45	0-20	0-20	NP-5

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
8010:												
Spickard--------	0-3	Slightly decomposed plant material	PT	A-8	0	0	100	100	35-70	15-40	---	---
	3-10	Moderately decomposed plant material	PT	A-8	0	0	100	100	35-70	15-40	---	---
	10-13	Ashy sandy loam	SM	A-1, A-2, A-4	0	0	65-100	60-100	35-70	15-40	25-35	NP-5
	13-22	Gravelly ashy sandy loam, ashy fine sandy loam, ashy sandy loam	GP-GM, GM, GC-GM	A-1, A-4	0-10	0-30	40-85	35-80	25-65	10-45	0-25	NP-5
	22-44	Gravelly ashy sandy loam, gravelly ashy fine sandy loam, ashy sandy loam	GP-GM, GM, GC-GM	A-1, A-4	0-10	0-30	45-90	40-85	25-75	10-50	0-25	NP-5
	44-60	Gravelly ashy sandy loam, gravelly ashy fine sandy loam, ashy sandy loam	GP-GM, GM, GC-GM	A-1, A-4	0-10	0-30	45-90	40-85	25-75	10-50	0-25	NP-5
	60-105	Very cobbly loamy sand, very gravelly loamy coarse sand, very gravelly sand	GW, SM, SC-SM	A-1	0-35	15-35	30-75	25-70	15-50	0-20	0-20	NP-5
	105-152	Very stony loamy sand, very gravelly loamy coarse sand, very cobbly sand	GW, SM, SC-SM	A-1	0-35	10-35	30-75	25-70	15-50	0-20	0-20	NP-5

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
8010:												
Stetattle, deciduous	0-12	Very stony medial fine sandy loam, very cobbly medial loam, very stony medial sandy loam	GP-GM, SM, GM	A-1, A-2	10-65	10-40	35-70	30-65	15-65	10-50	25-50	NP-10
	12-30	Extremely stony medial sandy loam, very cobbly medial fine sandy loam, extremely cobbly medial sandy loam	GM, GP-GM	A-1	10-55	5-30	30-70	25-65	15-60	10-40	25-45	NP-5
	30-55	Extremely stony medial sandy loam, very cobbly medial sandy loam, extremely cobbly medial sandy loam	GM, GP-GM	A-1	5-50	5-25	25-60	20-55	10-40	5-25	25-35	NP-5
	55-100	Extremely stony medial sandy loam, extremely cobbly medial loamy sand, very stony medial sandy loam	GP-GM, GM	A-1	5-50	10-40	35-70	30-65	15-50	5-30	20-35	NP-5
	100-152	Cobbles, gravel, stones		A-1	10-30	15-40	35-55	30-50	15-30	5-15	0-0	NP

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
8011:												
Chilliwack------	0-3	Slightly decomposed plant material	PT	A-8	0	0	100	100	25-75	10-50	---	---
	3-13	Medial sandy loam, gravelly medial fine sandy loam, gravelly medial sandy loam	SM, GP-GM	A-1, A-2, A-4	0-15	0-25	45-90	40-85	25-75	10-50	0-30	NP
	13-34	Gravelly medial sandy loam, gravelly medial coarse sandy loam, very gravelly medial sandy loam	SM, GP-GM	A-1, A-2	0-25	0-25	40-75	35-70	25-55	10-30	25-35	NP
	34-46	Gravelly medial sandy loam, very gravelly medial loamy sand	GM, GP-GM, SM	A-1, A-2	0-20	0-25	40-80	35-75	25-50	10-30	0-25	NP
	46-70	Extremely gravelly loamy sand, extremely gravelly sandy loam, very gravelly loamy coarse sand	GW-GM, GM	A-1, A-2	0-10	5-25	30-70	25-65	10-50	5-30	0-20	NP
	70-150	Extremely gravelly loamy sand, very gravelly loamy coarse sand, extremely gravelly coarse sand	GP, GW-GM, GM	A-1	0-20	10-20	20-60	15-55	10-45	0-20	0-20	NP

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
8011:												
Forbidden, cold	0-4	Slightly decomposed plant material	PT	A-8	0	0	100	100	25-85	10-55	---	---
	4-14	Moderately decomposed plant material	PT	A-8	0	0	100	100	25-85	10-55	---	---
	14-16	Very gravelly ashy loamy sand, ashy sandy loam	SM, CL-ML, GP-GM	A-2	0-30	0-55	40-100	35-100	25-85	10-55	0-25	NP-5
	16-46	Gravelly ashy loamy sand, ashy sandy loam, very gravelly ashy sandy loam	GM, GC-GM, GW	A-1	0-40	0-45	10-45	10-45	5-40	0-25	0-25	NP-5
	46-68	Very gravelly loamy sand, very gravelly sandy loam, extremely gravelly loamy sand	GW-GM, GM, GP	A-1	0-30	0-30	15-60	10-55	5-45	0-25	10-20	NP-5
	68-90	Very gravelly loamy sand, very gravelly sandy loam, extremely gravelly loamy sand	GP, GW-GM, GM	A-1	0-15	15-55	25-65	20-60	10-45	0-20	10-20	NP
	90-150	Extremely gravelly loamy sand, very gravelly loamy sand, extremely gravelly coarse sand	GP-GM, GP, GM	A-1	0-10	20-55	25-60	20-55	10-45	0-20	10-20	NP

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
8011:												
Stetattle, deciduous	0-12	Very stony medial fine sandy loam, very cobbly medial loam, very stony medial sandy loam	GP-GM, SM, GM	A-1, A-2	10-65	10-40	35-70	30-65	15-65	10-50	25-50	NP-10
	12-30	Extremely stony medial sandy loam, very cobbly medial fine sandy loam, extremely cobbly medial sandy loam	GM, GP-GM	A-1	10-55	5-30	30-70	25-65	15-60	10-40	25-45	NP-5
	30-55	Extremely stony medial sandy loam, very cobbly medial sandy loam, extremely cobbly medial sandy loam	GM, GP-GM	A-1	5-50	5-25	25-60	20-55	10-40	5-25	25-35	NP-5
	55-100	Extremely stony medial sandy loam, extremely cobbly medial loamy sand, very stony medial sandy loam	GP-GM, GM	A-1	5-50	10-40	35-70	30-65	15-50	5-30	20-35	NP-5
	100-152	Cobbles, gravel, stones		A-1	10-30	15-40	35-55	30-50	15-30	5-15	0-0	NP

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
8014:												
Chilliwack, dry	0-3	Slightly decomposed plant material	PT	A-8	0	0	100	100	25-75	10-50	---	---
	3-13	Medial sandy loam, gravelly medial fine sandy loam, gravelly medial sandy loam	SM, GP-GM	A-1, A-2, A-4	0-15	0-25	45-90	40-85	25-75	10-50	0-30	NP
	13-34	Gravelly medial sandy loam, gravelly medial coarse sandy loam, very gravelly medial sandy loam	SM, GP-GM	A-1, A-2	0-25	0-25	40-75	35-70	25-55	10-30	25-35	NP
	34-46	Gravelly medial sandy loam, very gravelly medial loamy sand	GM, GP-GM, SM	A-1, A-2	0-20	0-25	40-80	35-75	25-50	10-30	0-25	NP
	46-70	Extremely gravelly loamy sand, extremely gravelly sandy loam, very gravelly loamy coarse sand	GW-GM, GM	A-1, A-2	0-10	5-25	30-70	25-65	10-50	5-30	0-20	NP
	70-150	Extremely gravelly loamy sand, very gravelly loamy coarse sand, extremely gravelly coarse sand	GP, GW-GM, GM	A-1	0-20	10-20	20-60	15-55	10-45	0-20	0-20	NP

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
8014:												
Tepeh	0-2	Slightly decomposed plant material	PT	A-8	0	0	100	100	35-70	15-40	---	---
	2-5	Moderately decomposed plant material	PT	A-8	0	0	100	100	35-70	15-40	---	---
	5-8	Ashy sandy loam	SM, SC-SM	A-1, A-4, A-2	0	0-15	65-100	60-100	35-70	15-40	15-25	NP-5
	8-30	Very gravelly ashy sandy loam, gravelly ashy fine sandy loam, gravelly ashy sandy loam	GM, GP-GM	A-2, A-1	0-20	0-25	20-65	15-60	10-50	5-35	25-35	NP-5
	30-70	Very gravelly loamy fine sand, very gravelly coarse sandy loam, very gravelly sandy loam	GW-GM, GM	A-1	0-30	10-30	30-60	25-55	15-50	5-25	15-35	NP-5
	70-92	Extremely gravelly loamy fine sand, very gravelly coarse sandy loam, very gravelly sandy loam	GW-GM, GM	A-1	0-30	15-30	30-60	25-55	15-50	5-25	0-30	NP-5
	92-152	Very gravelly sandy loam, extremely gravelly coarse sandy loam, extremely cobbly loamy sand	GW-GM, GC-GM	A-1	0-25	10-25	30-60	25-55	15-45	5-25	0-25	NP-5

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
8014:												
Kimtah, dry-----	0-2	Slightly decomposed plant material	PT	A-8	0	0	100	100	40-95	20-75	---	---
	2-7	Moderately decomposed plant material	PT	A-8	0	0	100	100	40-95	20-75	---	---
	7-12	Ashy loam, gravelly ashy sandy loam, ashy fine sandy loam	ML, SM	A-4, A-1	0	0-15	75-100	70-100	40-95	20-75	15-35	NP-5
	12-33	Cobbly ashy loamy coarse sand, gravelly ashy fine sandy loam, ashy sandy loam	ML, SM, SP-SM	A-4, A-2, A-1	0	0-20	60-100	55-100	30-85	10-55	0-30	NP-5
	33-51	Cobbly ashy loamy coarse sand, gravelly ashy fine sandy loam, ashy sandy loam	SM, ML, SP-SM	A-4, A-2, A-1	0	0-20	60-100	55-100	30-85	10-55	0-30	NP-5
	51-90	Very gravelly loamy fine sand, cobbly coarse sandy loam, gravelly sandy loam	SC-SM, SM	A-4, A-2, A-1	0	0-15	65-100	60-100	35-90	15-50	15-20	NP-5
	90-150	Very gravelly loamy fine sand, cobbly coarse sandy loam, gravelly sandy loam	SM, SC-SM, GM	A-1, A-4	0	0-15	55-95	50-90	30-80	15-40	15-20	NP-5

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
8500:												
Primus	0-1	Slightly decomposed plant material	PT	A-8	0	0	100	100	25-85	10-55	---	---
	1-3	Moderately decomposed plant material	PT	A-8	0	0	100	100	25-85	10-55	---	---
	3-34	Gravelly ashy fine sandy loam, gravelly ashy coarse sandy loam, ashy sandy loam	GP-GM, GM, ML	A-1, A-2, A-4	0-10	0-25	45-100	40-100	25-85	10-55	25-35	NP-5
	34-60	Gravelly ashy fine sandy loam, gravelly ashy coarse sandy loam, ashy sandy loam	GP-GM, GM, ML	A-1, A-2, A-4	0-10	0-25	45-100	40-100	25-85	10-55	15-30	NP-5
	60-84	Extremely cobbly ashy sandy loam, very gravelly ashy loamy sand, very cobbly loamy sand	GW-GM, GM	A-1	0-15	15-55	30-65	25-60	15-45	5-25	15-30	NP-5
	84-152	Extremely gravelly loamy sand, very cobbly loamy coarse sand, very gravelly loamy sand	GP, GP-GM, SC-SM	A-1	0-10	10-55	25-70	20-65	10-50	0-20	0-25	NP-5

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
8500:												
Noca	0-2	Moderately decomposed plant material	PT	A-8	0	0	100	100	30-85	15-55	---	---
	2-5	Gravelly ashy sandy loam, gravelly ashy fine sandy loam, ashy sandy loam	GM, SM, ML	A-1, A-2, A-4	0-10	0-25	55-100	50-100	30-85	15-55	15-30	NP-5
	5-29	Stony ashy sandy loam, gravelly ashy coarse sandy loam, ashy fine sandy loam	GW-GM, GM, GC-GM	A-1, A-2, A-8	0-20	0-35	35-85	30-80	15-65	10-45	15-25	NP-5
	29-51	Gravelly ashy sandy loam, gravelly ashy coarse sandy loam, very gravelly ashy sandy loam	GP-GM, GM, SC-SM	A-1, A-2	0-15	0-30	40-90	35-85	25-65	10-35	15-25	NP-5
	51-77	Very gravelly loamy sand, extremely cobbly loamy coarse sand, very cobbly loamy sand	GP, GP-GM, GC-GM	A-1	0-5	10-25	25-60	20-55	10-45	0-20	0-20	NP-5
	77-152	Extremely gravelly loamy sand, extremely cobbly loamy coarse sand, very cobbly loamy sand	GP, GP-GM, SC-SM	A-1	0-10	10-50	25-70	20-65	10-50	0-20	0-20	NP-5
Stehekin	0-18	Very cobbly ashy sandy loam, gravelly ashy fine sandy loam, ashy sandy loam	SM, GM	A-4, A-2, A-1	0	0-40	55-90	50-85	30-75	15-50	25-35	NP-5
	18-44	Extremely cobbly coarse sandy loam, stony fine sandy loam, very cobbly sandy loam	SM, GC-GM, GW-GM	A-1, A-4	0-15	10-50	35-80	30-75	15-65	10-45	15-25	NP-5
	44-109	Very stony coarse sandy loam, extremely gravelly fine sandy loam, very stony sandy loam	GC-GM, SM, GP-GM	A-4, A-1	0-15	10-50	30-75	25-70	15-60	10-40	0-20	NP-5
	109-152	Very stony loamy sand, extremely gravelly coarse sandy loam, very stony sandy loam	GM, SC-SM, GW-GM	A-1, A-2	0-35	5-45	30-80	25-75	15-60	5-30	0-20	NP-5

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
8501:												
Stehekin---------	0-18	Very cobbly ashy sandy loam, gravelly ashy fine sandy loam, ashy sandy loam	SM, GM	A-4, A-2, A-1	0	0-40	55-90	50-85	30-75	15-50	25-35	NP-5
	18-44	Extremely cobbly coarse sandy loam, stony fine sandy loam, very cobbly sandy loam	SM, GC-GM, GW-GM	A-1, A-4	0-15	10-50	35-80	30-75	15-65	10-45	15-25	NP-5
	44-109	Very stony coarse sandy loam, extremely gravelly fine sandy loam, very stony sandy loam	GC-GM, SM, GP-GM	A-4, A-1	0-15	10-50	30-75	25-70	15-60	10-40	0-20	NP-5
	109-152	Very stony loamy sand, extremely gravelly coarse sandy loam, very stony sandy loam	GM, SC-SM, GW-GM	A-1, A-2	0-35	5-45	30-80	25-75	15-60	5-30	0-20	NP-5
Primus----------	0-1	Slightly decomposed plant material	PT	A-8	0	0	100	100	25-85	10-55	---	---
	1-3	Moderately decomposed plant material	PT	A-8	0	0	100	100	25-85	10-55	---	---
	3-34	Gravelly ashy fine sandy loam, gravelly ashy coarse sandy loam, ashy sandy loam	GP-GM, GM, ML	A-1, A-2, A-4	0-10	0-25	45-100	40-100	25-85	10-55	25-35	NP-5
	34-60	Gravelly ashy fine sandy loam, gravelly ashy coarse sandy loam, ashy sandy loam	GP-GM, GM, ML	A-1, A-2, A-4	0-10	0-25	45-100	40-100	25-85	10-55	15-30	NP-5
	60-84	Extremely cobbly ashy sandy loam, very gravelly ashy loamy sand, very cobbly loamy sand	GW-GM, GM	A-1	0-15	15-55	30-65	25-60	15-45	5-25	15-30	NP-5
	84-152	Extremely gravelly loamy sand, very cobbly loamy coarse sand, very gravelly loamy sand	GP, GP-GM, SC-SM	A-1	0-10	10-55	25-70	20-65	10-50	0-20	0-25	NP-5

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
9001:												
Noca	0-2	Moderately decomposed plant material	PT	A-8	0	0	100	100	30-85	15-55	---	---
	2-5	Gravelly ashy sandy loam, gravelly ashy fine sandy loam, ashy sandy loam	GM, SM, ML	A-1, A-2, A-4	0-10	0-25	55-100	50-100	30-85	15-55	15-30	NP-5
	5-29	Stony ashy sandy loam, gravelly ashy coarse sandy loam, ashy fine sandy loam	GW-GM, GM, GC-GM	A-1, A-2, A-8	0-20	0-35	35-85	30-80	15-65	10-45	15-25	NP-5
	29-51	Gravelly ashy sandy loam, gravelly ashy coarse sandy loam, very gravelly ashy sandy loam	GP-GM, GM, SC-SM	A-1, A-2	0-15	0-30	40-90	35-85	25-65	10-35	15-25	NP-5
	51-77	Very gravelly loamy sand, extremely cobbly loamy coarse sand, very cobbly loamy sand	GP, GP-GM, GC-GM	A-1	0-5	10-25	25-60	20-55	10-45	0-20	0-20	NP-5
	77-152	Extremely gravelly loamy sand, extremely cobbly loamy coarse sand, very cobbly loamy sand	GP, GP-GM, SC-SM	A-1	0-10	10-50	25-70	20-65	10-50	0-20	0-20	NP-5

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
9001:												
Perfect, dry----	0-3	Slightly decomposed plant material	PT	A-8	0	0	100	100	10-75	0-40	---	---
	3-4	Moderately decomposed plant material	PT	A-8	0	0	100	100	10-75	0-40	---	---
	4-7	Ashy sandy loam, gravelly loamy sand, gravelly ashy coarse sandy loam	GP, SM, SC-SM	A-1, A-2, A-4	0-20	0-45	25-100	20-100	10-75	0-40	0-25	NP-5
	7-11	Moderately decomposed plant material	PT	A-8	0	0	100	100	10-75	0-40	---	---
	11-13	Ashy sandy loam, gravelly loamy sand, gravelly ashy coarse sandy loam	GP, SM, SC-SM	A-1, A-2, A-4	0-20	0-50	25-100	20-100	10-75	0-40	0-25	NP-5
	13-39	Gravelly ashy sandy loam, very gravelly loamy sand, very gravelly coarse sandy loam	GP, SM, SC-SM	A-1, A-2	0-15	0-45	25-85	20-80	10-60	0-30	0-25	NP-5
	39-73	Extremely cobbly loamy sand, very gravelly loamy coarse sand, extremely gravelly loamy fine sand	GW, GP-GM, GC-GM	A-1	0-10	0-40	10-45	5-40	0-35	0-15	0-20	NP-5
	73-752	Extremely gravelly loamy coarse sand, very cobbly loamy sand, very gravelly loamy fine sand	GW, GP-GM, GC-GM	A-1	0-10	0-40	10-50	5-45	0-45	0-20	0-20	NP-5

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
9003:												
Stetattle	0-12	Very stony medial fine sandy loam, very cobbly medial loam, very stony medial sandy loam	GP-GM, SM, GM	A-1, A-2	10-65	10-40	35-70	30-65	15-65	10-50	25-50	NP-10
	12-30	Extremely stony medial sandy loam, very cobbly medial fine sandy loam, extremely cobbly medial sandy loam	GM, GP-GM	A-1	10-55	5-30	30-70	25-65	15-60	10-40	25-45	NP-5
	30-55	Extremely stony medial sandy loam, very cobbly medial sandy loam, extremely cobbly medial sandy loam	GM, GP-GM	A-1	5-50	5-25	25-60	20-55	10-40	5-25	25-35	NP-5
	55-100	Extremely stony medial sandy loam, extremely cobbly medial loamy sand, very stony medial sandy loam	GP-GM, GM	A-1	5-50	10-40	35-70	30-65	15-50	5-30	20-35	NP-5
	100-152	Cobbles, gravel, stones		A-1	10-30	15-40	35-55	30-50	15-30	5-15	0-0	NP
Doubtful	0-2	Slightly decomposed plant material	PT	A-8	0	0	100	100	25-50	10-30	---	---
	2-9	Gravelly ashy sandy loam	GP-GM, SM	A-2, A-1	0	0-25	45-75	40-70	25-50	10-30	25-35	NP-5
	9-27	Gravelly ashy coarse sandy loam, ashy fine sandy loam, gravelly ashy sandy loam	GP-GM, GM	A-4, A-1	0	0-20	40-75	35-70	25-60	10-40	0-30	NP-5
	27-58	Gravelly ashy coarse sandy loam, gravelly ashy fine sandy loam, gravelly ashy sandy loam	GP-GM, GM	A-1, A-4	0	0-20	40-75	35-70	25-60	10-40	0-30	NP-5
	58-70	Very gravelly coarse sand, very gravelly loamy sand, extremely gravelly loamy coarse sand	GC-GM, GP, GP-GM	A-1	0	5-25	15-65	10-60	5-45	0-20	0-20	NP-5
	70-152	Unweathered bedrock			---	---	---	---	---	---	---	---

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
9003:												
Arriva----------	0-4	Slightly decomposed plant material	PT	A-8	0	0	100	100	40-85	25-55	---	---
	4-23	Moderately decomposed plant material	PT	A-8	0	0	100	100	40-85	25-55	---	---
	23-26	Ashy fine sandy loam	SM, ML	A-1, A-4	0	0	65-100	60-100	40-85	25-55	20-30	NP-5
	26-38	Highly decomposed plant material	PT	A-8	0	0	100	100	25-75	10-50	---	---
	38-47	Medial sandy loam, medial fine sandy loam, gravelly medial sandy loam	SM, GP-GM	A-2, A-1, A-5	0	0-35	45-90	40-85	25-75	10-50	35-45	NP-5
	47-50	Medial loam, gravelly medial sandy loam, medial fine sandy loam	OH, GP-GM, MH	A-1, A-5	0-15	0-35	45-90	40-85	25-85	10-70	50-60	NP-10
	50-60	Gravelly medial sandy loam, gravelly medial fine sandy loam, cobbly medial sandy loam	GM, GP-GM	A-1, A-5	0-10	0-30	45-90	40-85	25-75	10-50	35-45	NP-5
	60-85	Very stony loamy coarse sand, very gravelly loamy sand, very cobbly sand	SC-SM, GM, GP	A-1	0-35	10-35	35-75	30-70	15-50	0-20	0-25	NP-5
	85-152	Very cobbly sand, very gravelly coarse sand, very stony loamy coarse sand	GP, SM, SC-SM	A-1	0-35	10-35	35-75	30-70	15-50	0-20	0-25	NP-5

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
9008:												
Mox	0-4	Slightly decomposed plant material	PT	A-8	0	0	100	100	35-70	15-40	---	---
	4-16	Moderately decomposed plant material	PT	A-8	0	0	100	100	35-70	15-40	---	---
	16-27	Ashy sandy loam	SM, SC-SM	A-1, A-2, A-4	0-15	0-15	65-100	60-100	35-70	15-40	15-25	NP-5
	27-49	Gravelly medial sandy loam, gravelly medial fine sandy loam	SM, GP-GM	A-1, A-5	0-10	0-30	40-90	35-85	25-75	10-40	35-45	NP-5
	49-76	Cobbly medial sandy loam, gravelly medial sandy loam, gravelly medial fine sandy loam	GM, GP-GM	A-1, A-5	0-10	0-35	40-85	35-80	25-65	10-45	35-45	NP-5
	76-94	Very gravelly coarse sandy loam, extremely gravelly sandy loam, very cobbly coarse sandy loam	GC-GM, GW-GM, GM	A-1	0-10	20-55	35-60	30-55	15-40	10-25	0-25	NP-5
	94-152	Very gravelly sandy loam, very gravelly coarse sandy loam, extremely cobbly loamy sand	GC-GM, GP-GM, GM	A-1	0-15	10-60	35-55	30-50	15-35	5-20	0-25	NP-5
Doubtful	0-2	Slightly decomposed plant material	PT	A-8	0	0	100	100	25-50	10-30	---	---
	2-9	Gravelly ashy sandy loam	GP-GM, SM	A-2, A-1	0	0-25	45-75	40-70	25-50	10-30	25-35	NP-5
	9-27	Gravelly ashy coarse sandy loam, ashy fine sandy loam, gravelly ashy sandy loam	GP-GM, GM	A-4, A-1	0	0-20	40-75	35-70	25-60	10-40	0-30	NP-5
	27-58	Gravelly ashy coarse sandy loam, gravelly ashy fine sandy loam, gravelly ashy sandy loam	GP-GM, GM	A-1, A-4	0	0-20	40-75	35-70	25-60	10-40	0-30	NP-5
	58-70	Very gravelly coarse sand, very gravelly loamy sand, extremely gravelly loamy coarse sand	GC-GM, GP, GP-GM	A-1	0	5-25	15-65	10-60	5-45	0-20	0-20	NP-5
	70-152	Unweathered bedrock			---	---	---	---	---	---	---	---

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
9008:												
Perfect, cold---	0-3	Slightly decomposed plant material	PT	A-8	0	0	100	100	10-75	0-40	---	---
	3-4	Moderately decomposed plant material	PT	A-8	0	0	100	100	10-75	0-40	---	---
	4-7	Ashy sandy loam, gravelly loamy sand, gravelly ashy coarse sandy loam	GP, SM, SC-SM	A-1, A-2, A-4	0-20	0-45	25-100	20-100	10-75	0-40	0-25	NP-5
	7-11	Moderately decomposed plant material	PT	A-8	0	0	100	100	10-75	0-40	---	---
	11-13	Ashy sandy loam, gravelly loamy sand, gravelly ashy coarse sandy loam	GP, SM, SC-SM	A-1, A-2, A-4	0-20	0-50	25-100	20-100	10-75	0-40	0-25	NP-5
	13-39	Gravelly ashy sandy loam, very gravelly loamy sand, very gravelly coarse sandy loam	GP, SM, SC-SM	A-1, A-2	0-15	0-45	25-85	20-80	10-60	0-30	0-25	NP-5
	39-73	Extremely cobbly loamy sand, very gravelly loamy coarse sand, extremely gravelly loamy fine sand	GW, GP-GM, GC-GM	A-1	0-10	0-40	10-45	5-40	0-35	0-15	0-20	NP-5
	73-752	Extremely gravelly loamy coarse sand, very cobbly loamy sand, very gravelly loamy fine sand	GW, GP-GM, GC-GM	A-1	0-10	0-40	10-50	5-45	0-45	0-20	0-20	NP-5

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
9010:												
Doubtful	0-2	Slightly decomposed plant material	PT	A-8	0	0	100	100	25-50	10-30	---	---
	2-9	Gravelly ashy sandy loam	GP-GM, SM	A-2, A-1	0	0-25	45-75	40-70	25-50	10-30	25-35	NP-5
	9-27	Gravelly ashy coarse sandy loam, ashy fine sandy loam, gravelly ashy sandy loam	GP-GM, GM	A-4, A-1	0	0-20	40-75	35-70	25-60	10-40	0-30	NP-5
	27-58	Gravelly ashy coarse sandy loam, gravelly ashy fine sandy loam, gravelly ashy sandy loam	GP-GM, GM	A-1, A-4	0	0-20	40-75	35-70	25-60	10-40	0-30	NP-5
	58-70	Very gravelly coarse sand, very gravelly loamy sand, extremely gravelly loamy coarse sand	GC-GM, GP, GP-GM	A-1	0	5-25	15-65	10-60	5-45	0-20	0-20	NP-5
	70-152	Unweathered bedrock			---	---	---	---	---	---	---	---
Treen	0-10	Medial loam, gravelly medial sandy loam, cobbly medial fine sandy loam	SM, OH	A-5, A-1	0-15	0-30	65-100	60-100	35-100	15-100	50-60	NP-10
	10-30	Medial sandy loam, gravelly medial fine sandy loam, cobbly medial loam	SM, OH	A-2, A-1, A-5	0-15	0-30	65-100	60-100	35-100	15-100	50-60	NP-10
	30-40	Cobbly medial sandy loam, very cobbly medial sandy loam, very gravelly medial fine sandy loam	GM, SM, OL	A-2, A-1, A-5	0-10	0-35	50-100	45-100	30-85	15-55	35-45	NP-5
	40-152	Unweathered bedrock			---	---	---	---	---	---	---	---
Rock outcrop	0-152	Unweathered bedrock			---	---	---	---	---	---	---	---

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
9012:												
Spickard--------	0-3	Slightly decomposed plant material	PT	A-8	0	0	100	100	35-70	15-40	---	---
	3-10	Moderately decomposed plant material	PT	A-8	0	0	100	100	35-70	15-40	---	---
	10-13	Ashy sandy loam	SM	A-1, A-2, A-4	0	0	65-100	60-100	35-70	15-40	25-35	NP-5
	13-22	Gravelly ashy sandy loam, ashy fine sandy loam, ashy sandy loam	GP-GM, GM, GC-GM	A-1, A-4	0-10	0-30	40-85	35-80	25-65	10-45	0-25	NP-5
	22-44	Gravelly ashy sandy loam, gravelly ashy fine sandy loam, ashy sandy loam	GP-GM, GM, GC-GM	A-1, A-4	0-10	0-30	45-90	40-85	25-75	10-50	0-25	NP-5
	44-60	Gravelly ashy sandy loam, gravelly ashy fine sandy loam, ashy sandy loam	GP-GM, GM, GC-GM	A-1, A-4	0-10	0-30	45-90	40-85	25-75	10-50	0-25	NP-5
	60-105	Very cobbly loamy sand, very gravelly loamy coarse sand, very gravelly sand	GW, SM, SC-SM	A-1	0-35	15-35	30-75	25-70	15-50	0-20	0-20	NP-5
	105-152	Very stony loamy sand, very gravelly loamy coarse sand, very cobbly sand	GW, SM, SC-SM	A-1	0-35	10-35	30-75	25-70	15-50	0-20	0-20	NP-5

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
9012:												
Tepeh, moist----	0-2	Slightly decomposed plant material	PT	A-8	0	0	100	100	35-70	15-40	---	---
	2-5	Moderately decomposed plant material	PT	A-8	0	0	100	100	35-70	15-40	---	---
	5-8	Ashy sandy loam	SM, SC-SM	A-1, A-4, A-2	0	0-15	65-100	60-100	35-70	15-40	15-25	NP-5
	8-30	Very gravelly ashy sandy loam, gravelly ashy fine sandy loam, gravelly ashy sandy loam	GM, GP-GM	A-2, A-1	0-20	0-25	20-65	15-60	10-50	5-35	25-35	NP-5
	30-70	Very gravelly loamy fine sand, very gravelly coarse sandy loam, very gravelly sandy loam	GW-GM, GM	A-1	0-30	10-30	30-60	25-55	15-50	5-25	15-35	NP-5
	70-92	Extremely gravelly loamy fine sand, very gravelly coarse sandy loam, very gravelly sandy loam	GW-GM, GM	A-1	0-30	15-30	30-60	25-55	15-50	5-25	0-30	NP-5
	92-152	Very gravelly sandy loam, extremely gravelly coarse sandy loam, extremely cobbly loamy sand	GW-GM, GC-GM	A-1	0-25	10-25	30-60	25-55	15-45	5-25	0-25	NP-5

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
9012:												
Maggib----------	0-2	Moderately decomposed plant material	PT	A-8	0	0	100	100	30-85	10-55	---	---
	2-5	Highly decomposed plant material	PT	A-8	0	0	100	100	30-85	10-55	---	---
	5-9	Stony medial sandy loam, gravelly medial fine sandy loam, gravelly medial loamy sand	SM, SP-SM, CL-ML	A-2, A-1, A-4	0-25	0-35	60-100	55-100	30-85	10-55	15-25	NP-5
	9-27	Gravelly medial fine sandy loam, cobbly medial sandy loam, gravelly medial loam	GM, GP-GM, CL-ML	A-2, A-1, A-4	0-20	0-25	45-85	40-80	25-75	10-60	15-25	NP-5
	27-64	Gravelly medial sandy loam, cobbly medial fine sandy loam, cobbly medial sandy loam	GM, GP-GM, SC-SM	A-1, A-2	0-20	0-20	45-85	40-80	25-65	10-35	15-25	NP-5
	64-80	Extremely cobbly loamy sand, very gravelly loamy sand, very cobbly loamy coarse sand	GP-GM, GW-GM, GC-GM	A-1	0-10	15-40	30-50	25-45	15-35	5-20	5-20	NP-5
	80-152	Unweathered bedrock			---	---	---	---	---	---	---	---
9016:												
Doubtful--------	0-2	Slightly decomposed plant material	PT	A-8	0	0	100	100	25-50	10-30	---	---
	2-9	Gravelly ashy sandy loam	GP-GM, SM	A-2, A-1	0	0-25	45-75	40-70	25-50	10-30	25-35	NP-5
	9-27	Gravelly ashy coarse sandy loam, ashy fine sandy loam, gravelly ashy sandy loam	GP-GM, GM	A-4, A-1	0	0-20	40-75	35-70	25-60	10-40	0-30	NP-5
	27-58	Gravelly ashy coarse sandy loam, gravelly ashy fine sandy loam, gravelly ashy sandy loam	GP-GM, GM	A-1, A-4	0	0-20	40-75	35-70	25-60	10-40	0-30	NP-5
	58-70	Very gravelly coarse sand, very gravelly loamy sand, extremely gravelly loamy coarse sand	GC-GM, GP, GP-GM	A-1	0	5-25	15-65	10-60	5-45	0-20	0-20	NP-5
	70-152	Unweathered bedrock			---	---	---	---	---	---	---	---

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
9016:												
Triumph---------	0-15	Gravelly ashy sandy loam, very gravelly ashy fine sandy loam, cobbly sandy loam	SM, GP-GM, GM	A-1, A-5	0-10	5-70	30-80	25-75	15-65	10-45	35-65	NP-5
	15-50	Very cobbly ashy sandy loam, gravelly ashy fine sandy loam, very gravelly sandy loam	GM, GP-GM	A-1, A-5	0-5	10-65	25-75	20-70	10-60	5-40	25-50	NP-5
	50-120	Extremely cobbly ashy sandy loam, very cobbly ashy fine sandy loam, extremely gravelly sandy loam	GP-GM, GM	A-1, A-2	0-5	10-70	20-60	15-55	10-55	5-35	20-45	NP-5
	120-152	Weathered bedrock			---	---	---	---	---	---	---	---
Perfect, cold---	0-3	Slightly decomposed plant material	PT	A-8	0	0	100	100	10-75	0-40	---	---
	3-4	Moderately decomposed plant material	PT	A-8	0	0	100	100	10-75	0-40	---	---
	4-7	Ashy sandy loam, gravelly loamy sand, gravelly ashy coarse sandy loam	GP, SM, SC-SM	A-1, A-2, A-4	0-20	0-45	25-100	20-100	10-75	0-40	0-25	NP-5
	7-11	Moderately decomposed plant material	PT	A-8	0	0	100	100	10-75	0-40	---	---
	11-13	Ashy sandy loam, gravelly loamy sand, gravelly ashy coarse sandy loam	GP, SM, SC-SM	A-1, A-2, A-4	0-20	0-50	25-100	20-100	10-75	0-40	0-25	NP-5
	13-39	Gravelly ashy sandy loam, very gravelly loamy sand, very gravelly coarse sandy loam	GP, SM, SC-SM	A-1, A-2	0-15	0-45	25-85	20-80	10-60	0-30	0-25	NP-5
	39-73	Extremely cobbly loamy sand, very gravelly loamy coarse sand, extremely gravelly loamy fine sand	GW, GP-GM, GC-GM	A-1	0-10	0-40	10-45	5-40	0-35	0-15	0-20	NP-5
	73-752	Extremely gravelly loamy coarse sand, very cobbly loamy sand, very gravelly loamy fine sand	GW, GP-GM, GC-GM	A-1	0-10	0-40	10-50	5-45	0-45	0-20	0-20	NP-5

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
9501:												
Stehekin	0-18	Very cobbly ashy sandy loam, gravelly ashy fine sandy loam, ashy sandy loam	SM, GM	A-4, A-2, A-1	0	0-40	55-90	50-85	30-75	15-50	25-35	NP-5
	18-44	Extremely cobbly coarse sandy loam, stony fine sandy loam, very cobbly sandy loam	SM, GC-GM, GW-GM	A-1, A-4	0-15	10-50	35-80	30-75	15-65	10-45	15-25	NP-5
	44-109	Very stony coarse sandy loam, extremely gravelly fine sandy loam, very stony sandy loam	GC-GM, SM, GP-GM	A-4, A-1	0-15	10-50	30-75	25-70	15-60	10-40	0-20	NP-5
	109-152	Very stony loamy sand, extremely gravelly coarse sandy loam, very stony sandy loam	GM, SC-SM, GW-GM	A-1, A-2	0-35	5-45	30-80	25-75	15-60	5-30	0-20	NP-5
Primus	0-1	Slightly decomposed plant material	PT	A-8	0	0	100	100	25-85	10-55	---	---
	1-3	Moderately decomposed plant material	PT	A-8	0	0	100	100	25-85	10-55	---	---
	3-34	Gravelly ashy fine sandy loam, gravelly ashy coarse sandy loam, ashy sandy loam	GP-GM, GM, ML	A-1, A-2, A-4	0-10	0-25	45-100	40-100	25-85	10-55	25-35	NP-5
	34-60	Gravelly ashy fine sandy loam, gravelly ashy coarse sandy loam, ashy sandy loam	GP-GM, GM, ML	A-1, A-2, A-4	0-10	0-25	45-100	40-100	25-85	10-55	15-30	NP-5
	60-84	Extremely cobbly ashy sandy loam, very gravelly ashy loamy sand, very cobbly loamy sand	GW-GM, GM	A-1	0-15	15-55	30-65	25-60	15-45	5-25	15-30	NP-5
	84-152	Extremely gravelly loamy sand, very cobbly loamy coarse sand, very gravelly loamy sand	GP, GP-GM, SC-SM	A-1	0-10	10-55	25-70	20-65	10-50	0-20	0-25	NP-5

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
9501:												
Stetattle	0-12	Very stony medial fine sandy loam, very cobbly medial loam, very stony medial sandy loam	GP-GM, SM, GM	A-1, A-2	10-65	10-40	35-70	30-65	15-65	10-50	25-50	NP-10
	12-30	Extremely stony medial sandy loam, very cobbly medial fine sandy loam, extremely cobbly medial sandy loam	GM, GP-GM	A-1	10-55	5-30	30-70	25-65	15-60	10-40	25-45	NP-5
	30-55	Extremely stony medial sandy loam, very cobbly medial sandy loam, extremely cobbly medial sandy loam	GM, GP-GM	A-1	5-50	5-25	25-60	20-55	10-40	5-25	25-35	NP-5
	55-100	Extremely stony medial sandy loam, extremely cobbly medial loamy sand, very stony medial sandy loam	GP-GM, GM	A-1	5-50	10-40	35-70	30-65	15-50	5-30	20-35	NP-5
	100-152	Cobbles, gravel, stones		A-1	10-30	15-40	35-55	30-50	15-30	5-15	0-0	NP
9997:												
Rock outcrop	0-152	Unweathered bedrock			---	---	---	---	---	---	---	---
Despair	0-4	Highly decomposed plant material	PT	A-8	0	0	100	100	25-70	10-40	---	---
	4-21	Ashy sandy loam	GP-GM, SM	A-4, A-1	0-15	0-35	40-100	35-100	25-70	10-40	25-35	NP-5
	21-41	Gravelly ashy sandy loam, gravelly ashy fine sandy loam, ashy sandy loam	GP-GM, GM, ML	A-1, A-4	0-10	0-30	40-100	35-100	25-85	10-55	0-30	NP-5
	41-152	Unweathered bedrock			---	---	---	---	---	---	---	---
9998:												
Rock outcrop	0-152	Unweathered bedrock			---	---	---	---	---	---	---	---
Glaciers	---	---	---	---	---	---	---	---	---	---	---	---

Table 23.—Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>250 millimeters	75-250 millimeters	4	10	40	200		
	cm				*Pct*	*Pct*					*Pct*	
9998:												
Harlequin-------	0-6	Slightly decomposed plant material	PT	A-8	0	0	100	100	40-85	20-55	---	---
	6-24	Coarse sandy loam, fine sandy loam, sandy loam	OH, SM	A-2, A-1, A-5	0	0-10	75-100	70-100	40-85	20-55	30-50	NP-5
	24-46	Coarse sandy loam, fine sandy loam, sandy loam	ML, SM	A-4, A-2, A-1	0	0-10	75-100	70-100	40-85	20-55	15-30	NP-5
	46-152	Unweathered bedrock			---	---	---	---	---	---	---	---
9999:												
Water, freshwater-----	---	---	---	---	---	---	---	---	---	---	---	---

Table 24.—Physical Soil Properties

(Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Wind erodibility index" apply only to the surface layer. Absence of an entry indicates that data were not estimated or the layer consists of organic material.)

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	cm	*Pct*	*Pct*	*Pct*	*g/cm3*	*um/sec*	*cm/cm*	*Pct*	*Pct*					
6000:														
Manlywham	0-6	55-70	25-44	1-5	1.10-1.45	14.00-42.00	0.11-0.13	0.1-0.6	10-25	.32	.32	4	3	86
	6-24	55-70	25-44	1-5	1.10-1.45	14.00-42.00	0.05-0.12	0.1-0.6	7.0-12	.28	.28			
	24-60	55-70	25-44	1-5	1.25-1.50	14.00-141.00	0.03-0.10	0.1-0.5	0.3-1.0	.15	.20			
	60-104	70-85	12-29	1-5	1.35-1.60	14.00-141.00	0.02-0.04	0.1-0.3	0.3-1.0	.02	.05			
	104-150	70-85	12-29	1-5	1.35-1.60	14.00-141.00	0.02-0.04	0.1-0.3	0.3-1.0	.02	.05			
Nohokomeen	0-3	55-75	18-42	3-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	4	2	134
	3-7	55-75	18-42	3-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---			
	7-30	55-75	18-42	3-8	0.70-1.20	14.00-42.00	0.13-0.22	0.2-0.6	1.0-5.0	.32	.32			
	30-73	40-70	20-50	3-10	1.00-1.35	14.00-42.00	0.10-0.24	0.3-1.2	0.5-3.0	.37	.37			
	73-108	40-70	20-50	3-10	1.00-1.50	14.00-42.00	0.08-0.14	0.3-1.2	0.3-3.0	.55	.55			
	108-152	60-90	4-36	0-6	1.20-1.70	42.00-141.00	0.01-0.07	0.0-0.5	0.3-2.0	.05	.15			
Roland	0-3	55-70	20-43	2-10	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	3	3	86
	3-17	55-70	20-43	2-10	0.90-1.35	14.00-42.00	0.11-0.13	0.2-1.2	3.0-9.0	.32	.32			
	17-42	55-75	15-45	0-10	1.00-1.35	14.00-42.00	0.08-0.14	0.0-1.2	1.0-5.0	.37	.37			
	42-78	55-75	15-45	0-10	1.00-1.50	14.00-42.00	0.08-0.14	0.0-1.2	0.5-3.0	.55	.55			
	78-137	60-85	5-40	0-10	1.00-1.50	14.00-141.00	0.04-0.12	0.0-1.2	0.3-3.0	.24	.24			
	137-152	60-90	4-40	0-6	1.20-1.70	14.00-141.00	0.02-0.10	0.0-0.7	0.3-2.0	.02	.02			
6009:														
Ragged, deciduous	0-2	60-85	5-38	2-10	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	2	1	220
	2-5	60-85	5-38	2-10	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---			
	5-20	60-85	5-38	2-10	0.80-1.10	14.00-42.00	0.05-0.16	0.1-0.8	0.8-3.0	.15	.20			
	20-34	60-85	5-38	2-10	0.80-1.10	14.00-42.00	0.05-0.16	0.1-0.8	0.3-2.5	.32	.32			
	34-150	60-95	5-20	0-5	1.40-1.60	42.00-141.00	0.01-0.04	0.0-0.4	0.3-1.0	.02	.02			
Tricouni, deciduous	0-3	60-75	17-38	2-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	5	2	134
	3-9	60-75	17-38	2-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---			
	9-10	60-75	17-38	2-8	0.80-1.00	14.00-42.00	0.17-0.19	0.1-0.6	1.5-5.0	.28	.28			
	10-28	60-75	15-38	2-10	0.80-1.00	14.00-42.00	0.08-0.20	0.1-0.8	3.0-7.0	.10	.17			
	28-60	60-75	15-38	2-10	1.00-1.50	14.00-42.00	0.04-0.11	0.1-1.1	2.0-6.0	.10	.24			
	60-104	60-80	10-38	2-10	1.25-1.50	14.00-141.00	0.03-0.09	0.1-1.0	1.0-5.0	.10	.24			
	104-152	60-85	10-40	0-5	1.40-1.60	14.00-141.00	0.02-0.08	0.0-0.5	0.5-3.0	.05	.17			

Table 24.—Physical Soil Properties—Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	cm	*Pct*	*Pct*	*Pct*	*g/cm3*	*um/sec*	*cm/cm*	*Pct*	*Pct*					
6009:														
Cosho	0-6	50-75	18-49	1-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	2	3	86
	6-14	50-75	18-49	1-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---			
	14-15	50-75	18-49	1-8	0.60-0.90	14.00-42.00	0.09-0.23	0.1-0.6	1.0-2.0	.24	.37			
	15-53	50-75	18-48	2-8	0.60-0.90	14.00-42.00	0.08-0.20	0.1-0.6	1.0-4.0	.17	.32			
	53-75	75-90	4-24	1-6	1.30-1.50	14.00-141.00	0.01-0.05	0.0-0.5	0.3-1.0	.15	.37			
	75-90	75-90	4-25	0-6	1.40-1.60	14.00-141.00	0.01-0.03	0.0-0.4	0.3-0.8	.15	.37			
	90-152	---	---	---	---	---	---	---	---	---	---			
6010:														
Roland	0-3	55-70	20-43	2-10	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	3	3	86
	3-17	55-70	20-43	2-10	0.90-1.35	14.00-42.00	0.11-0.13	0.2-1.2	3.0-9.0	.32	.32			
	17-42	55-75	15-45	0-10	1.00-1.35	14.00-42.00	0.08-0.14	0.0-1.2	1.0-5.0	.37	.37			
	42-78	55-75	15-45	0-10	1.00-1.50	14.00-42.00	0.08-0.14	0.0-1.2	0.5-3.0	.55	.55			
	78-137	60-85	5-40	0-10	1.00-1.50	14.00-141.00	0.04-0.12	0.0-1.2	0.3-3.0	.24	.24			
	137-152	60-90	4-40	0-6	1.20-1.70	14.00-141.00	0.02-0.10	0.0-0.7	0.3-2.0	.02	.02			
Skymo	0-2	85-90	7-15	0-3	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	5	1	180
	2-10	85-90	7-15	0-3	1.35-1.60	42.00-705.00	0.03-0.04	0.0-0.4	0.3-1.0	.05	.05			
	10-16	65-85	7-35	0-8	1.10-1.50	14.00-141.00	0.05-0.12	0.0-1.0	5.0-9.0	.24	.24			
	16-34	75-90	7-25	0-3	1.35-1.60	42.00-705.00	0.03-0.06	0.0-0.4	0.3-1.0	.05	.05			
	34-40	65-90	2-35	0-8	1.10-1.50	14.00-141.00	0.04-0.12	0.0-1.0	5.0-9.0	.24	.24			
	40-45	75-90	2-25	0-8	1.25-1.50	42.00-141.00	0.03-0.06	0.0-1.0	1.0-5.0	.10	.10			
	45-66	75-90	2-25	0-8	1.25-1.50	42.00-141.00	0.03-0.06	0.0-1.0	1.0-5.0	.15	.15			
	66-90	75-90	2-25	0-8	1.25-1.50	42.00-705.00	0.03-0.06	0.0-1.0	0.5-3.0	.24	.24			
	90-152	75-95	2-25	0-3	1.35-1.60	42.00-705.00	0.02-0.06	0.0-0.4	0.3-1.0	.02	.02			
Deerlick	0-3	20-70	25-54	1-5	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	3	2	134
	3-10	20-70	25-54	1-5	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---			
	10-14	20-70	25-54	1-5	0.80-1.00	14.00-42.00	0.16-0.30	0.1-0.4	7.0-12	.43	.43			
	14-22	50-75	20-49	1-5	0.80-1.00	14.00-42.00	0.13-0.26	0.1-0.4	1.0-4.0	.37	.37			
	22-30	70-100	0-30	0-5	0.80-1.00	14.00-141.00	0.05-0.09	0.0-0.4	0.3-1.0	.02	.02			
	30-50	70-100	0-30	0-5	0.80-1.00	14.00-141.00	0.05-0.09	0.0-0.4	0.3-1.0	.02	.02			
	50-64	50-85	10-49	1-5	1.25-1.50	14.00-141.00	0.05-0.14	0.1-0.6	0.3-1.0	.55	.55			
	64-80	70-100	0-29	1-5	1.25-1.50	14.00-141.00	0.03-0.14	0.1-0.6	0.3-1.0	.55	.55			
	80-152	65-100	0-5	0-5	1.35-1.60	14.00-141.00	0.02-0.07	0.0-0.4	0.3-1.0	.02	.02			

Table 24.—Physical Soil Properties—Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	cm	*Pct*	*Pct*	*Pct*	*g/cm3*	*um/sec*	*cm/cm*	*Pct*	*Pct*					
6014:														
Thorton	0-4	55-75	20-45	1-6	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	3	2	134
	4-8	55-75	20-45	1-6	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---			
	8-12	55-75	20-45	1-6	0.60-0.85	14.00-42.00	0.14-0.23	0.1-0.5	1.5-5.3	.32	.32			
	12-30	55-75	20-45	2-10	0.60-0.85	14.00-42.00	0.09-0.23	0.1-0.8	0.8-3.5	.20	.37			
	30-46	55-75	20-40	2-10	0.60-0.85	14.00-42.00	0.09-0.19	0.1-0.7	0.3-1.8	.17	.37			
	46-60	65-85	15-35	0-6	1.30-1.40	14.00-141.00	0.01-0.07	0.0-0.5	0.3-1.5	.10	.32			
	60-150	65-85	15-35	0-6	1.30-1.40	14.00-141.00	0.01-0.07	0.0-0.5	0.3-0.8	.10	.32			
Ragged	0-2	60-85	5-38	2-10	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	2	1	220
	2-5	60-85	5-38	2-10	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---			
	5-20	60-85	5-38	2-10	0.80-1.10	14.00-42.00	0.05-0.16	0.1-0.8	0.8-3.0	.15	.20			
	20-34	60-85	5-38	2-10	0.80-1.10	14.00-42.00	0.05-0.16	0.1-0.8	0.3-2.5	.32	.32			
	34-150	60-95	5-20	0-5	1.40-1.60	42.00-141.00	0.01-0.04	0.0-0.4	0.3-1.0	.02	.02			
Ledeir	0-2	50-75	19-49	1-6	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	4	2	134
	2-12	50-75	19-49	1-6	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---			
	12-20	50-75	19-49	1-6	0.70-0.90	14.00-42.00	0.14-0.22	0.1-0.5	1.5-5.0	.32	.32			
	20-50	50-75	19-47	3-10	0.75-0.95	14.00-42.00	0.14-0.21	0.2-0.8	2.0-9.0	.28	.28			
	50-82	50-75	19-47	3-10	0.80-1.00	14.00-42.00	0.13-0.21	0.2-0.8	1.0-4.0	.37	.37			
	82-152	70-90	9-30	0-6	1.40-1.60	42.00-705.00	0.01-0.04	0.0-0.5	0.3-1.5	.05	.17			
6015:														
Tricouni	0-3	60-75	17-38	2-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	5	2	134
	3-9	60-75	17-38	2-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---			
	9-10	60-75	17-38	2-8	0.80-1.00	14.00-42.00	0.17-0.19	0.1-0.6	1.5-5.0	.28	.28			
	10-28	60-75	15-38	2-10	0.80-1.00	14.00-42.00	0.08-0.20	0.1-0.8	3.0-7.0	.10	.17			
	28-60	60-75	15-38	2-10	1.00-1.50	14.00-42.00	0.04-0.11	0.1-1.1	2.0-6.0	.10	.24			
	60-104	60-80	10-38	2-10	1.25-1.50	14.00-141.00	0.03-0.09	0.1-1.0	1.0-5.0	.10	.24			
	104-152	60-85	10-40	0-5	1.40-1.60	14.00-141.00	0.02-0.08	0.0-0.5	0.5-3.0	.05	.17			
Ragged	0-2	60-85	5-38	2-10	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	2	1	220
	2-5	60-85	5-38	2-10	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---			
	5-20	60-85	5-38	2-10	0.80-1.10	14.00-42.00	0.05-0.16	0.1-0.8	0.8-3.0	.15	.20			
	20-34	60-85	5-38	2-10	0.80-1.10	14.00-42.00	0.05-0.16	0.1-0.8	0.3-2.5	.32	.32			
	34-150	60-95	5-20	0-5	1.40-1.60	42.00-141.00	0.01-0.04	0.0-0.4	0.3-1.0	.02	.02			
Easy	0-3	55-75	19-44	1-6	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	2	2	134
	3-6	55-75	19-44	1-6	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---			
	6-12	55-75	19-44	1-6	0.60-0.85	14.00-42.00	0.09-0.23	0.1-0.5	0.5-2.0	.37	.37			
	12-28	55-75	15-42	3-10	0.60-0.85	14.00-42.00	0.15-0.23	0.2-0.8	2.0-5.0	.15	.28			
	28-41	55-75	15-42	3-10	0.60-0.85	14.00-42.00	0.14-0.23	0.2-0.8	1.0-4.0	.15	.32			
	41-66	55-80	12-44	1-8	1.20-1.40	14.00-141.00	0.01-0.08	0.0-0.6	0.3-2.0	.05	.24			
	66-150	55-80	14-45	0-6	1.20-1.40	14.00-141.00	0.01-0.07	0.0-0.4	0.3-1.5	.05	.20			

Table 24.—Physical Soil Properties—Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	cm	*Pct*	*Pct*	*Pct*	*g/cm3*	*um/sec*	*cm/cm*	*Pct*	*Pct*					
6500:														
Sandalee	0-2	50-75	18-48	2-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	5	3	86
	2-11	50-75	18-48	2-8	1.10-1.45	14.00-42.00	0.11-0.13	0.2-1.0	7.0-12	.20	.20			
	11-40	50-75	18-48	2-8	1.20-1.40	14.00-42.00	0.10-0.14	0.2-1.0	1.0-4.0	.32	.32			
	40-56	50-75	18-48	2-8	1.40-1.60	14.00-42.00	0.09-0.11	0.2-1.0	0.3-1.5	.37	.37			
	56-80	50-75	18-48	2-8	1.50-1.70	14.00-42.00	0.05-0.10	0.2-1.0	0.3-1.5	.37	.37			
	80-152	70-90	5-25	0-6	1.35-1.60	42.00-705.00	0.02-0.06	0.0-0.7	0.3-1.0	.10	.10			
Kettling	0-2	55-70	22-43	2-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	5	3	86
	2-5	55-70	22-43	2-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---			
	5-13	55-70	22-43	2-8	1.10-1.45	14.00-42.00	0.11-0.12	0.2-1.0	3.0-9.0	.28	.28			
	13-25	45-70	20-53	2-10	0.90-1.45	14.00-42.00	0.10-0.19	0.2-1.2	1.0-5.0	.43	.43			
	25-60	45-70	20-53	2-10	1.00-1.45	14.00-42.00	0.08-0.17	0.2-1.2	1.0-3.0	.37	.37			
	60-90	70-95	2-30	0-3	1.35-1.60	42.00-705.00	0.01-0.05	0.0-0.3	0.3-2.0	.02	.02			
	90-152	60-85	5-40	0-10	1.25-1.60	42.00-141.00	0.03-0.10	0.0-1.1	0.3-1.0	.20	.20			
Torment	0-2	75-95	2-25	0-3	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	3	2	134
	2-15	75-95	2-25	0-3	1.35-1.60	42.00-141.00	0.05-0.06	0.0-0.4	0.3-2.0	.15	.15			
	15-25	75-95	2-25	0-3	0.10-0.30	42.00-705.00	0.30-0.60	---	15-40	---	---			
	25-35	75-95	2-25	0-3	1.35-1.60	42.00-705.00	0.02-0.05	0.0-0.3	1.0-5.0	.02	.02			
	35-70	75-95	2-25	0-3	1.35-1.60	42.00-705.00	0.01-0.04	0.0-0.2	0.5-3.0	.02	.02			
	70-152	75-95	2-25	0-3	1.35-1.60	42.00-705.00	0.03-0.07	0.0-0.3	0.3-1.0	.02	.05			
6502:														
Mesahchie	0-2	55-75	17-42	3-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	3	3	86
	2-20	55-75	17-42	3-8	0.60-1.10	14.00-141.00	0.06-0.18	0.1-0.6	10-18	.20	.32			
	20-44	60-75	17-37	3-8	0.85-1.20	14.00-141.00	0.05-0.16	0.1-0.9	6.0-15	.15	.28			
	44-74	60-75	17-37	3-8	0.90-1.30	14.00-141.00	0.05-0.14	0.1-0.9	3.0-10	.10	.24			
	74-96	65-85	9-34	1-6	1.10-1.50	14.00-141.00	0.03-0.08	0.0-0.5	1.0-5.0	.10	.28			
	96-152	75-85	9-25	0-6	1.20-1.60	42.00-705.00	0.02-0.04	0.0-0.5	0.3-3.0	.05	.15			
Inspiration	0-2	55-70	24-42	3-6	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	5	5	56
	2-9	55-70	24-42	3-6	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---			
	9-15	55-70	24-42	3-6	0.10-0.30	42.00-705.00	0.30-0.60	---	15-40	---	---			
	15-25	55-70	24-42	3-6	0.65-0.85	14.00-42.00	0.06-0.14	0.1-0.3	3.0-9.0	.10	.28			
	25-37	55-70	24-42	3-6	0.70-0.90	14.00-42.00	0.06-0.14	0.1-0.3	2.0-8.0	.05	.28			
	37-64	55-70	23-43	2-7	0.75-0.90	14.00-42.00	0.10-0.16	0.1-0.4	1.0-3.0	.15	.32			
	64-150	55-72	23-44	1-5	1.30-1.50	14.00-141.00	0.02-0.07	0.0-0.4	0.3-1.0	.05	.32			
Lyall	0-4	60-85	7-38	2-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	4	4	86
	4-7	60-85	7-38	2-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---			
	7-19	60-85	7-38	2-8	0.85-1.20	14.00-141.00	0.07-0.15	0.1-0.9	7.0-16	.10	.15			
	19-44	65-85	7-38	2-8	1.00-1.35	14.00-141.00	0.02-0.12	0.0-0.8	3.0-7.0	.02	.10			
	44-75	70-85	7-28	2-8	1.00-1.35	14.00-141.00	0.02-0.11	0.0-0.7	2.0-6.0	.02	.10			
	75-120	75-85	7-22	2-8	1.00-1.35	14.00-141.00	0.02-0.08	0.0-0.7	1.0-5.0	.02	.10			
	120-150	75-90	5-25	0-5	1.20-1.50	42.00-705.00	0.01-0.05	0.0-0.7	0.5-3.0	.02	.15			

Table 24.—Physical Soil Properties—Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	cm	*Pct*	*Pct*	*Pct*	*g/cm3*	*um/sec*	*cm/cm*	*Pct*	*Pct*					
6505:														
Farway	0-3	55-75	23-43	2-10	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	4	2	134
	3-45	55-75	23-43	2-10	0.75-1.10	14.00-42.00	0.13-0.26	0.1-0.8	2.0-9.0	.32	.32			
	45-78	55-75	23-43	2-10	0.75-1.10	14.00-42.00	0.13-0.26	0.1-0.8	2.0-9.0	.20	.32			
	78-90	55-75	23-43	2-10	0.75-1.30	14.00-42.00	0.11-0.24	0.1-0.8	2.0-9.0	.15	.28			
	90-152	55-75	23-43	2-10	1.00-1.50	14.00-141.00	0.02-0.08	0.0-0.8	0.5-4.0	.10	.28			
Lyall	0-4	60-85	7-38	2-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	4	4	86
	4-7	60-85	7-38	2-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---			
	7-19	60-85	7-38	2-8	0.85-1.20	14.00-141.00	0.07-0.15	0.1-0.9	7.0-16	.10	.15			
	19-44	65-85	7-38	2-8	1.00-1.35	14.00-141.00	0.02-0.12	0.0-0.8	3.0-7.0	.02	.10			
	44-75	70-85	7-28	2-8	1.00-1.35	14.00-141.00	0.02-0.11	0.0-0.7	2.0-6.0	.02	.10			
	75-120	75-85	7-22	2-8	1.00-1.35	14.00-141.00	0.02-0.08	0.0-0.7	1.0-5.0	.02	.10			
	120-150	75-90	5-25	0-5	1.20-1.50	42.00-705.00	0.01-0.05	0.0-0.7	0.5-3.0	.02	.15			
Inspiration	0-2	55-70	24-42	3-6	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	5	5	56
	2-9	55-70	24-42	3-6	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---			
	9-15	55-70	24-42	3-6	0.10-0.30	42.00-705.00	0.30-0.60	---	15-40	---	---			
	15-25	55-70	24-42	3-6	0.65-0.85	14.00-42.00	0.06-0.14	0.1-0.3	3.0-9.0	.10	.28			
	25-37	55-70	24-42	3-6	0.70-0.90	14.00-42.00	0.06-0.14	0.1-0.3	2.0-8.0	.05	.28			
	37-64	55-70	23-43	2-7	0.75-0.90	14.00-42.00	0.10-0.16	0.1-0.4	1.0-3.0	.15	.32			
	64-150	55-72	23-44	1-5	1.30-1.50	14.00-141.00	0.02-0.07	0.0-0.4	0.3-1.0	.05	.32			
7003:														
Damnation	0-4	55-75	15-43	2-10	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	1	3	86
	4-6	55-75	15-43	2-10	0.10-0.30	42.00-705.00	0.30-0.60	---	15-40	---	---			
	6-14	55-75	15-43	2-10	0.60-1.00	14.00-42.00	0.14-0.21	0.1-0.8	1.0-5.0	.24	.43			
	14-31	55-75	15-43	2-10	0.60-1.00	14.00-42.00	0.14-0.23	0.1-0.8	1.0-5.0	.24	.49			
	31-45	55-75	15-43	2-10	0.60-1.00	14.00-42.00	0.14-0.23	0.1-0.8	0.3-3.0	.28	.49			
	45-152	---	---	---	---	---	---	---	---	---	---			
Ragged	0-2	60-85	5-38	2-10	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	2	1	220
	2-5	60-85	5-38	2-10	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---			
	5-20	60-85	5-38	2-10	0.80-1.10	14.00-42.00	0.05-0.16	0.1-0.8	0.8-3.0	.15	.20			
	20-34	60-85	5-38	2-10	0.80-1.10	14.00-42.00	0.05-0.16	0.1-0.8	0.3-2.5	.32	.32			
	34-150	60-95	5-20	0-5	1.40-1.60	42.00-141.00	0.01-0.04	0.0-0.4	0.3-1.0	.02	.02			
Rock outcrop	0-152	---	---	---	---	---	---	---	---	---	---	---	---	---

Table 24.—Physical Soil Properties—Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	cm	*Pct*	*Pct*	*Pct*	*g/cm3*	*um/sec*	*cm/cm*	*Pct*	*Pct*					
7015:														
Thorton	0-4	55-75	20-45	1-6	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	3	2	134
	4-8	55-75	20-45	1-6	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---			
	8-12	55-75	20-45	1-6	0.60-0.85	14.00-42.00	0.14-0.23	0.1-0.5	1.5-5.3	.32	.32			
	12-30	55-75	20-45	2-10	0.60-0.85	14.00-42.00	0.09-0.23	0.1-0.8	0.8-3.5	.20	.37			
	30-46	55-75	20-40	2-10	0.60-0.85	14.00-42.00	0.09-0.19	0.1-0.7	0.3-1.8	.17	.37			
	46-60	65-85	15-35	0-6	1.30-1.40	14.00-141.00	0.01-0.07	0.0-0.5	0.3-1.5	.10	.32			
	60-150	65-85	15-35	0-6	1.30-1.40	14.00-141.00	0.01-0.07	0.0-0.5	0.3-0.8	.10	.32			
Ragged	0-2	60-85	5-38	2-10	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	2	1	220
	2-5	60-85	5-38	2-10	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---			
	5-20	60-85	5-38	2-10	0.80-1.10	14.00-42.00	0.05-0.16	0.1-0.8	0.8-3.0	.15	.20			
	20-34	60-85	5-38	2-10	0.80-1.10	14.00-42.00	0.05-0.16	0.1-0.8	0.3-2.5	.32	.32			
	34-150	60-95	5-20	0-5	1.40-1.60	42.00-141.00	0.01-0.04	0.0-0.4	0.3-1.0	.02	.02			
Damnation	0-4	55-75	15-43	2-10	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	1	3	86
	4-6	55-75	15-43	2-10	0.10-0.30	42.00-705.00	0.30-0.60	---	15-40	---	---			
	6-14	55-75	15-43	2-10	0.60-1.00	14.00-42.00	0.14-0.21	0.1-0.8	1.0-5.0	.24	.43			
	14-31	55-75	15-43	2-10	0.60-1.00	14.00-42.00	0.14-0.23	0.1-0.8	1.0-5.0	.24	.49			
	31-45	55-75	15-43	2-10	0.60-1.00	14.00-42.00	0.14-0.23	0.1-0.8	0.3-3.0	.28	.49			
	45-152	---	---	---	---	---	---	---	---	---	---			
7500:														
Inspiration	0-2	55-70	24-42	3-6	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	5	5	56
	2-9	55-70	24-42	3-6	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---			
	9-15	55-70	24-42	3-6	0.10-0.30	42.00-705.00	0.30-0.60	---	15-40	---	---			
	15-25	55-70	24-42	3-6	0.65-0.85	14.00-42.00	0.06-0.14	0.1-0.3	3.0-9.0	.10	.28			
	25-37	55-70	24-42	3-6	0.70-0.90	14.00-42.00	0.06-0.14	0.1-0.3	2.0-8.0	.05	.28			
	37-64	55-70	23-43	2-7	0.75-0.90	14.00-42.00	0.10-0.16	0.1-0.4	1.0-3.0	.15	.32			
	64-150	55-72	23-44	1-5	1.30-1.50	14.00-141.00	0.02-0.07	0.0-0.4	0.3-1.0	.05	.32			
Mesahchie	0-2	55-75	17-42	3-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	3	3	86
	2-20	55-75	17-42	3-8	0.60-1.10	14.00-141.00	0.06-0.18	0.1-0.6	10-18	.20	.32			
	20-44	60-75	17-37	3-8	0.85-1.20	14.00-141.00	0.05-0.16	0.1-0.9	6.0-15	.15	.28			
	44-74	60-75	17-37	3-8	0.90-1.30	14.00-141.00	0.05-0.14	0.1-0.9	3.0-10	.10	.24			
	74-96	65-85	9-34	1-6	1.10-1.50	14.00-141.00	0.03-0.08	0.0-0.5	1.0-5.0	.10	.28			
	96-152	75-85	9-25	0-6	1.20-1.60	42.00-705.00	0.02-0.04	0.0-0.5	0.3-3.0	.05	.15			
Sawtooth	0-3	55-75	15-43	2-10	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	2	3	86
	3-15	55-75	15-43	2-10	0.60-1.00	14.00-42.00	0.15-0.21	0.1-0.8	5.0-9.0	.10	.24			
	15-35	55-75	15-43	2-10	0.60-1.00	14.00-42.00	0.15-0.23	0.1-0.8	3.0-7.0	.17	.32			
	35-45	60-75	17-40	0-8	1.30-1.60	14.00-42.00	0.03-0.08	0.0-0.7	1.0-3.0	.20	.43			
	45-60	60-80	14-40	0-6	1.30-1.60	14.00-141.00	0.02-0.07	0.0-0.5	0.3-1.0	.10	.37			
	60-152	---	---	---	---	---	---	---	---	---	---			

Table 24.—Physical Soil Properties—Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	cm	*Pct*	*Pct*	*Pct*	*g/cm3*	*um/sec*	*cm/cm*	*Pct*	*Pct*					
7501:														
Despair	0-4	55-75	17-43	2-8	0.10-0.30	42.00-705.00	0.30-0.60	---	15-40	---	---	1	2	134
	4-21	55-75	17-43	2-8	0.60-1.00	14.00-42.00	0.14-0.21	0.1-0.6	4.0-9.0	.37	.37			
	21-41	55-75	17-43	2-8	0.60-1.00	14.00-42.00	0.14-0.23	0.1-0.6	1.0-5.0	.24	.37			
	41-152	---	---	---	---	---	---	---	---	---	---			
Goode	0-2	55-75	17-43	2-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	3	3	86
	2-23	55-75	17-43	2-8	0.60-1.10	14.00-42.00	0.09-0.20	0.1-0.6	5.0-12	.17	.28			
	23-66	55-75	17-43	2-8	0.75-1.30	14.00-42.00	0.04-0.14	0.1-0.8	2.0-7.0	.10	.28			
	66-91	55-75	19-44	1-6	1.00-1.50	14.00-141.00	0.03-0.08	0.0-0.5	1.0-4.0	.05	.17			
	91-152	70-90	4-30	0-6	1.10-1.60	42.00-141.00	0.01-0.04	0.0-0.5	0.3-3.0	.02	.02			
Rock outcrop	0-152	---	---	---	---	---	---	---	---	---	---	---	---	---
7502:														
Farway	0-3	55-75	23-43	2-10	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	4	2	134
	3-45	55-75	23-43	2-10	0.75-1.10	14.00-42.00	0.13-0.26	0.1-0.8	2.0-9.0	.32	.32			
	45-78	55-75	23-43	2-10	0.75-1.10	14.00-42.00	0.13-0.26	0.1-0.8	2.0-9.0	.20	.32			
	78-90	55-75	23-43	2-10	0.75-1.30	14.00-42.00	0.11-0.24	0.1-0.8	2.0-9.0	.15	.28			
	90-152	55-75	23-43	2-10	1.00-1.50	14.00-141.00	0.02-0.08	0.0-0.8	0.5-4.0	.10	.28			
Sawtooth	0-3	55-75	15-43	2-10	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	2	3	86
	3-15	55-75	15-43	2-10	0.60-1.00	14.00-42.00	0.15-0.21	0.1-0.8	5.0-9.0	.10	.24			
	15-35	55-75	15-43	2-10	0.60-1.00	14.00-42.00	0.15-0.23	0.1-0.8	3.0-7.0	.17	.32			
	35-45	60-75	17-40	0-8	1.30-1.60	14.00-42.00	0.03-0.08	0.0-0.7	1.0-3.0	.20	.43			
	45-60	60-80	14-40	0-6	1.30-1.60	14.00-141.00	0.02-0.07	0.0-0.5	0.3-1.0	.10	.37			
	60-152	---	---	---	---	---	---	---	---	---	---			
Despair	0-4	55-75	17-43	2-8	0.10-0.30	42.00-705.00	0.30-0.60	---	15-40	---	---	1	2	134
	4-21	55-75	17-43	2-8	0.60-1.00	14.00-42.00	0.14-0.21	0.1-0.6	4.0-9.0	.37	.37			
	21-41	55-75	17-43	2-8	0.60-1.00	14.00-42.00	0.14-0.23	0.1-0.6	1.0-5.0	.24	.37			
	41-152	---	---	---	---	---	---	---	---	---	---			
8000:														
Beaverpass	0-18	70-90	2-30	0-8	0.10-0.30	4.00-42.00	0.30-0.60	---	15-35	---	---	1	5	56
	18-56	70-90	2-30	0-8	0.10-0.30	4.00-42.00	0.30-0.60	---	15-35	---	---			
	56-91	70-90	2-30	0-8	0.10-0.30	4.00-42.00	0.30-0.60	---	15-35	---	---			
	91-107	70-90	2-30	0-8	1.35-1.60	14.00-705.00	0.03-0.10	0.0-1.0	0.5-9.0	.10	.10			
	107-152	65-90	2-35	0-8	1.25-1.60	14.00-705.00	0.05-0.13	0.0-1.0	0.5-12	.32	.32			
Purple	0-25	40-55	27-55	5-18	0.10-0.30	4.00-42.00	0.30-0.60	---	15-35	---	---	1	5	56
	25-45	40-55	27-55	5-18	0.80-1.20	14.00-42.00	0.12-0.19	0.5-2.2	10-25	.28	.28			
	45-58	40-55	27-55	5-18	0.80-1.20	14.00-42.00	0.11-0.19	0.5-2.2	10-25	.28	.28			
	58-96	55-90	10-40	0-15	1.25-1.50	14.00-141.00	0.02-0.12	0.2-1.8	0.3-1.0	.28	.28			
	96-150	70-85	8-30	0-7	1.35-1.60	14.00-141.00	0.02-0.10	0.0-0.8	0.3-1.0	.24	.24			

Table 24.—Physical Soil Properties—Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	cm	*Pct*	*Pct*	*Pct*	*g/cm3*	*um/sec*	*cm/cm*	*Pct*	*Pct*					
8000:														
Bacon	0-2	55-70	24-44	1-6	0.10-0.30	4.00-42.00	0.30-0.60	---	15-35	---	---	5	3	86
	2-20	55-70	24-44	1-6	1.60-1.80	14.00-141.00	0.07-0.09	0.1-0.7	1.0-4.0	.32	.32			
	20-38	55-70	24-44	1-6	1.60-1.80	14.00-141.00	0.07-0.10	0.1-0.7	0.3-1.0	.55	.55			
	38-43	85-100	0-15	0-5	1.60-1.80	14.00-141.00	0.01-0.05	0.0-0.6	0.3-1.0	.02	.02			
	43-65	55-70	25-45	0-5	1.60-1.80	14.00-141.00	0.01-0.10	0.0-0.6	0.3-1.0	.55	.55			
	65-150	85-100	0-15	0-5	1.60-1.80	14.00-141.00	0.01-0.05	0.0-0.6	0.3-1.0	.05	.15			
8006:														
Stetattle, deciduous	0-12	50-75	15-47	3-10	0.60-0.85	14.00-42.00	0.03-0.25	0.0-0.7	11-19	.10	.32	3	5	56
	12-30	55-75	15-42	3-10	0.60-0.85	14.00-42.00	0.03-0.15	0.0-0.6	7.0-13	.05	.28			
	30-55	55-75	15-42	3-10	0.60-0.85	14.00-42.00	0.03-0.15	0.0-0.6	5.0-11	.02	.32			
	55-100	60-85	7-39	1-8	0.75-1.00	14.00-141.00	0.02-0.17	0.0-0.4	2.0-8.0	.02	.28			
	100-152	70-85	10-30	0-5	1.30-1.60	141.00-705.00	0.01-0.03	0.0-0.3	0.3-1.0	.02	.15			
Forbidden	0-4	55-75	20-45	1-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	2	2	134
	4-14	55-75	20-45	1-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---			
	14-16	55-75	20-45	1-8	0.60-0.85	14.00-42.00	0.08-0.23	0.1-0.6	1.5-5.0	.24	.24			
	16-46	55-85	20-40	1-8	0.60-0.85	14.00-42.00	0.02-0.14	0.0-0.4	0.8-3.5	.10	.32			
	46-68	55-90	5-25	1-6	0.90-1.10	14.00-141.00	0.01-0.07	0.0-0.5	0.3-1.8	.02	.05			
	68-90	55-90	5-25	1-5	1.25-1.50	42.00-141.00	0.01-0.04	0.0-0.4	0.3-1.0	.02	.10			
	90-150	55-95	2-15	1-3	1.25-1.50	42.00-141.00	0.01-0.03	0.0-0.2	0.3-0.8	.02	.02			
Triumph	0-15	55-75	17-43	2-8	0.80-1.30	14.00-42.00	0.03-0.15	0.0-0.8	10-20	.15	.28	4	4	86
	15-50	55-75	17-43	2-8	0.80-1.30	14.00-42.00	0.03-0.12	0.0-0.6	5.0-15	.05	.28			
	50-120	55-75	17-43	2-8	0.80-1.30	14.00-42.00	0.03-0.12	0.0-0.6	3.0-12	.02	.28			
	120-152	---	---	---	---	---	---	---	---	---	---			
8007:														
Kimtah	0-2	55-70	26-44	1-4	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	5	2	134
	2-7	55-70	26-44	1-4	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---			
	7-12	55-70	26-44	1-4	1.60-1.80	14.00-42.00	0.08-0.17	0.1-0.3	0.3-1.0	.43	.43			
	12-33	55-70	23-43	2-7	1.10-1.45	14.00-42.00	0.06-0.16	0.1-0.5	2.0-5.0	.32	.32			
	33-51	55-70	23-43	2-7	1.10-1.45	14.00-42.00	0.06-0.16	0.1-0.5	2.0-5.0	.32	.32			
	51-90	55-70	23-43	2-7	1.60-1.80	4.00-14.00	0.03-0.08	0.2-0.8	0.3-1.0	.20	.43			
	90-150	55-70	23-43	2-7	1.25-1.50	4.00-14.00	0.06-0.11	0.2-0.8	0.3-1.0	.17	.37			
Bacon	0-2	55-70	24-44	1-6	0.10-0.30	4.00-42.00	0.30-0.60	---	15-35	---	---	5	3	86
	2-20	55-70	24-44	1-6	1.60-1.80	14.00-141.00	0.07-0.09	0.1-0.7	1.0-4.0	.32	.32			
	20-38	55-70	24-44	1-6	1.60-1.80	14.00-141.00	0.07-0.10	0.1-0.7	0.3-1.0	.55	.55			
	38-43	85-100	0-15	0-5	1.60-1.80	14.00-141.00	0.01-0.05	0.0-0.6	0.3-1.0	.02	.02			
	43-65	55-70	25-45	0-5	1.60-1.80	14.00-141.00	0.01-0.10	0.0-0.6	0.3-1.0	.55	.55			
	65-150	85-100	0-15	0-5	1.60-1.80	14.00-141.00	0.01-0.05	0.0-0.6	0.3-1.0	.05	.15			

Table 24.—Physical Soil Properties—Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	cm	*Pct*	*Pct*	*Pct*	*g/cm3*	*um/sec*	*cm/cm*	*Pct*	*Pct*					
8007:														
Yawning	0-2	50-70	25-49	1-5	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	2	2	134
	2-8	50-70	25-49	1-5	0.10-0.30	42.00-705.00	0.30-0.60	---	15-40	---	---			
	8-14	50-70	25-49	1-5	0.60-0.85	14.00-42.00	0.18-0.23	0.1-0.4	1.0-5.0	.28	.28			
	14-32	50-70	25-49	1-5	0.80-1.25	14.00-42.00	0.05-0.21	0.0-0.3	4.0-6.0	.10	.28			
	32-50	50-70	25-49	1-5	1.25-1.80	14.00-141.00	0.01-0.07	0.0-0.4	0.5-4.0	.02	.24			
	50-100	50-70	25-50	0-5	1.25-1.80	14.00-141.00	0.01-0.08	0.0-0.4	0.3-1.0	.02	.24			
	100-150	50-70	25-50	0-5	1.25-1.80	14.00-141.00	0.01-0.08	0.0-0.4	0.3-1.0	.02	.24			
8009:														
Chilliwack, warm	0-3	50-70	22-45	3-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	2	2	134
	3-13	50-70	22-45	3-8	0.60-0.85	14.00-42.00	0.15-0.20	0.2-0.6	1.5-5.0	.37	.37			
	13-34	50-70	20-45	2-10	0.60-0.85	14.00-42.00	0.12-0.19	0.1-0.7	3.0-11	.24	.37			
	34-46	60-80	10-35	2-10	0.80-1.00	14.00-42.00	0.06-0.16	0.1-0.7	1.0-5.0	.15	.28			
	46-70	70-85	10-30	1-6	1.40-1.60	14.00-141.00	0.01-0.07	0.0-0.5	0.3-1.5	.05	.24			
	70-150	75-90	5-25	0-4	1.50-1.70	42.00-141.00	0.01-0.03	0.0-0.2	0.3-1.0	.02	.05			
Perfect	0-3	50-80	22-49	1-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	2	2	134
	3-4	50-80	22-49	1-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---			
	4-7	50-80	22-49	1-8	1.00-1.40	14.00-42.00	0.03-0.15	0.0-1.0	0.8-3.0	.37	.37			
	7-11	50-80	22-49	1-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---			
	11-13	50-80	22-49	1-8	1.00-1.40	14.00-42.00	0.03-0.15	0.0-1.0	1.0-3.0	.37	.37			
	13-39	50-80	22-49	1-8	1.00-1.40	14.00-42.00	0.02-0.12	0.0-1.0	0.5-3.0	.24	.37			
	39-73	70-85	10-30	0-5	1.40-1.60	42.00-705.00	0.01-0.05	0.0-0.4	0.3-2.0	.05	.28			
	73-752	70-85	10-30	0-5	1.40-1.60	42.00-705.00	0.01-0.05	0.0-0.4	0.3-1.0	.05	.24			
Terror	0-5	60-70	25-39	1-5	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	4	2	134
	5-8	60-70	25-39	1-5	0.10-0.30	42.00-705.00	0.30-0.60	---	15-40	---	---			
	8-17	60-70	25-39	1-5	1.10-1.45	14.00-141.00	0.06-0.22	0.1-0.4	7.0-12	.24	.24			
	17-28	60-70	28-38	2-8	1.10-1.45	14.00-141.00	0.11-0.17	0.1-0.6	6.0-11	.24	.24			
	28-36	55-70	20-39	6-10	0.80-1.20	14.00-141.00	0.07-0.25	0.3-0.8	1.0-4.0	.28	.28			
	36-52	60-70	20-37	3-10	1.10-1.45	14.00-141.00	0.05-0.11	0.3-1.1	0.5-3.5	.15	.24			
	52-60	65-85	11-29	1-4	1.35-1.60	14.00-141.00	0.03-0.10	0.1-0.5	0.3-1.0	.15	.28			
	60-80	65-85	11-29	1-4	1.35-1.60	14.00-141.00	0.03-0.10	0.1-0.5	0.3-1.0	.15	.28			
	80-150	65-85	11-29	1-4	1.35-1.60	14.00-141.00	0.03-0.10	0.1-0.5	0.3-1.0	.10	.28			
8010:														
Perfect	0-3	50-80	22-49	1-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	2	2	134
	3-4	50-80	22-49	1-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---			
	4-7	50-80	22-49	1-8	1.00-1.40	14.00-42.00	0.03-0.15	0.0-1.0	0.8-3.0	.37	.37			
	7-11	50-80	22-49	1-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---			
	11-13	50-80	22-49	1-8	1.00-1.40	14.00-42.00	0.03-0.15	0.0-1.0	1.0-3.0	.37	.37			
	13-39	50-80	22-49	1-8	1.00-1.40	14.00-42.00	0.02-0.12	0.0-1.0	0.5-3.0	.24	.37			
	39-73	70-85	10-30	0-5	1.40-1.60	42.00-705.00	0.01-0.05	0.0-0.4	0.3-2.0	.05	.28			
	73-752	70-85	10-30	0-5	1.40-1.60	42.00-705.00	0.01-0.05	0.0-0.4	0.3-1.0	.05	.24			

Table 24.—Physical Soil Properties—Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	cm	*Pct*	*Pct*	*Pct*	*g/cm3*	*um/sec*	*cm/cm*	*Pct*	*Pct*					
8010:														
Spickard	0-3	55-75	15-43	2-10	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	4	2	134
	3-10	55-75	15-43	2-10	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---			
	10-13	55-75	15-43	2-10	0.60-1.00	14.00-42.00	0.18-0.21	0.1-0.8	3.0-9.0	.28	.28			
	13-22	55-75	15-43	2-10	0.60-1.00	14.00-42.00	0.14-0.21	0.1-0.8	2.0-7.0	.10	.24			
	22-44	55-75	15-43	2-10	0.60-1.00	14.00-42.00	0.13-0.21	0.1-0.8	1.0-5.0	.15	.28			
	44-60	55-75	15-45	0-10	0.60-1.00	14.00-42.00	0.13-0.21	0.0-0.8	0.5-3.0	.15	.32			
	60-105	70-90	4-30	0-6	1.35-1.60	42.00-141.00	0.02-0.04	0.0-0.5	0.3-2.0	.05	.17			
	105-152	70-90	4-30	0-6	1.35-1.60	42.00-141.00	0.02-0.04	0.0-0.5	0.3-2.0	.05	.17			
Stetattle, deciduous	0-12	50-75	15-47	3-10	0.60-0.85	14.00-42.00	0.03-0.25	0.0-0.7	11-19	.10	.32	3	5	56
	12-30	55-75	15-42	3-10	0.60-0.85	14.00-42.00	0.03-0.15	0.0-0.6	7.0-13	.05	.28			
	30-55	55-75	15-42	3-10	0.60-0.85	14.00-42.00	0.03-0.15	0.0-0.6	5.0-11	.02	.32			
	55-100	60-85	7-39	1-8	1.20-1.50	14.00-141.00	0.02-0.17	0.0-0.4	2.0-8.0	.02	.28			
	100-152	70-85	10-30	0-5	1.30-1.60	141.00-705.00	0.01-0.03	0.0-0.3	0.3-1.0	.02	.15			
8011:														
Chilliwack	0-3	50-70	22-45	3-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	2	2	134
	3-13	50-70	22-45	3-8	0.60-0.85	14.00-42.00	0.15-0.20	0.2-0.6	1.5-5.0	.37	.37			
	13-34	50-70	20-45	2-10	0.60-0.85	14.00-42.00	0.12-0.19	0.1-0.7	3.0-11	.24	.37			
	34-46	60-80	10-35	2-10	0.80-1.00	14.00-42.00	0.06-0.16	0.1-0.7	1.0-5.0	.15	.28			
	46-70	70-85	10-30	1-6	1.40-1.60	14.00-141.00	0.01-0.07	0.0-0.5	0.3-1.5	.05	.24			
	70-150	75-90	5-25	0-4	1.50-1.70	42.00-141.00	0.01-0.03	0.0-0.2	0.3-1.0	.02	.05			
Forbidden, cold	0-4	55-75	20-45	1-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	2	2	134
	4-14	55-75	20-45	1-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---			
	14-16	55-75	20-45	1-8	0.60-0.85	14.00-42.00	0.08-0.23	0.1-0.6	1.5-5.0	.24	.24			
	16-46	55-85	20-40	1-8	0.60-0.85	14.00-42.00	0.02-0.14	0.0-0.4	0.8-3.5	.10	.32			
	46-68	55-90	5-25	1-6	0.90-1.10	14.00-141.00	0.01-0.07	0.0-0.5	0.3-1.8	.02	.05			
	68-90	55-90	5-25	1-5	1.25-1.50	42.00-141.00	0.01-0.04	0.0-0.4	0.3-1.0	.02	.10			
	90-150	55-95	2-15	1-3	1.25-1.50	42.00-141.00	0.01-0.03	0.0-0.2	0.3-0.8	.02	.02			
Stetattle, deciduous	0-12	50-75	15-47	3-10	0.60-0.85	14.00-42.00	0.03-0.25	0.0-0.7	11-19	.10	.32	3	5	56
	12-30	55-75	15-42	3-10	0.60-0.85	14.00-42.00	0.03-0.15	0.0-0.6	7.0-13	.05	.28			
	30-55	55-75	15-42	3-10	0.60-0.85	14.00-42.00	0.03-0.15	0.0-0.6	5.0-11	.02	.32			
	55-100	60-85	7-39	1-8	1.20-1.50	14.00-141.00	0.02-0.17	0.0-0.4	2.0-8.0	.02	.28			
	100-152	70-85	10-30	0-5	1.30-1.60	141.00-705.00	0.01-0.03	0.0-0.3	0.3-1.0	.02	.15			
8014:														
Chilliwack, dry	0-3	50-70	22-45	3-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	2	2	134
	3-13	50-70	22-45	3-8	0.60-0.85	14.00-42.00	0.15-0.20	0.2-0.6	1.5-5.0	.37	.37			
	13-34	50-70	20-45	2-10	0.60-0.85	14.00-42.00	0.12-0.19	0.1-0.7	3.0-11	.24	.37			
	34-46	60-80	10-35	2-10	0.80-1.00	14.00-42.00	0.06-0.16	0.1-0.7	1.0-5.0	.15	.28			
	46-70	70-85	10-30	1-6	1.40-1.60	14.00-141.00	0.01-0.07	0.0-0.5	0.3-1.5	.05	.24			
	70-150	75-90	5-25	0-4	1.50-1.70	42.00-141.00	0.01-0.03	0.0-0.2	0.3-1.0	.02	.05			

Table 24.—Physical Soil Properties—Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	cm	*Pct*	*Pct*	*Pct*	*g/cm3*	*um/sec*	*cm/cm*	*Pct*	*Pct*					
8014:														
Tepeh	0-2	55-75	19-44	1-6	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	3	2	134
	2-5	55-75	19-44	1-6	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---			
	5-8	55-75	19-44	1-6	0.60-1.00	14.00-42.00	0.18-0.21	0.1-0.5	1.0-5.0	.20	.20			
	8-30	55-75	15-43	2-10	0.60-1.00	14.00-42.00	0.10-0.19	0.1-0.7	3.0-7.0	.10	.24			
	30-70	55-75	15-43	2-10	1.25-1.50	14.00-141.00	0.02-0.07	0.1-0.8	2.0-6.0	.05	.15			
	70-92	55-75	15-45	0-10	1.25-1.50	14.00-141.00	0.02-0.07	0.0-0.8	1.0-5.0	.05	.17			
	92-152	70-90	5-30	0-5	1.25-1.60	14.00-141.00	0.01-0.07	0.0-0.4	0.5-3.0	.02	.17			
Kimtah, dry	0-2	55-70	26-44	1-4	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	5	2	134
	2-7	55-70	26-44	1-4	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---			
	7-12	55-70	26-44	1-4	1.60-1.80	14.00-42.00	0.08-0.17	0.1-0.3	0.3-1.0	.43	.43			
	12-33	55-70	23-43	2-7	1.10-1.45	14.00-42.00	0.06-0.16	0.1-0.5	2.0-5.0	.32	.32			
	33-51	55-70	23-43	2-7	1.10-1.45	14.00-42.00	0.06-0.16	0.1-0.5	2.0-5.0	.32	.32			
	51-90	55-70	23-43	2-7	1.60-1.80	4.00-14.00	0.03-0.08	0.2-0.8	0.3-1.0	.20	.43			
	90-150	55-70	23-43	2-7	1.25-1.50	4.00-14.00	0.06-0.11	0.2-0.8	0.3-1.0	.17	.37			
8500:														
Primus	0-1	55-75	17-42	3-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	3	3	86
	1-3	55-75	17-42	3-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---			
	3-34	55-75	17-42	3-8	0.70-0.90	14.00-42.00	0.11-0.22	0.2-0.6	1.5-7.0	.15	.28			
	34-60	55-75	17-42	3-8	0.75-0.95	14.00-42.00	0.11-0.21	0.2-0.6	1.5-6.0	.15	.32			
	60-84	65-85	9-36	1-6	0.85-1.10	14.00-141.00	0.01-0.13	0.0-0.5	1.0-4.0	.02	.17			
	84-152	75-85	9-25	0-6	1.10-1.50	42.00-141.00	0.01-0.05	0.0-0.5	0.5-2.0	.02	.15			
Noca	0-2	55-75	17-43	2-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	3	3	86
	2-5	55-75	17-43	2-8	0.60-0.85	14.00-42.00	0.15-0.23	0.1-0.6	1.5-5.0	.17	.28			
	5-29	55-75	17-43	3-8	0.60-0.85	14.00-42.00	0.11-0.21	0.2-0.6	1.0-3.5	.15	.28			
	29-51	55-75	17-43	3-8	0.80-1.00	14.00-42.00	0.10-0.18	0.2-0.6	0.5-2.5	.15	.32			
	51-77	75-85	9-22	1-6	1.30-1.40	14.00-141.00	0.01-0.04	0.0-0.5	0.3-1.5	.05	.17			
	77-152	75-85	12-22	0-3	1.40-1.60	42.00-141.00	0.01-0.03	0.0-0.2	0.3-1.0	.05	.17			
Stehekin	0-18	55-65	27-42	3-8	0.80-1.00	14.00-42.00	0.13-0.18	0.2-0.6	7.0-12	.28	.28	5	2	134
	18-44	55-70	21-41	4-9	1.10-1.45	14.00-42.00	0.03-0.12	0.1-0.8	1.0-4.0	.10	.28			
	44-109	55-70	23-44	1-7	1.10-1.45	14.00-141.00	0.02-0.08	0.0-0.5	0.3-1.0	.10	.32			
	109-152	55-70	23-44	1-7	1.10-1.45	14.00-141.00	0.02-0.08	0.0-0.5	0.3-1.0	.10	.32			
8501:														
Stehekin	0-18	55-65	27-42	3-8	0.80-1.00	14.00-42.00	0.13-0.18	0.2-0.6	7.0-12	.28	.28	5	2	134
	18-44	55-70	21-41	4-9	1.10-1.45	14.00-42.00	0.03-0.12	0.1-0.8	1.0-4.0	.10	.28			
	44-109	55-70	23-44	1-7	1.10-1.45	14.00-141.00	0.02-0.08	0.0-0.5	0.3-1.0	.10	.32			
	109-152	55-70	23-44	1-7	1.10-1.45	14.00-141.00	0.02-0.08	0.0-0.5	0.3-1.0	.10	.32			

Table 24.—Physical Soil Properties—Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	cm	*Pct*	*Pct*	*Pct*	*g/cm3*	*um/sec*	*cm/cm*	*Pct*	*Pct*					
8501:														
Primus	0-1	55-75	17-42	3-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	3	3	86
	1-3	55-75	17-42	3-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---			
	3-34	55-75	17-42	3-8	0.70-0.90	14.00-42.00	0.11-0.22	0.2-0.6	1.5-7.0	.15	.28			
	34-60	55-75	17-42	3-8	0.75-0.95	14.00-42.00	0.11-0.21	0.2-0.6	1.5-6.0	.15	.32			
	60-84	65-85	9-36	1-6	0.85-1.10	14.00-141.00	0.01-0.13	0.0-0.5	1.0-4.0	.02	.17			
	84-152	75-85	9-25	0-6	1.10-1.50	42.00-141.00	0.01-0.05	0.0-0.5	0.5-2.0	.02	.15			
9001:														
Noca	0-2	55-75	17-43	2-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	3	3	86
	2-5	55-75	17-43	2-8	0.60-0.85	14.00-42.00	0.15-0.23	0.1-0.6	1.5-5.0	.17	.28			
	5-29	55-75	17-43	3-8	0.60-0.85	14.00-42.00	0.11-0.21	0.2-0.6	1.0-3.5	.15	.28			
	29-51	55-75	17-43	3-8	0.80-1.00	14.00-42.00	0.10-0.18	0.2-0.6	0.5-2.5	.15	.32			
	51-77	75-85	9-22	1-6	1.30-1.40	14.00-141.00	0.01-0.04	0.0-0.5	0.3-1.5	.05	.17			
	77-152	75-85	12-22	0-3	1.40-1.60	42.00-141.00	0.01-0.03	0.0-0.2	0.3-1.0	.05	.17			
Perfect, dry	0-3	50-80	22-49	1-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	2	2	134
	3-4	50-80	22-49	1-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---			
	4-7	50-80	22-49	1-8	1.00-1.40	14.00-42.00	0.03-0.15	0.0-1.0	0.8-3.0	.37	.37			
	7-11	50-80	22-49	1-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---			
	11-13	50-80	22-49	1-8	1.00-1.40	14.00-42.00	0.03-0.15	0.0-1.0	1.0-3.0	.37	.37			
	13-39	50-80	22-49	1-8	1.00-1.40	14.00-42.00	0.02-0.12	0.0-1.0	0.5-3.0	.24	.37			
	39-73	70-85	10-30	0-5	1.40-1.60	42.00-705.00	0.01-0.05	0.0-0.4	0.3-2.0	.05	.28			
	73-752	70-85	10-30	0-5	1.40-1.60	42.00-705.00	0.01-0.05	0.0-0.4	0.3-1.0	.05	.24			
9003:														
Stetattle	0-12	50-75	15-47	3-10	0.60-0.85	14.00-42.00	0.03-0.25	0.0-0.7	11-19	.10	.32	3	5	56
	12-30	55-75	15-42	3-10	0.60-0.85	14.00-42.00	0.03-0.15	0.0-0.6	7.0-13	.05	.28			
	30-55	55-75	15-42	3-10	0.60-0.85	14.00-42.00	0.03-0.15	0.0-0.6	5.0-11	.02	.32			
	55-100	60-85	7-39	1-8	0.75-1.00	14.00-141.00	0.02-0.17	0.0-0.4	2.0-8.0	.02	.28			
	100-152	70-85	10-30	0-5	1.30-1.60	141.00-705.00	0.01-0.03	0.0-0.3	0.3-1.0	.02	.15			
Doubtful	0-2	60-75	19-39	1-6	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	2	3	86
	2-9	60-75	19-39	1-6	0.60-1.00	14.00-42.00	0.30-0.60	0.1-0.4	4.0-9.0	.17	.24			
	9-27	55-75	19-43	2-6	0.60-1.00	14.00-42.00	0.14-0.23	0.1-0.4	1.0-5.0	.15	.28			
	27-58	60-75	19-38	2-6	0.60-1.00	14.00-42.00	0.09-0.23	0.1-0.4	1.0-5.0	.17	.37			
	58-70	75-90	6-25	0-4	1.35-1.60	42.00-141.00	0.09-0.19	0.0-0.3	0.3-1.0	.02	.24			
	70-152	---	---	---	---	---	---	---	---	---	---			

Table 24.—Physical Soil Properties—Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	cm	*Pct*	*Pct*	*Pct*	*g/cm3*	*um/sec*	*cm/cm*	*Pct*	*Pct*					
9003:														
Arriva	0-4	60-70	25-39	1-5	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	3	2	134
	4-23	60-70	25-39	1-5	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---			
	23-26	60-70	25-39	1-5	0.60-0.90	14.00-42.00	0.19-0.23	0.1-0.4	1.0-9.0	.37	.37			
	26-38	55-70	20-43	2-10	0.10-0.30	42.00-705.00	0.30-0.60	---	15-40	---	---			
	38-47	55-70	20-43	2-10	0.60-0.90	14.00-42.00	0.15-0.23	0.1-0.8	3.0-12	.28	.28			
	47-50	45-70	20-53	2-10	0.60-0.90	4.00-42.00	0.16-0.28	0.1-0.8	3.0-12	.37	.37			
	50-60	55-75	17-43	2-8	0.60-0.90	14.00-42.00	0.15-0.22	0.1-0.6	3.0-9.0	.10	.28			
	60-85	70-90	5-30	0-5	1.35-1.60	42.00-705.00	0.02-0.04	0.0-0.4	1.0-3.0	.02	.10			
	85-152	70-90	5-30	0-5	1.35-1.60	42.00-705.00	0.01-0.03	0.0-0.4	0.5-3.0	.05	.10			
9008:														
Mox	0-4	55-75	15-45	0-10	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	4	2	134
	4-16	55-75	15-45	0-10	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---			
	16-27	55-75	15-45	0-10	0.60-0.90	14.00-42.00	0.18-0.21	0.0-0.8	1.0-5.0	.28	.28			
	27-49	55-75	15-45	0-10	0.60-1.00	14.00-42.00	0.15-0.22	0.0-0.8	3.0-9.0	.15	.28			
	49-76	55-75	15-45	0-10	0.60-1.00	14.00-42.00	0.16-0.23	0.0-0.8	1.0-5.0	.15	.28			
	76-94	60-75	15-40	0-10	1.35-1.70	14.00-42.00	0.02-0.07	0.0-0.8	0.3-1.0	.10	.32			
	94-152	65-80	10-35	0-10	1.35-1.70	14.00-141.00	0.01-0.07	0.0-0.8	0.3-1.0	.05	.24			
Doubtful	0-2	60-75	19-39	1-6	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	2	3	86
	2-9	60-75	19-39	1-6	0.60-1.00	14.00-42.00	0.30-0.60	0.1-0.4	4.0-9.0	.17	.24			
	9-27	55-75	19-43	2-6	0.60-1.00	14.00-42.00	0.14-0.23	0.1-0.4	1.0-5.0	.15	.28			
	27-58	60-75	19-38	2-6	0.60-1.00	14.00-42.00	0.09-0.23	0.1-0.4	1.0-5.0	.17	.37			
	58-70	75-90	6-25	0-4	1.35-1.60	42.00-141.00	0.09-0.19	0.0-0.3	0.3-1.0	.02	.24			
	70-152	---	---	---	---	---	---	---	---	---	---			
Perfect, cold	0-3	50-80	22-49	1-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	2	2	134
	3-4	50-80	22-49	1-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---			
	4-7	50-80	22-49	1-8	1.00-1.40	14.00-42.00	0.03-0.15	0.0-1.0	0.8-3.0	.37	.37			
	7-11	50-80	22-49	1-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---			
	11-13	50-80	22-49	1-8	1.00-1.40	14.00-42.00	0.03-0.15	0.0-1.0	1.0-3.0	.37	.37			
	13-39	50-80	22-49	1-8	1.00-1.40	14.00-42.00	0.02-0.12	0.0-1.0	0.5-3.0	.24	.37			
	39-73	70-85	10-30	0-5	1.40-1.60	42.00-705.00	0.01-0.05	0.0-0.4	0.3-2.0	.05	.28			
	73-752	70-85	10-30	0-5	1.40-1.60	42.00-705.00	0.01-0.05	0.0-0.4	0.3-1.0	.05	.24			
9010:														
Doubtful	0-2	60-75	19-39	1-6	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	2	3	86
	2-9	60-75	19-39	1-6	0.60-1.00	14.00-42.00	0.30-0.60	0.1-0.4	4.0-9.0	.17	.24			
	9-27	55-75	19-43	2-6	0.60-1.00	14.00-42.00	0.14-0.23	0.1-0.4	1.0-5.0	.15	.28			
	27-58	60-75	19-38	2-6	0.60-1.00	14.00-42.00	0.09-0.23	0.1-0.4	1.0-5.0	.17	.37			
	58-70	75-90	6-25	0-4	1.35-1.60	42.00-141.00	0.09-0.19	0.0-0.3	0.3-1.0	.02	.24			
	70-152	---	---	---	---	---	---	---	---	---	---			

Table 24.—Physical Soil Properties—Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	cm	*Pct*	*Pct*	*Pct*	*g/cm3*	*um/sec*	*cm/cm*	*Pct*	*Pct*					
9010:														
Treen	0-10	40-70	20-58	2-10	0.60-0.90	14.00-42.00	0.16-0.29	0.1-0.8	9.0-20	.55	.55	1	2	134
	10-30	40-70	20-58	2-10	0.60-0.90	14.00-42.00	0.16-0.29	0.1-0.8	5.0-15	.37	.37			
	30-40	50-70	20-48	2-10	0.70-0.90	14.00-42.00	0.13-0.23	0.1-0.8	2.0-15	.24	.37			
	40-152	---	---	---	---	---	---	---	---	---	---			
Rock outcrop	0-152	---	---	---	---	---	---	---	---	---	---	---	---	---
9012:														
Spickard	0-3	55-75	15-43	2-10	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	4	2	134
	3-10	55-75	15-43	2-10	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---			
	10-13	55-75	15-43	2-10	0.60-1.00	14.00-42.00	0.18-0.21	0.1-0.8	3.0-9.0	.28	.28			
	13-22	55-75	15-43	2-10	0.60-1.00	14.00-42.00	0.14-0.21	0.1-0.8	2.0-7.0	.10	.24			
	22-44	55-75	15-43	2-10	0.60-1.00	14.00-42.00	0.13-0.21	0.1-0.8	1.0-5.0	.15	.28			
	44-60	55-75	15-45	0-10	0.60-1.00	14.00-42.00	0.13-0.21	0.0-0.8	0.5-3.0	.15	.32			
	60-105	70-90	4-30	0-6	1.35-1.60	42.00-141.00	0.02-0.04	0.0-0.5	0.3-2.0	.05	.17			
	105-152	70-90	4-30	0-6	1.35-1.60	42.00-141.00	0.02-0.04	0.0-0.5	0.3-2.0	.05	.17			
Tepeh, moist	0-2	55-75	19-44	1-6	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	3	2	134
	2-5	55-75	19-44	1-6	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---			
	5-8	55-75	19-44	1-6	0.60-1.00	14.00-42.00	0.18-0.21	0.1-0.5	1.0-5.0	.20	.20			
	8-30	55-75	15-43	2-10	0.60-1.00	14.00-42.00	0.10-0.19	0.1-0.7	3.0-7.0	.10	.24			
	30-70	55-75	15-43	2-10	1.25-1.50	14.00-141.00	0.02-0.07	0.1-0.8	2.0-6.0	.05	.15			
	70-92	55-75	15-45	0-10	1.25-1.50	14.00-141.00	0.02-0.07	0.0-0.8	1.0-5.0	.05	.17			
	92-152	70-90	5-30	0-5	1.25-1.60	14.00-141.00	0.01-0.07	0.0-0.4	0.5-3.0	.02	.17			
Maggib	0-2	55-80	14-44	1-6	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	2	3	86
	2-5	55-80	14-44	1-6	0.10-0.30	42.00-705.00	0.30-0.60	---	15-40	---	---			
	5-9	55-80	14-44	1-6	0.60-0.90	14.00-42.00	0.09-0.24	0.1-0.5	1.0-2.0	.20	.32			
	9-27	50-75	15-47	3-10	0.60-0.90	14.00-42.00	0.15-0.28	0.2-0.8	4.0-9.0	.17	.28			
	27-64	50-75	15-47	3-10	0.60-0.90	14.00-42.00	0.15-0.23	0.2-0.8	1.0-5.0	.15	.32			
	64-80	65-85	7-34	1-8	1.00-1.40	14.00-141.00	0.01-0.08	0.0-0.6	0.3-1.0	.02	.32			
	80-152	---	---	---	---	---	---	---	---	---	---			
9016:														
Doubtful	0-2	60-75	19-39	1-6	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	2	3	86
	2-9	60-75	19-39	1-6	0.60-1.00	14.00-42.00	0.30-0.60	0.1-0.4	4.0-9.0	.17	.24			
	9-27	55-75	19-43	2-6	0.60-1.00	14.00-42.00	0.14-0.23	0.1-0.4	1.0-5.0	.15	.28			
	27-58	60-75	19-38	2-6	0.60-1.00	14.00-42.00	0.09-0.23	0.1-0.4	1.0-5.0	.17	.37			
	58-70	75-90	6-25	0-4	1.35-1.60	42.00-141.00	0.09-0.19	0.0-0.3	0.3-1.0	.02	.24			
	70-152	---	---	---	---	---	---	---	---	---	---			
Triumph	0-15	55-75	17-43	2-8	0.80-1.30	14.00-42.00	0.03-0.15	0.0-0.8	10-20	.15	.28	4	4	86
	15-50	55-75	17-43	2-8	0.80-1.30	14.00-42.00	0.03-0.12	0.0-0.6	5.0-15	.05	.28			
	50-120	55-75	17-43	2-8	0.80-1.30	14.00-42.00	0.03-0.12	0.0-0.6	3.0-12	.02	.28			
	120-152	---	---	---	---	---	---	---	---	---	---			

Table 24.—Physical Soil Properties—Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	cm	*Pct*	*Pct*	*Pct*	*g/cm3*	*um/sec*	*cm/cm*	*Pct*	*Pct*					
9016:														
Perfect, cold	0-3	50-80	22-49	1-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	2	2	134
	3-4	50-80	22-49	1-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---			
	4-7	50-80	22-49	1-8	1.00-1.40	14.00-42.00	0.03-0.15	0.0-1.0	0.8-3.0	.37	.37			
	7-11	50-80	22-49	1-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---			
	11-13	50-80	22-49	1-8	1.00-1.40	14.00-42.00	0.03-0.15	0.0-1.0	1.0-3.0	.37	.37			
	13-39	50-80	22-49	1-8	1.00-1.40	14.00-42.00	0.02-0.12	0.0-1.0	0.5-3.0	.24	.37			
	39-73	70-85	10-30	0-5	1.40-1.60	42.00-705.00	0.01-0.05	0.0-0.4	0.3-2.0	.05	.28			
	73-752	70-85	10-30	0-5	1.40-1.60	42.00-705.00	0.01-0.05	0.0-0.4	0.3-1.0	.05	.24			
9501:														
Stehekin	0-18	55-65	27-42	3-8	0.80-1.00	14.00-42.00	0.13-0.18	0.2-0.6	7.0-12	.28	.28	5	2	134
	18-44	55-70	21-41	4-9	1.10-1.45	14.00-42.00	0.03-0.12	0.1-0.8	1.0-4.0	.10	.28			
	44-109	55-70	23-44	1-7	1.10-1.45	14.00-141.00	0.02-0.08	0.0-0.5	0.3-1.0	.10	.32			
	109-152	55-70	23-44	1-7	1.10-1.45	14.00-141.00	0.02-0.08	0.0-0.5	0.3-1.0	.10	.32			
Primus	0-1	55-75	17-42	3-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	3	3	86
	1-3	55-75	17-42	3-8	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---			
	3-34	55-75	17-42	3-8	0.70-0.90	14.00-42.00	0.11-0.22	0.2-0.6	1.5-7.0	.15	.28			
	34-60	55-75	17-42	3-8	0.75-0.95	14.00-42.00	0.11-0.21	0.2-0.6	1.5-6.0	.15	.32			
	60-84	65-85	9-36	1-6	0.85-1.10	14.00-141.00	0.01-0.13	0.0-0.5	1.0-4.0	.02	.17			
	84-152	75-85	9-25	0-6	1.10-1.50	42.00-141.00	0.01-0.05	0.0-0.5	0.5-2.0	.02	.15			
Stetattle	0-12	50-75	15-47	3-10	0.60-0.85	14.00-42.00	0.03-0.25	0.0-0.7	11-19	.10	.32	3	5	56
	12-30	55-75	15-42	3-10	0.60-0.85	14.00-42.00	0.03-0.15	0.0-0.6	7.0-13	.05	.28			
	30-55	55-75	15-42	3-10	0.60-0.85	14.00-42.00	0.03-0.15	0.0-0.6	5.0-11	.02	.32			
	55-100	60-85	7-39	1-8	0.75-1.00	14.00-141.00	0.02-0.17	0.0-0.4	2.0-8.0	.02	.28			
	100-152	70-85	10-30	0-5	1.30-1.60	141.00-705.00	0.01-0.03	0.0-0.3	0.3-1.0	.02	.15			
9997:														
Rock outcrop	0-152	---	---	---	---	---	---	---	---	---	---	---	---	---
Despair	0-4	55-75	17-43	2-8	0.10-0.30	42.00-705.00	0.30-0.60	---	15-40	---	---	1	2	134
	4-21	55-75	17-43	2-8	0.60-1.00	14.00-42.00	0.14-0.21	0.1-0.6	4.0-9.0	.37	.37			
	21-41	55-75	17-43	2-8	0.60-1.00	14.00-42.00	0.14-0.23	0.1-0.6	1.0-5.0	.24	.37			
	41-152	---	---	---	---	---	---	---	---	---	---			
9998:														
Rock outcrop	0-152	---	---	---	---	---	---	---	---	---	---	---	---	---
Glaciers	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Harlequin	0-6	53-65	25-44	3-10	0.10-0.30	42.00-705.00	0.30-0.60	---	60-95	---	---	1	3	86
	6-24	53-65	25-44	3-10	1.10-1.45	14.00-42.00	0.10-0.13	0.3-1.2	7.0-12	.37	.37			
	24-46	55-70	23-44	1-7	1.10-1.45	14.00-141.00	0.10-0.13	0.1-0.8	1.0-4.0	.37	.37			
	46-152	---	---	---	---	---	---	---	---	---	---			

Table 24.—Physical Soil Properties—Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	cm	*Pct*	*Pct*	*Pct*	*g/cm3*	*um/sec*	*cm/cm*	*Pct*	*Pct*					
9999:														
Water, freshwater----	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Table 25.—Total Soil Carbon

(Soil organic carbon (SOC) and soil inorganic carbon (SIC) are given in kilograms per square meter to a depth of 2 meters or to the representative depth to top of any kind of bedrock or any cemented soil horizon. SOC and SIC are estimated on a volumetric whole soil basis, corrected for representative rock fragments indicated in the database. SOC is converted from horizon soil organic matter of the fraction of the soil less than 2 millimeters in diameter. If soil organic matter is indicated as NULL in the database, SOC is assumed to be zero. SIC is converted from horizon calcium carbonate content fraction of the soil less than 2 millimeters in diameter. If horizon calcium carbonate is indicated as NULL in the database, SIC is assumed to be zero. A weighted average of all horizons is used in the calculations. Only the major components of each map unit are shown in the table.)

Map unit symbol and component name (percentage of map unit)	SOC	SIC
	kg/m2	*kg/m2*
6000:		
Manlywham (60 percent)	23	0
Nohokomeen (15 percent)	17	0
Roland (15 percent)	21	0
6009:		
Ragged, deciduous (50 percent)	10	0
Tricouni, deciduous (30 percent)	28	0
Cosho (15 percent)	12	0
6010:		
Roland (40 percent)	21	0
Skymo (25 percent)	18	0
Deerlick (20 percent)	14	0
6014:		
Thorton (40 percent)	9	0
Ragged (25 percent)	10	0
Ledeir (15 percent)	24	0
6015:		
Tricouni (50 percent)	28	0
Ragged (25 percent)	10	0
Easy (15 percent)	10	0
6500:		
Sandalee (40 percent)	18	0
Kettling (25 percent)	16	0
Torment (20 percent)	14	0
6502:		
Mesahchie (50 percent)	35	0

Table 25.—Total Soil Carbon—Continued

Map unit symbol and component name (percentage of map unit)	SOC	SIC
	kg/m2	*kg/m2*
6502:		
Inspiration (25 percent)	16	0
Lyall (15 percent)	26	0
6505:		
Farway (50 percent)	30	0
Lyall (30 percent)	26	0
Inspiration (15 percent)	16	0
7003:		
Damnation (50 percent)	6	0
Ragged (25 percent)	10	0
Rock outcrop (15 percent)	0	0
7015:		
Thorton (40 percent)	9	0
Ragged (25 percent)	10	0
Damnation (15 percent)	6	0
7500:		
Inspiration (50 percent)	16	0
Mesahchie (25 percent)	35	0
Sawtooth (15 percent)	9	0
7501:		
Despair (40 percent)	8	0
Goode (30 percent)	20	0
Rock outcrop (15 percent)	0	0
7502:		
Farway (50 percent)	30	0
Sawtooth (25 percent)	9	0
Despair (15 percent)	8	0
8000:		
Beaverpass (40 percent)	63	0
Purple (30 percent)	49	0
Bacon (15 percent)	11	0
8006:		
Stetattle, deciduous (60 percent)	13	0
Forbidden (15 percent)	9	0
Triumph (15 percent)	28	0
8007:		
Kimtah (40 percent)	19	0

Table 25.—Total Soil Carbon—Continued

Map unit symbol and component name (percentage of map unit)	SOC	SIC
	kg/m2	*kg/m2*
8007:		
Bacon (30 percent)	11	0
Yawning (15 percent)	13	0
8009:		
Chilliwack, warm (40 percent)	13	0
Perfect (30 percent)	15	0
Terror (15 percent)	24	0
8010:		
Perfect (50 percent)	16	0
Spickard (20 percent)	14	0
Stetattle, deciduous (15 percent)	15	0
8011:		
Chilliwack (50 percent)	13	0
Forbidden, cold (30 percent)	9	0
Stetattle, deciduous (15 percent)	15	0
8014:		
Chilliwack, dry (40 percent)	13	0
Tepeh (30 percent)	27	0
Kimtah, dry (15 percent)	19	0
8500:		
Primus (50 percent)	14	0
Noca (20 percent)	7	0
Stehekin (20 percent)	10	0
8501:		
Stehekin (50 percent)	10	0
Primus (30 percent)	14	0
9001:		
Noca (40 percent)	7	0
Perfect, dry (30 percent)	16	0
9003:		
Stetattle (30 percent)	13	0
Doubtful (25 percent)	8	0
Arriva (20 percent)	36	0
9008:		
Mox (30 percent)	22	0
Doubtful (20 percent)	8	0
Perfect, cold (15 percent)	16	0

Table 25.—Total Soil Carbon—Continued

Map unit symbol and component name (percentage of map unit)	SOC	SIC
	kg/m2	*kg/m2*
9010:		
Doubtful (30 percent)	8	0
Treen (25 percent)	16	0
Rock outcrop (15 percent)	0	0
9012:		
Spickard (40 percent)	14	0
Tepeh, moist (25 percent)	27	0
Maggib (15 percent)	10	0
9016:		
Doubtful (30 percent)	8	0
Triumph (20 percent)	28	0
Perfect, cold (15 percent)	16	0
9501:		
Stehekin (40 percent)	10	0
Primus (25 percent)	14	0
Stetattle (15 percent)	13	0
9997:		
Rock outcrop (70 percent)	0	0
Despair (15 percent)	8	0
9998:		
Rock outcrop (60 percent)	0	0
Glaciers (15 percent)	0	0
Harlequin (15 percent)	19	0
9999:		
Water, freshwater (100 percent)	0	0

Table 26.—Chemical Soil Properties

(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	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	cm	*meq/100 g*	*meq/100 g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
6000:								
Manlywham	0-6	20.0-55.0	---	5.6-6.5	0	0	0	0
	6-24	15.0-25.0	---	5.6-6.5	0	0	0	0
	24-60	1.0-5.0	1.0-5.0	5.1-6.0	0	0	0	0
	60-104	1.0-4.0	1.0-5.0	4.5-5.5	0	0	0	0
	104-150	1.0-4.0	1.0-5.0	4.5-5.5	0	0	0	0
Nohokomeen	0-3	---	30.0-40.0	3.5-5.5	0	0	0	0
	3-7	---	30.0-40.0	3.5-5.5	0	0	0	0
	7-30	5.0-13.0	5.0-15.0	5.1-6.0	0	0	0	0
	30-73	3.0-10.0	---	5.6-6.5	0	0	0	0
	73-108	2.0-10.0	---	5.6-6.5	0	0	0	0
	108-152	0.0-5.0	---	5.6-6.5	0	0	0	0
Roland	0-3	---	30.0-40.0	3.5-5.5	0	0	0	0
	3-17	5.0-25.0	5.0-25.0	5.1-6.0	0	0	0	0
	17-42	5.0-15.0	5.0-15.0	5.1-6.0	0	0	0	0
	42-78	1.0-10.0	1.0-10.0	5.1-6.0	0	0	0	0
	78-137	1.0-10.0	1.0-10.0	5.6-6.5	0	0	0	0
	137-152	1.0-5.0	1.0-5.0	5.6-6.5	0	0	0	0
6009:								
Ragged, deciduous	0-2	---	30.0-40.0	3.5-5.5	0	0	0	0
	2-5	---	30.0-40.0	3.5-5.5	0	0	0	0
	5-20	4.0-8.0	1.0-10.0	5.0-6.0	0	0	0	0
	20-34	3.0-8.0	1.0-10.0	5.0-6.0	0	0	0	0
	34-150	0.0-5.0	---	5.5-6.5	0	0	0	0
Tricouni, deciduous	0-3	---	30.0-40.0	3.5-5.5	0	0	0	0
	3-9	---	30.0-40.0	3.5-5.5	0	0	0	0
	9-10	6.0-13.0	2.0-10.0	5.1-6.0	0	0	0	0
	10-28	9.0-17.0	10.0-15.0	5.1-6.0	0	0	0	0
	28-60	6.0-15.0	5.0-15.0	5.1-6.0	0	0	0	0
	60-104	5.0-13.0	5.0-15.0	5.1-6.0	0	0	0	0
	104-152	4.0-9.0	5.0-10.0	5.1-6.0	0	0	0	0
Cosho	0-6	---	30.0-40.0	3.5-5.5	0	0	0	0
	6-14	---	30.0-40.0	3.5-5.5	0	0	0	0
	14-15	6.0-10.0	5.0-10.0	3.5-5.5	0	0	0	0
	15-53	6.0-17.0	5.0-15.0	5.1-6.0	0	0	0	0
	53-75	3.0-6.0	1.0-5.0	5.6-6.5	0	0	0	0
	75-90	2.0-6.0	1.0-5.0	5.6-6.5	0	0	0	0
	90-152	---	---	---	---	---	---	---
6010:								
Roland	0-3	---	30.0-40.0	3.5-5.5	0	0	0	0
	3-17	5.0-25.0	5.0-25.0	5.1-6.0	0	0	0	0
	17-42	5.0-15.0	5.0-15.0	5.1-6.0	0	0	0	0
	42-78	1.0-10.0	1.0-10.0	5.1-6.0	0	0	0	0
	78-137	1.0-10.0	1.0-10.0	5.6-6.5	0	0	0	0
	137-152	1.0-5.0	1.0-5.0	5.6-6.5	0	0	0	0

Table 26.—Chemical Soil Properties—Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	cm	*meq/100 g*	*meq/100 g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
6010:								
Skymo	0-2	---	30.0-40.0	3.5-5.5	0	0	0	0
	2-10	1.0-4.0	1.0-5.0	5.1-6.0	0	0	0	0
	10-16	4.0-10.0	1.0-10.0	5.1-6.0	0	0	0	0
	16-34	3.0-10.0	1.0-10.0	5.1-6.0	0	0	0	0
	34-40	0.0-5.0	1.0-5.0	5.1-6.0	0	0	0	0
	40-45	2.0-15.0	1.0-15.0	5.1-6.0	0	0	0	0
	45-66	2.0-15.0	1.0-15.0	5.1-6.0	0	0	0	0
	66-90	1.0-10.0	1.0-10.0	5.1-6.0	0	0	0	0
	90-152	1.0-4.0	1.0-5.0	5.1-6.5	0	0	0	0
Deerlick	0-3	---	30.0-40.0	3.5-5.5	0	0	0	0
	3-10	---	30.0-40.0	3.5-5.5	0	0	0	0
	10-14	17.0-28.0	10.0-20.0	5.1-6.0	0	0	0	0
	14-22	6.0-12.0	1.0-5.0	5.1-6.0	0	0	0	0
	22-30	3.0-6.0	1.0-5.0	5.1-6.0	0	0	0	0
	30-50	3.0-6.0	1.0-5.0	5.1-6.0	0	0	0	0
	50-64	2.0-6.0	---	5.6-6.5	0	0	0	0
	64-80	1.0-5.0	---	5.6-6.5	0	0	0	0
	80-152	1.0-5.0	---	5.6-6.5	0	0	0	0
6014:								
Thorton	0-4	---	30.0-40.0	3.5-5.5	0	0	0	0
	4-8	---	30.0-40.0	3.5-5.5	0	0	0	0
	8-12	6.0-14.0	1.0-10.0	4.4-5.5	0	0	0	0
	12-30	4.0-10.0	5.0-10.0	5.1-6.0	0	0	0	0
	30-46	3.0-6.0	1.0-5.0	5.1-6.0	0	0	0	0
	46-60	2.0-6.0	1.0-5.0	5.1-6.5	0	0	0	0
	60-150	1.0-5.0	1.0-5.0	5.1-6.5	0	0	0	0
Ragged	0-2	---	30.0-40.0	3.5-5.5	0	0	0	0
	2-5	---	30.0-40.0	3.5-5.5	0	0	0	0
	5-20	4.0-8.0	1.0-10.0	5.0-6.0	0	0	0	0
	20-34	3.0-8.0	1.0-10.0	5.0-6.0	0	0	0	0
	34-150	0.0-5.0	---	5.5-6.5	0	0	0	0
Ledeir	0-2	---	30.0-40.0	3.5-5.5	0	0	0	0
	2-12	---	30.0-40.0	3.5-5.5	0	0	0	0
	12-20	6.0-14.0	1.0-10.0	4.3-5.5	0	0	0	0
	20-50	7.0-21.0	5.0-15.0	5.1-6.0	0	0	0	0
	50-82	5.0-11.0	1.0-10.0	5.1-6.0	0	0	0	0
	82-152	1.0-6.0	1.0-5.0	5.1-6.5	0	0	0	0
6015:								
Tricouni	0-3	---	30.0-40.0	3.5-5.5	0	0	0	0
	3-9	---	30.0-40.0	3.5-5.5	0	0	0	0
	9-10	6.0-13.0	2.0-10.0	5.1-6.0	0	0	0	0
	10-28	9.0-17.0	10.0-15.0	5.1-6.0	0	0	0	0
	28-60	6.0-15.0	5.0-15.0	5.1-6.0	0	0	0	0
	60-104	5.0-13.0	5.0-15.0	5.1-6.0	0	0	0	0
	104-152	4.0-9.0	5.0-10.0	5.1-6.0	0	0	0	0
Ragged	0-2	---	30.0-40.0	3.5-5.5	0	0	0	0
	2-5	---	30.0-40.0	3.5-5.5	0	0	0	0
	5-20	4.0-8.0	1.0-10.0	5.0-6.0	0	0	0	0
	20-34	3.0-8.0	1.0-10.0	5.0-6.0	0	0	0	0
	34-150	0.0-5.0	---	5.5-6.5	0	0	0	0

Table 26.—Chemical Soil Properties—Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	cm	*meq/100 g*	*meq/100 g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
6015:								
Easy	0-3	---	30.0-40.0	3.5-5.5	0	0	0	0
	3-6	---	30.0-40.0	3.5-5.5	0	0	0	0
	6-12	3.0-7.0	1.0-5.0	4.5-5.5	0	0	0	0
	12-28	7.0-13.0	5.0-15.0	5.1-6.0	0	0	0	0
	28-41	5.0-11.0	5.0-10.0	5.1-6.0	0	0	0	0
	41-66	3.0-7.0	1.0-5.0	5.1-6.3	0	0	0	0
	66-150	2.0-6.0	1.0-5.0	5.4-6.5	0	0	0	0
6500:								
Sandalee	0-2	---	30.0-40.0	3.5-5.5	0	0	0	0
	2-11	15.0-30.0	5.0-15.0	4.5-5.5	0	0	0	0
	11-40	3.0-10.0	1.0-10.0	5.1-6.0	0	0	0	0
	40-56	2.0-5.0	1.0-5.0	5.1-6.5	0	0	0	0
	56-80	2.0-5.0	1.0-5.0	5.1-6.5	0	0	0	0
	80-152	1.0-5.0	1.0-5.0	5.6-6.5	0	0	0	0
Kettling	0-2	---	30.0-40.0	3.5-5.5	0	0	0	0
	2-5	---	30.0-40.0	3.5-5.5	0	0	0	0
	5-13	5.0-15.0	5.0-15.0	5.1-6.0	0	0	0	0
	13-25	3.0-15.0	1.0-15.0	5.1-6.0	0	0	0	0
	25-60	3.0-10.0	---	5.6-6.5	0	0	0	0
	60-90	1.0-5.0	---	5.6-6.5	0	0	0	0
	90-152	1.0-5.0	---	5.6-6.5	0	0	0	0
Torment	0-2	---	30.0-40.0	3.5-5.5	0	0	0	0
	2-15	1.0-5.0	1.0-5.0	5.1-6.0	0	0	0	0
	15-25	---	30.0-40.0	3.5-5.5	0	0	0	0
	25-35	2.0-10.0	1.0-5.0	5.1-6.0	0	0	0	0
	35-70	1.0-10.0	1.0-5.0	5.1-6.0	0	0	0	0
	70-152	1.0-4.0	---	5.6-6.5	0	0	0	0
6502:								
Mesahchie	0-2	---	30.0-40.0	3.5-5.5	0	0	0	0
	2-20	27.0-43.0	30.0-45.0	4.5-6.0	0	0	0	0
	20-44	18.0-38.0	20.0-40.0	4.5-6.0	0	0	0	0
	44-74	12.0-28.0	10.0-30.0	4.5-6.0	0	0	0	0
	74-96	3.0-17.0	5.0-20.0	5.1-6.5	0	0	0	0
	96-152	0.0-5.0	1.0-5.0	5.6-6.5	0	0	0	0
Inspiration	0-2	---	30.0-40.0	3.5-5.5	0	0	0	0
	2-9	---	30.0-40.0	3.5-5.5	0	0	0	0
	9-15	---	30.0-40.0	3.5-5.5	0	0	0	0
	15-25	9.0-21.0	5.0-15.0	4.5-5.5	0	0	0	0
	25-37	7.0-19.0	5.0-15.0	4.5-5.5	0	0	0	0
	37-64	5.0-8.0	1.0-10.0	5.1-6.0	0	0	0	0
	64-150	1.0-5.0	1.0-10.0	5.1-6.5	0	0	0	0
Lyall	0-4	---	30.0-40.0	3.5-5.5	0	0	0	0
	4-7	---	30.0-40.0	3.5-5.5	0	0	0	0
	7-19	15.0-35.0	15.0-35.0	5.0-6.0	0	0	0	0
	19-44	5.0-20.0	---	5.5-6.1	0	0	0	0
	44-75	5.0-15.0	---	5.5-6.2	0	0	0	0
	75-120	3.0-15.0	---	5.5-6.3	0	0	0	0
	120-150	1.0-10.0	---	5.6-6.5	0	0	0	0

Table 26.—Chemical Soil Properties—Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	cm	*meq/100 g*	*meq/100 g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
6505:								
Farway	0-3	---	30.0-40.0	3.5-5.5	0	0	0	0
	3-45	8.0-21.0	5.0-20.0	5.1-6.5	0	0	0	0
	45-78	8.0-21.0	5.0-20.0	5.1-6.5	0	0	0	0
	78-90	8.0-11.0	5.0-10.0	5.1-6.5	0	0	0	0
	90-152	2.0-10.0	1.0-10.0	5.6-6.5	0	0	0	0
Lyall	0-4	---	30.0-40.0	3.5-5.5	0	0	0	0
	4-7	---	30.0-40.0	3.5-5.5	0	0	0	0
	7-19	15.0-35.0	15.0-35.0	5.0-6.0	0	0	0	0
	19-44	5.0-20.0	---	5.5-6.1	0	0	0	0
	44-75	5.0-15.0	---	5.5-6.2	0	0	0	0
	75-120	3.0-15.0	---	5.5-6.3	0	0	0	0
	120-150	1.0-10.0	---	5.6-6.5	0	0	0	0
Inspiration	0-2	---	30.0-40.0	3.5-5.5	0	0	0	0
	2-9	---	30.0-40.0	3.5-5.5	0	0	0	0
	9-15	---	30.0-40.0	3.5-5.5	0	0	0	0
	15-25	9.0-21.0	5.0-15.0	4.5-5.5	0	0	0	0
	25-37	7.0-19.0	5.0-15.0	4.5-5.5	0	0	0	0
	37-64	5.0-8.0	1.0-10.0	5.1-6.0	0	0	0	0
	64-150	1.0-5.0	1.0-10.0	5.1-6.5	0	0	0	0
7003:								
Damnation	0-4	---	30.0-40.0	3.5-5.5	0	0	0	0
	4-6	---	30.0-40.0	3.5-5.5	0	0	0	0
	6-14	5.0-13.0	5.0-15.0	4.5-5.5	0	0	0	0
	14-31	5.0-13.0	5.0-15.0	4.5-5.5	0	0	0	0
	31-45	3.0-9.0	1.0-10.0	4.5-5.5	0	0	0	0
	45-152	---	---	---	---	---	---	---
Ragged	0-2	---	30.0-40.0	3.5-5.5	0	0	0	0
	2-5	---	30.0-40.0	3.5-5.5	0	0	0	0
	5-20	4.0-8.0	1.0-10.0	5.0-6.0	0	0	0	0
	20-34	3.0-8.0	1.0-10.0	5.0-6.0	0	0	0	0
	34-150	0.0-5.0	---	5.5-6.5	0	0	0	0
Rock outcrop	---	---	---	---	---	---	---	---
7015:								
Thorton	0-4	---	30.0-40.0	3.5-5.5	0	0	0	0
	4-8	---	30.0-40.0	3.5-5.5	0	0	0	0
	8-12	6.0-14.0	1.0-10.0	4.4-5.5	0	0	0	0
	12-30	4.0-10.0	5.0-10.0	5.1-6.0	0	0	0	0
	30-46	3.0-6.0	1.0-5.0	5.1-6.0	0	0	0	0
	46-60	2.0-6.0	1.0-5.0	5.1-6.5	0	0	0	0
	60-150	1.0-5.0	1.0-5.0	5.1-6.5	0	0	0	0
Ragged	0-2	---	30.0-40.0	3.5-5.5	0	0	0	0
	2-5	---	30.0-40.0	3.5-5.5	0	0	0	0
	5-20	4.0-8.0	1.0-10.0	5.0-6.0	0	0	0	0
	20-34	3.0-8.0	1.0-10.0	5.0-6.0	0	0	0	0
	34-150	0.0-5.0	---	5.5-6.5	0	0	0	0
Damnation	0-4	---	30.0-40.0	3.5-5.5	0	0	0	0
	4-6	---	30.0-40.0	3.5-5.5	0	0	0	0
	6-14	5.0-13.0	5.0-15.0	4.5-5.5	0	0	0	0
	14-31	5.0-13.0	5.0-15.0	4.5-5.5	0	0	0	0
	31-45	3.0-9.0	1.0-10.0	4.5-5.5	0	0	0	0
	45-152	---	---	---	---	---	---	---

Table 26.—Chemical Soil Properties—Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	cm	*meq/100 g*	*meq/100 g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
7500:								
Inspiration	0-2	---	30.0-40.0	3.5-5.5	0	0	0	0
	2-9	---	30.0-40.0	3.5-5.5	0	0	0	0
	9-15	---	30.0-40.0	3.5-5.5	0	0	0	0
	15-25	9.0-21.0	5.0-15.0	4.5-5.5	0	0	0	0
	25-37	7.0-19.0	5.0-15.0	4.5-5.5	0	0	0	0
	37-64	5.0-8.0	1.0-10.0	5.1-6.0	0	0	0	0
	64-150	1.0-5.0	1.0-10.0	5.1-6.5	0	0	0	0
Mesahchie	0-2	---	30.0-40.0	3.5-5.5	0	0	0	0
	2-20	27.0-43.0	30.0-45.0	4.5-6.0	0	0	0	0
	20-44	18.0-38.0	20.0-40.0	4.5-6.0	0	0	0	0
	44-74	12.0-28.0	10.0-30.0	4.5-6.0	0	0	0	0
	74-96	3.0-17.0	5.0-20.0	5.1-6.5	0	0	0	0
	96-152	0.0-5.0	1.0-5.0	5.6-6.5	0	0	0	0
Sawtooth	0-3	---	30.0-40.0	3.5-5.5	0	0	0	0
	3-15	13.0-21.0	10.0-20.0	5.1-6.0	0	0	0	0
	15-35	9.0-17.0	10.0-20.0	5.1-6.0	0	0	0	0
	35-45	5.0-10.0	5.0-10.0	5.1-6.0	0	0	0	0
	45-60	2.0-5.0	1.0-5.0	5.6-6.5	0	0	0	0
	60-152	---	---	---	---	---	---	---
7501:								
Despair	0-4	---	30.0-40.0	3.5-5.5	0	0	0	0
	4-21	11.0-21.0	10.0-20.0	5.1-6.0	0	0	0	0
	21-41	5.0-13.0	10.0-20.0	5.1-6.0	0	0	0	0
	41-152	---	---	---	---	---	---	---
Goode	0-2	---	30.0-40.0	3.5-5.5	0	0	0	0
	2-23	13.0-27.0	5.0-15.0	4.5-6.0	0	0	0	0
	23-66	5.0-20.0	1.0-10.0	5.1-6.5	0	0	0	0
	66-91	3.0-10.0	---	5.6-6.5	0	0	0	0
	91-152	0.0-10.0	---	5.6-6.5	0	0	0	0
Rock outcrop	---	---	---	---	---	---	---	---
7502:								
Farway	0-3	---	30.0-40.0	3.5-5.5	0	0	0	0
	3-45	8.0-21.0	5.0-20.0	5.1-6.5	0	0	0	0
	45-78	8.0-21.0	5.0-20.0	5.1-6.5	0	0	0	0
	78-90	8.0-11.0	5.0-10.0	5.1-6.5	0	0	0	0
	90-152	2.0-10.0	1.0-10.0	5.6-6.5	0	0	0	0
Sawtooth	0-3	---	30.0-40.0	3.5-5.5	0	0	0	0
	3-15	13.0-21.0	10.0-20.0	5.1-6.0	0	0	0	0
	15-35	9.0-17.0	10.0-20.0	5.1-6.0	0	0	0	0
	35-45	5.0-10.0	5.0-10.0	5.1-6.0	0	0	0	0
	45-60	2.0-5.0	1.0-5.0	5.6-6.5	0	0	0	0
	60-152	---	---	---	---	---	---	---
Despair	0-4	---	30.0-40.0	3.5-5.5	0	0	0	0
	4-21	11.0-21.0	10.0-20.0	5.1-6.0	0	0	0	0
	21-41	5.0-13.0	10.0-20.0	5.1-6.0	0	0	0	0
	41-152	---	---	---	---	---	---	---
8000:								
Beaverpass	0-18	---	30.0-40.0	3.5-5.0	0	0	0	0
	18-56	---	30.0-40.0	3.5-5.0	0	0	0	0
	56-91	---	30.0-40.0	3.5-5.5	0	0	0	0
	91-107	1.0-20.0	1.0-20.0	5.1-6.0	0	0	0	0
	107-152	1.0-30.0	1.0-30.0	5.1-6.0	0	0	0	0

Table 26.—Chemical Soil Properties—Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	cm	*meq/100 g*	*meq/100 g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
8000:								
Purple	0-25	---	30.0-40.0	3.5-5.5	0	0	0	0
	25-45	25.0-60.0	10.0-25.0	4.5-5.5	0	0	0	0
	45-58	25.0-60.0	10.0-25.0	4.5-5.5	0	0	0	0
	58-96	3.0-10.0	1.0-10.0	4.5-5.5	0	0	0	0
	96-150	1.0-5.0	1.0-5.0	4.5-5.5	0	0	0	0
Bacon	0-2	---	30.0-40.0	3.5-5.5	0	0	0	0
	2-20	3.0-10.0	5.0-10.0	4.5-5.5	0	0	0	0
	20-38	1.0-5.0	5.0-10.0	4.5-5.5	0	0	0	0
	38-43	1.0-5.0	1.0-5.0	5.1-6.0	0	0	0	0
	43-65	1.0-5.0	1.0-5.0	5.1-6.0	0	0	0	0
	65-150	1.0-5.0	1.0-5.0	5.1-6.0	0	0	0	0
8006:								
Stetattle, deciduous	0-12	26.0-40.0	7.4-20.7	4.3-5.5	0	0	0	0
	12-30	17.0-29.0	15.0-30.0	4.3-5.5	0	0	0	0
	30-55	13.0-26.0	15.0-25.0	4.3-5.5	0	0	0	0
	55-100	7.0-19.0	5.0-20.0	4.5-5.7	0	0	0	0
	100-152	1.0-6.0	1.0-5.0	5.1-6.5	0	0	0	0
Forbidden	0-4	---	30.0-40.0	3.5-5.5	0	0	0	0
	4-14	---	30.0-40.0	3.5-5.5	0	0	0	0
	14-16	6.0-13.0	5.0-15.0	4.5-5.5	0	0	0	0
	16-46	4.5-10.0	5.0-10.0	5.1-7.0	0	0	0	0
	46-68	2.5-6.0	1.0-5.0	5.1-7.0	0	0	0	0
	68-90	1.5-5.0	1.0-5.0	5.1-6.5	0	0	0	0
	90-150	1.0-4.0	1.0-5.0	5.1-6.5	0	0	0	0
Triumph	0-15	20.0-45.0	10.0-30.0	4.5-6.0	0	0	0	0
	15-50	10.0-35.0	5.0-20.0	4.5-6.0	0	0	0	0
	50-120	5.0-30.0	1.0-10.0	4.5-6.0	0	0	0	0
	120-152	---	---	---	---	---	---	---
8007:								
Kimtah	0-2	---	30.0-40.0	3.5-5.5	0	0	0	0
	2-7	---	30.0-40.0	3.5-5.5	0	0	0	0
	7-12	5.0-15.0	1.0-5.0	3.5-5.0	0	0	0	0
	12-33	10.0-25.0	1.0-5.0	5.1-6.0	0	0	0	0
	33-51	10.0-25.0	1.0-5.0	5.1-6.0	0	0	0	0
	51-90	2.0-5.0	1.0-5.0	5.1-6.5	0	0	0	0
	90-150	2.0-5.0	1.0-5.0	5.1-6.5	0	0	0	0
Bacon	0-2	---	30.0-40.0	3.5-5.5	0	0	0	0
	2-20	3.0-10.0	5.0-10.0	4.5-5.5	0	0	0	0
	20-38	1.0-5.0	5.0-10.0	4.5-5.5	0	0	0	0
	38-43	1.0-5.0	1.0-5.0	5.1-6.0	0	0	0	0
	43-65	1.0-5.0	1.0-5.0	5.1-6.0	0	0	0	0
	65-150	1.0-5.0	1.0-5.0	5.1-6.0	0	0	0	0
Yawning	0-2	---	30.0-40.0	3.5-5.5	0	0	0	0
	2-8	---	30.0-40.0	3.5-5.5	0	0	0	0
	8-14	5.0-13.0	1.0-10.0	3.5-5.0	0	0	0	0
	14-32	11.0-15.0	5.0-11.0	4.5-5.5	0	0	0	0
	32-50	3.0-11.0	1.0-5.0	5.1-6.0	0	0	0	0
	50-100	3.0-5.0	1.0-5.0	5.1-6.5	0	0	0	0
	100-150	3.0-5.0	1.0-5.0	5.1-6.5	0	0	0	0

Table 26.—Chemical Soil Properties—Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	cm	*meq/100 g*	*meq/100 g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
8009:								
Chilliwack, warm-----	0-3	---	30.0-40.0	3.5-5.5	0	0	0	0
	3-13	8.0-13.0	1.0-10.0	4.0-5.0	0	0	0	0
	13-34	9.0-26.0	10.0-25.0	5.0-6.0	0	0	0	0
	34-46	6.0-13.0	5.0-15.0	5.0-6.0	0	0	0	0
	46-70	3.0-6.0	1.0-5.0	5.5-6.0	0	0	0	0
	70-150	0.0-5.0	1.0-5.0	5.6-6.5	0	0	0	0
Perfect----------	0-3	---	30.0-40.0	3.5-5.5	0	0	0	0
	3-4	---	30.0-40.0	3.5-5.5	0	0	0	0
	4-7	2.0-10.0	1.0-10.0	5.1-6.5	0	0	0	0
	7-11	---	30.0-40.0	3.5-5.5	0	0	0	0
	11-13	3.0-10.0	1.0-10.0	4.5-6.0	0	0	0	0
	13-39	2.0-10.0	1.0-10.0	5.1-6.5	0	0	0	0
	39-73	1.0-5.0	1.0-5.0	5.6-6.5	0	0	0	0
	73-752	0.0-5.0	1.0-5.0	5.6-6.5	0	0	0	0
Terror----------	0-5	---	30.0-40.0	3.5-5.5	0	0	0	0
	5-8	---	30.0-40.0	3.5-5.5	0	0	0	0
	8-17	17.0-28.0	1.0-5.0	4.5-5.5	0	0	0	0
	17-28	15.0-26.0	1.0-5.0	4.5-5.5	0	0	0	0
	28-36	5.0-11.0	1.0-5.0	4.5-5.5	0	0	0	0
	36-52	3.0-12.0	1.0-5.0	4.5-5.5	0	0	0	0
	52-60	1.0-4.0	1.0-5.0	4.5-6.0	0	0	0	0
	60-80	1.0-4.0	1.0-5.0	4.5-6.0	0	0	0	0
	80-150	1.0-4.0	1.0-5.0	4.5-6.0	0	0	0	0
8010:								
Perfect----------	0-3	---	30.0-40.0	3.5-5.5	0	0	0	0
	3-4	---	30.0-40.0	3.5-5.5	0	0	0	0
	4-7	2.0-10.0	1.0-10.0	5.1-6.5	0	0	0	0
	7-11	---	30.0-40.0	3.5-5.5	0	0	0	0
	11-13	3.0-10.0	1.0-10.0	4.5-6.0	0	0	0	0
	13-39	2.0-10.0	1.0-10.0	5.1-6.5	0	0	0	0
	39-73	1.0-5.0	1.0-5.0	5.6-6.5	0	0	0	0
	73-752	0.0-5.0	1.0-5.0	5.6-6.5	0	0	0	0
Spickard----------	0-3	---	30.0-40.0	3.5-5.5	0	0	0	0
	3-10	---	30.0-40.0	3.5-5.5	0	0	0	0
	10-13	9.0-21.0	10.0-20.0	4.0-5.5	0	0	0	0
	13-22	7.0-17.0	5.0-15.0	4.5-5.5	0	0	0	0
	22-44	5.0-13.0	5.0-15.0	4.5-5.5	0	0	0	0
	44-60	4.0-9.0	5.0-10.0	4.5-5.5	0	0	0	0
	60-105	1.0-5.0	1.0-5.0	5.1-6.0	0	0	0	0
	105-152	1.0-5.0	1.0-5.0	5.1-6.0	0	0	0	0
Stetattle, deciduous	0-12	26.0-40.0	7.4-20.7	4.3-5.5	0	0	0	0
	12-30	17.0-29.0	15.0-30.0	4.3-5.5	0	0	0	0
	30-55	13.0-26.0	15.0-25.0	4.3-5.5	0	0	0	0
	55-100	7.0-19.0	5.0-20.0	4.5-5.7	0	0	0	0
	100-152	1.0-6.0	1.0-5.0	5.1-6.5	0	0	0	0
8011:								
Chilliwack-----------	0-3	---	30.0-40.0	3.5-5.5	0	0	0	0
	3-13	8.0-13.0	1.0-10.0	4.0-5.0	0	0	0	0
	13-34	9.0-26.0	10.0-25.0	5.0-6.0	0	0	0	0
	34-46	6.0-13.0	5.0-15.0	5.0-6.0	0	0	0	0
	46-70	3.0-6.0	1.0-5.0	5.5-6.0	0	0	0	0
	70-150	0.0-5.0	1.0-5.0	5.6-6.5	0	0	0	0

Table 26.—Chemical Soil Properties—Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	cm	*meq/100 g*	*meq/100 g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
8011:								
Forbidden, cold	0-4	---	30.0-40.0	3.5-5.5	0	0	0	0
	4-14	---	30.0-40.0	3.5-5.5	0	0	0	0
	14-16	6.0-13.0	5.0-15.0	4.5-5.5	0	0	0	0
	16-46	4.5-10.0	5.0-10.0	5.1-7.0	0	0	0	0
	46-68	2.5-6.0	1.0-5.0	5.1-7.0	0	0	0	0
	68-90	1.5-5.0	1.0-5.0	5.1-6.5	0	0	0	0
	90-150	1.0-4.0	1.0-5.0	5.1-6.5	0	0	0	0
Stetattle, deciduous	0-12	26.0-40.0	7.4-20.7	4.3-5.5	0	0	0	0
	12-30	17.0-29.0	15.0-30.0	4.3-5.5	0	0	0	0
	30-55	13.0-26.0	15.0-25.0	4.3-5.5	0	0	0	0
	55-100	7.0-19.0	5.0-20.0	4.5-5.7	0	0	0	0
	100-152	1.0-6.0	1.0-5.0	5.1-6.5	0	0	0	0
8014:								
Chilliwack, dry	0-3	---	30.0-40.0	3.5-5.5	0	0	0	0
	3-13	8.0-13.0	1.0-10.0	4.0-5.0	0	0	0	0
	13-34	9.0-26.0	10.0-25.0	5.0-6.0	0	0	0	0
	34-46	6.0-13.0	5.0-15.0	5.0-6.0	0	0	0	0
	46-70	3.0-6.0	1.0-5.0	5.5-6.0	0	0	0	0
	70-150	0.0-5.0	1.0-5.0	5.6-6.5	0	0	0	0
Tepeh	0-2	---	30.0-40.0	3.5-5.5	0	0	0	0
	2-5	---	30.0-40.0	3.5-5.5	0	0	0	0
	5-8	5.0-13.0	1.0-10.0	4.0-5.0	0	0	0	0
	8-30	9.0-17.0	5.0-10.0	4.5-5.5	0	0	0	0
	30-70	7.0-15.0	5.0-10.0	5.1-6.0	0	0	0	0
	70-92	5.0-13.0	1.0-10.0	5.1-6.0	0	0	0	0
	92-152	0.0-4.0	1.0-5.0	5.1-6.0	0	0	0	0
Kimtah, dry	0-2	---	30.0-40.0	3.5-5.5	0	0	0	0
	2-7	---	30.0-40.0	3.5-5.5	0	0	0	0
	7-12	5.0-15.0	1.0-5.0	3.5-5.0	0	0	0	0
	12-33	10.0-25.0	1.0-5.0	5.1-6.0	0	0	0	0
	33-51	10.0-25.0	1.0-5.0	5.1-6.0	0	0	0	0
	51-90	2.0-5.0	1.0-5.0	5.1-6.5	0	0	0	0
	90-150	2.0-5.0	1.0-5.0	5.1-6.5	0	0	0	0
8500:								
Primus	0-1	---	30.0-40.0	3.5-5.5	0	0	0	0
	1-3	---	30.0-40.0	3.5-5.5	0	0	0	0
	3-34	8.0-28.0	10.0-30.0	5.1-6.0	0	0	0	0
	34-60	8.0-24.0	10.0-25.0	5.1-6.0	0	0	0	0
	60-84	3.0-11.0	5.0-10.0	5.6-6.5	0	0	0	0
	84-152	1.0-7.0	1.0-5.0	5.6-6.5	0	0	0	0
Noca	0-2	---	30.0-40.0	3.5-5.5	0	0	0	0
	2-5	6.0-13.0	1.0-10.0	4.4-5.5	0	0	0	0
	5-29	5.0-10.0	5.0-10.0	5.1-6.0	0	0	0	0
	29-51	4.0-8.0	1.0-10.0	5.1-6.0	0	0	0	0
	51-77	1.0-6.0	1.0-5.0	5.1-6.5	0	0	0	0
	77-152	0.0-4.0	1.0-5.0	5.1-6.5	0	0	0	0
Stehekin	0-18	17.0-28.0	10.0-15.0	4.5-5.5	0	0	0	0
	18-44	4.0-15.0	1.0-10.0	4.5-5.5	0	0	0	0
	44-109	1.0-5.0	1.0-5.0	5.1-6.0	0	0	0	0
	109-152	1.0-5.0	1.0-5.0	5.1-6.0	0	0	0	0

Table 26.—Chemical Soil Properties—Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	cm	*meq/100 g*	*meq/100 g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
8501:								
Stehekin	0-18	17.0-28.0	10.0-15.0	4.5-5.5	0	0	0	0
	18-44	4.0-15.0	1.0-10.0	4.5-5.5	0	0	0	0
	44-109	1.0-5.0	1.0-5.0	5.1-6.0	0	0	0	0
	109-152	1.0-5.0	1.0-5.0	5.1-6.0	0	0	0	0
Primus	0-1	---	30.0-40.0	3.5-5.5	0	0	0	0
	1-3	---	30.0-40.0	3.5-5.5	0	0	0	0
	3-34	8.0-28.0	10.0-30.0	5.1-6.0	0	0	0	0
	34-60	8.0-24.0	10.0-25.0	5.1-6.0	0	0	0	0
	60-84	3.0-11.0	5.0-10.0	5.6-6.5	0	0	0	0
	84-152	1.0-7.0	1.0-5.0	5.6-6.5	0	0	0	0
9001:								
Noca	0-2	---	30.0-40.0	3.5-5.5	0	0	0	0
	2-5	6.0-13.0	1.0-10.0	4.4-5.5	0	0	0	0
	5-29	5.0-10.0	5.0-10.0	5.1-6.0	0	0	0	0
	29-51	4.0-8.0	1.0-10.0	5.1-6.0	0	0	0	0
	51-77	1.0-6.0	1.0-5.0	5.1-6.5	0	0	0	0
	77-152	0.0-4.0	1.0-5.0	5.1-6.5	0	0	0	0
Perfect, dry	0-3	---	30.0-40.0	3.5-5.5	0	0	0	0
	3-4	---	30.0-40.0	3.5-5.5	0	0	0	0
	4-7	2.0-10.0	1.0-10.0	5.1-6.5	0	0	0	0
	7-11	---	30.0-40.0	3.5-5.5	0	0	0	0
	11-13	3.0-10.0	1.0-10.0	4.5-6.0	0	0	0	0
	13-39	2.0-10.0	1.0-10.0	5.1-6.5	0	0	0	0
	39-73	1.0-5.0	1.0-5.0	5.6-6.5	0	0	0	0
	73-752	0.0-5.0	1.0-5.0	5.6-6.5	0	0	0	0
9003:								
Stetattle	0-12	26.0-40.0	7.4-20.7	4.3-5.5	0	0	0	0
	12-30	17.0-29.0	15.0-30.0	4.3-5.5	0	0	0	0
	30-55	13.0-26.0	15.0-25.0	4.3-5.5	0	0	0	0
	55-100	7.0-19.0	5.0-20.0	4.5-5.7	0	0	0	0
	100-152	1.0-6.0	1.0-5.0	5.1-6.5	0	0	0	0
Doubtful	0-2	---	30.0-40.0	3.5-5.5	0	0	0	0
	2-9	11.0-21.0	10.0-20.0	5.1-6.0	0	0	0	0
	9-27	5.0-13.0	---	5.6-6.5	0	0	0	0
	27-58	5.0-13.0	---	5.6-6.5	0	0	0	0
	58-70	3.0-6.0	---	5.6-6.5	0	0	0	0
	70-152	---	---	---	---	---	---	---
Arriva	0-4	---	30.0-40.0	3.5-5.0	0	0	0	0
	4-23	---	30.0-40.0	3.5-5.0	0	0	0	0
	23-26	5.0-21.0	1.0-10.0	4.0-5.0	0	0	0	0
	26-38	---	30.0-40.0	3.5-5.0	0	0	0	0
	38-47	9.0-28.0	10.0-30.0	4.5-5.5	0	0	0	0
	47-50	9.0-28.0	10.0-30.0	4.5-5.5	0	0	0	0
	50-60	9.0-21.0	10.0-20.0	4.5-5.5	0	0	0	0
	60-85	5.0-9.0	5.0-10.0	5.1-6.0	0	0	0	0
	85-152	4.0-9.0	5.0-10.0	5.1-6.0	0	0	0	0
9008:								
Mox	0-4	---	30.0-40.0	3.5-5.5	0	0	0	0
	4-16	---	30.0-40.0	3.5-5.5	0	0	0	0
	16-27	5.0-13.0	5.0-15.0	4.0-5.0	0	0	0	0
	27-49	9.0-21.0	10.0-20.0	4.5-5.5	0	0	0	0
	49-76	5.0-13.0	5.0-15.0	4.5-5.5	0	0	0	0
	76-94	1.0-7.0	1.0-5.0	5.1-6.0	0	0	0	0
	94-152	1.0-7.0	1.0-5.0	5.1-6.0	0	0	0	0

Table 26.—Chemical Soil Properties—Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	cm	*meq/100 g*	*meq/100 g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
9008:								
Doubtful	0-2	---	30.0-40.0	3.5-5.5	0	0	0	0
	2-9	11.0-21.0	10.0-20.0	5.1-6.0	0	0	0	0
	9-27	5.0-13.0	---	5.6-6.5	0	0	0	0
	27-58	5.0-13.0	---	5.6-6.5	0	0	0	0
	58-70	3.0-6.0	---	5.6-6.5	0	0	0	0
	70-152	---	---	---	---	---	---	---
Perfect, cold	0-3	---	30.0-40.0	3.5-5.5	0	0	0	0
	3-4	---	30.0-40.0	3.5-5.5	0	0	0	0
	4-7	2.0-10.0	1.0-10.0	5.1-6.5	0	0	0	0
	7-11	---	30.0-40.0	3.5-5.5	0	0	0	0
	11-13	3.0-10.0	1.0-10.0	4.5-6.0	0	0	0	0
	13-39	2.0-10.0	1.0-10.0	5.1-6.5	0	0	0	0
	39-73	1.0-5.0	1.0-5.0	5.6-6.5	0	0	0	0
	73-752	0.0-5.0	1.0-5.0	5.6-6.5	0	0	0	0
9010:								
Doubtful	0-2	---	30.0-40.0	3.5-5.5	0	0	0	0
	2-9	11.0-21.0	10.0-20.0	5.1-6.0	0	0	0	0
	9-27	5.0-13.0	---	5.6-6.5	0	0	0	0
	27-58	5.0-13.0	---	5.6-6.5	0	0	0	0
	58-70	3.0-6.0	---	5.6-6.5	0	0	0	0
	70-152	---	---	---	---	---	---	---
Treen	0-10	21.0-42.0	10.0-35.0	5.1-6.5	0	0	0	0
	10-30	13.0-34.0	10.0-30.0	5.1-6.5	0	0	0	0
	30-40	7.0-30.0	5.0-20.0	5.1-6.5	0	0	0	0
	40-152	---	---	---	---	---	---	---
Rock outcrop	---	---	---	---	---	---	---	---
9012:								
Spickard	0-3	---	30.0-40.0	3.5-5.5	0	0	0	0
	3-10	---	30.0-40.0	3.5-5.5	0	0	0	0
	10-13	9.0-21.0	10.0-20.0	4.0-5.5	0	0	0	0
	13-22	7.0-17.0	5.0-15.0	4.5-5.5	0	0	0	0
	22-44	5.0-13.0	5.0-15.0	4.5-5.5	0	0	0	0
	44-60	4.0-9.0	5.0-10.0	4.5-5.5	0	0	0	0
	60-105	1.0-5.0	1.0-5.0	5.1-6.0	0	0	0	0
	105-152	1.0-5.0	1.0-5.0	5.1-6.0	0	0	0	0
Tepeh, moist	0-2	---	30.0-40.0	3.5-5.5	0	0	0	0
	2-5	---	30.0-40.0	3.5-5.5	0	0	0	0
	5-8	5.0-13.0	1.0-10.0	4.0-5.0	0	0	0	0
	8-30	9.0-17.0	5.0-10.0	4.5-5.5	0	0	0	0
	30-70	7.0-15.0	5.0-10.0	5.1-6.0	0	0	0	0
	70-92	5.0-13.0	1.0-10.0	5.1-6.0	0	0	0	0
	92-152	0.0-4.0	1.0-5.0	5.1-6.0	0	0	0	0
Maggib	0-2	---	30.0-40.0	3.5-5.5	0	0	0	0
	2-5	---	30.0-40.0	3.5-5.5	0	0	0	0
	5-9	5.0-7.0	1.0-5.0	4.2-5.5	0	0	0	0
	9-27	10.0-30.0	5.0-15.0	5.1-6.0	0	0	0	0
	27-64	5.0-15.0	5.0-10.0	5.1-6.0	0	0	0	0
	64-80	3.0-5.0	1.0-5.0	5.1-6.5	0	0	0	0
	80-152	---	---	---	---	---	---	---

Table 26.—Chemical Soil Properties—Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	cm	*meq/100 g*	*meq/100 g*	*pH*	*Pct*	*Pct*	*mmhos/cm*	
9016:								
Doubtful	0-2	---	30.0-40.0	3.5-5.5	0	0	0	0
	2-9	11.0-21.0	10.0-20.0	5.1-6.0	0	0	0	0
	9-27	5.0-13.0	---	5.6-6.5	0	0	0	0
	27-58	5.0-13.0	---	5.6-6.5	0	0	0	0
	58-70	3.0-6.0	---	5.6-6.5	0	0	0	0
	70-152	---	---	---	---	---	---	---
Triumph	0-15	20.0-45.0	10.0-30.0	4.5-6.0	0	0	0	0
	15-50	10.0-35.0	5.0-20.0	4.5-6.0	0	0	0	0
	50-120	5.0-30.0	1.0-10.0	4.5-6.0	0	0	0	0
	120-152	---	---	---	---	---	---	---
Perfect, cold	0-3	---	30.0-40.0	3.5-5.5	0	0	0	0
	3-4	---	30.0-40.0	3.5-5.5	0	0	0	0
	4-7	2.0-10.0	1.0-10.0	5.1-6.5	0	0	0	0
	7-11	---	30.0-40.0	3.5-5.5	0	0	0	0
	11-13	3.0-10.0	1.0-10.0	4.5-6.0	0	0	0	0
	13-39	2.0-10.0	1.0-10.0	5.1-6.5	0	0	0	0
	39-73	1.0-5.0	1.0-5.0	5.6-6.5	0	0	0	0
	73-752	0.0-5.0	1.0-5.0	5.6-6.5	0	0	0	0
9501:								
Stehekin	0-18	17.0-28.0	10.0-15.0	4.5-5.5	0	0	0	0
	18-44	4.0-15.0	1.0-10.0	4.5-5.5	0	0	0	0
	44-109	1.0-5.0	1.0-5.0	5.1-6.0	0	0	0	0
	109-152	1.0-5.0	1.0-5.0	5.1-6.0	0	0	0	0
Primus	0-1	---	30.0-40.0	3.5-5.5	0	0	0	0
	1-3	---	30.0-40.0	3.5-5.5	0	0	0	0
	3-34	8.0-28.0	10.0-30.0	5.1-6.0	0	0	0	0
	34-60	8.0-24.0	10.0-25.0	5.1-6.0	0	0	0	0
	60-84	3.0-11.0	5.0-10.0	5.6-6.5	0	0	0	0
	84-152	1.0-7.0	1.0-5.0	5.6-6.5	0	0	0	0
Stetattle	0-12	26.0-40.0	7.4-20.7	4.3-5.5	0	0	0	0
	12-30	17.0-29.0	15.0-30.0	4.3-5.5	0	0	0	0
	30-55	13.0-26.0	15.0-25.0	4.3-5.5	0	0	0	0
	55-100	7.0-19.0	5.0-20.0	4.5-5.7	0	0	0	0
	100-152	1.0-6.0	1.0-5.0	5.1-6.5	0	0	0	0
9997:								
Rock outcrop	---	---	---	---	---	---	---	---
Despair	0-4	---	30.0-40.0	3.5-5.5	0	0	0	0
	4-21	11.0-21.0	10.0-20.0	5.1-6.0	0	0	0	0
	21-41	5.0-13.0	10.0-20.0	5.1-6.0	0	0	0	0
	41-152	---	---	---	---	---	---	---
9998:								
Rock outcrop	---	---	---	---	---	---	---	---
Glaciers	---	---	---	---	---	---	---	---
Harlequin	0-6	---	30.0-40.0	3.5-5.5	0	0	0	0
	6-24	15.0-30.0	10.0-15.0	4.0-5.0	0	0	0	0
	24-46	3.0-10.0	1.0-10.0	4.5-5.5	0	0	0	0
	46-152	---	---	---	---	---	---	---
9999:								
Water, freshwater	---	---	---	---	---	---	---	---

Table 27.—Water Features

(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. Depth to water table is based on a representative value.)

Map symbol and soil name	Hydrologic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			cm	cm	*cm*				
6000:									
Manlywham	A/D								
		January	0	>200	0-10	Long	Frequent	---	None
		February	0	>200	0-10	Long	Frequent	---	None
		March	0	>200	0-10	Long	Frequent	---	None
		April	0	>200	0-10	Long	Frequent	Brief	Occasional
		May	0	>200	0-5	Long	Frequent	Brief	Occasional
		June	20	>200	0-5	Long	Frequent	Brief	Occasional
		July	25	>200	---	---	None	---	None
		August	25	>200	---	---	None	---	None
		September	25	>200	---	---	None	---	None
		October	20	>200	0-5	Long	Frequent	Brief	Occasional
		November	0	>200	0-5	Long	Frequent	Brief	Occasional
		December	0	>200	0-10	Long	Frequent	Brief	Occasional
Nohokomeen	A/D								
		January	60	>200	---	---	None	---	None
		February	50	>200	---	---	None	---	None
		March	45	>200	---	---	None	---	None
		April	40	>200	---	---	None	---	None
		May	45	>200	---	---	None	Brief	Occasional
		June	100	>200	---	---	None	Brief	Occasional
		July	160	>200	---	---	None	---	None
		August	180	>200	---	---	None	---	None
		September	180	>200	---	---	None	---	None
		October	160	>200	---	---	None	---	None
		November	125	>200	---	---	None	Brief	Occasional
		December	75	>200	---	---	None	---	None

Table 27.—Water Features—Continued

Map symbol and soil name	Hydrologic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			cm	cm	*cm*				
6000:									
Roland	A/D								
		January	35	>200	---	---	None	---	None
		February	30	>200	---	---	None	---	None
		March	30	>200	---	---	None	---	None
		April	35	>200	---	---	None	---	None
		May	50	>200	---	---	None	Brief	Occasional
		June	75	>200	---	---	None	Brief	Occasional
		July	125	>200	---	---	None	---	None
		August	160	>200	---	---	None	---	None
		September	160	>200	---	---	None	---	None
		October	140	>200	---	---	None	---	None
		November	75	>200	---	---	None	Brief	Occasional
		December	40	>200	---	---	None	---	None
6009:									
Ragged, deciduous	A								
		Jan-Dec	---	---	---	---	None	---	None
Tricouni, deciduous	A								
		Jan-Dec	---	---	---	---	None	---	None
Cosho	B								
		Jan-Dec	---	---	---	---	None	---	None
6010:									
Roland	A/D								
		January	35	>200	---	---	None	---	None
		February	30	>200	---	---	None	---	None
		March	30	>200	---	---	None	---	None
		April	35	>200	---	---	None	---	None
		May	50	>200	---	---	None	Brief	Occasional
		June	75	>200	---	---	None	Brief	Occasional
		July	125	>200	---	---	None	---	None
		August	160	>200	---	---	None	---	None
		September	160	>200	---	---	None	---	None
		October	140	>200	---	---	None	---	None
		November	75	>200	---	---	None	Brief	Occasional
		December	40	>200	---	---	None	---	None

Table 27.—Water Features—Continued

Map symbol and soil name	Hydrologic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			cm	cm	*cm*				
6010:									
Skymo	B								
		January	110	>200	---	---	None	---	None
		February	100	>200	---	---	None	---	None
		March	90	>200	---	---	None	---	None
		April	80	>200	---	---	None	---	None
		May	80	>200	---	---	None	Brief	Occasional
		June	140	>200	---	---	None	Brief	Occasional
		July	170	>200	---	---	None	---	None
		August	180	>200	---	---	None	---	None
		September	180	>200	---	---	None	---	None
		October	170	>200	---	---	None	---	None
		November	150	>200	---	---	None	Brief	Occasional
		December	125	>200	---	---	None	---	None
Deerlick	A/D								
		January	70	>200	---	---	None	---	None
		February	60	>200	---	---	None	---	None
		March	60	>200	---	---	None	---	None
		April	60	>200	---	---	None	---	None
		May	80	>200	---	---	None	Brief	Occasional
		June	140	>200	---	---	None	Brief	Occasional
		July	160	>200	---	---	None	---	None
		August	170	>200	---	---	None	---	None
		September	160	>200	---	---	None	---	None
		October	140	>200	---	---	None	---	None
		November	90	>200	---	---	None	Brief	Occasional
		December	70	>200	---	---	None	---	None
6014:									
Thorton	A								
		Jan-Dec	---	---	---	---	None	---	None
Ragged	A								
		Jan-Dec	---	---	---	---	None	---	None
Ledeir	A								
		Jan-Dec	---	---	---	---	None	---	None
6015:									
Tricouni	A								
		Jan-Dec	---	---	---	---	None	---	None
Ragged	A								
		Jan-Dec	---	---	---	---	None	---	None

Table 27.—Water Features—Continued

Map symbol and soil name	Hydrologic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			cm	cm	*cm*				
6015:									
Easy	A								
		Jan-Dec	---	---	---	---	None	---	None
6500:									
Sandalee	A/D								
		January	35	>200	---	---	None	---	None
		February	30	>200	---	---	None	---	None
		March	30	>200	---	---	None	---	None
		April	35	>200	---	---	None	---	None
		May	50	>200	---	---	None	Brief	Occasional
		June	75	>200	---	---	None	Brief	Occasional
		July	125	>200	---	---	None	---	None
		August	160	>200	---	---	None	---	None
		September	160	>200	---	---	None	---	None
		October	140	>200	---	---	None	---	None
		November	75	>200	---	---	None	Brief	Occasional
		December	40	>200	---	---	None	---	None
Kettling	A/D								
		January	70	>200	---	---	None	---	None
		February	60	>200	---	---	None	---	None
		March	60	>200	---	---	None	---	None
		April	60	>200	---	---	None	---	None
		May	80	>200	---	---	None	Brief	Occasional
		June	140	>200	---	---	None	Brief	Occasional
		July	160	>200	---	---	None	---	None
		August	170	>200	---	---	None	---	None
		September	160	>200	---	---	None	---	None
		October	140	>200	---	---	None	---	None
		November	90	>200	---	---	None	Brief	Occasional
		December	70	>200	---	---	None	---	None
Torment	A								
		January	110	>200	---	---	None	---	None
		February	100	>200	---	---	None	---	None
		March	90	>200	---	---	None	---	None
		April	80	>200	---	---	None	---	None
		May	80	>200	---	---	None	Brief	Occasional
		June	140	>200	---	---	None	Brief	Occasional
		July	170	>200	---	---	None	---	None
		August	180	>200	---	---	None	---	None
		September	180	>200	---	---	None	---	None
		October	170	>200	---	---	None	---	None
		November	150	>200	---	---	None	Brief	Occasional
		December	125	>200	---	---	None	---	None

Table 27.—Water Features—Continued

Map symbol and soil name	Hydrologic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			cm	cm	*cm*				
6502:									
Mesahchie	A	Jan-Dec	---	---	---	---	None	---	None
Inspiration	A	Jan-Dec	---	---	---	---	None	---	None
Lyall	A	Jan-Dec	---	---	---	---	None	---	None
6505:									
Farway	A	Jan-Dec	---	---	---	---	None	---	None
Lyall	A	Jan-Dec	---	---	---	---	None	---	None
Inspiration	A	Jan-Dec	---	---	---	---	None	---	None
7003:									
Damnation	D	Jan-Dec	---	---	---	---	None	---	None
Ragged	A	Jan-Dec	---	---	---	---	None	---	None
Rock outcrop	D	Jan-Dec	---	---	---	---	None	---	None
7015:									
Thorton	A	Jan-Dec	---	---	---	---	None	---	None
Ragged	A	Jan-Dec	---	---	---	---	None	---	None
Damnation	D	Jan-Dec	---	---	---	---	None	---	None
7500:									
Inspiration	A	Jan-Dec	---	---	---	---	None	---	None

Table 27.—Water Features—Continued

Map symbol and soil name	Hydrologic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			cm	cm	*cm*				
7500:									
Mesahchie	A								
		Jan-Dec	---	---	---	---	None	---	None
Sawtooth	B								
		Jan-Dec	---	---	---	---	None	---	None
7501:									
Despair	D								
		Jan-Dec	---	---	---	---	None	---	None
Goode	A								
		Jan-Dec	---	---	---	---	None	---	None
Rock outcrop	D								
		Jan-Dec	---	---	---	---	None	---	None
7502:									
Farway	A								
		Jan-Dec	---	---	---	---	None	---	None
Sawtooth	B								
		Jan-Dec	---	---	---	---	None	---	None
Despair	D								
		Jan-Dec	---	---	---	---	None	---	None
8000:									
Beaverpass	A/D								
		January	0	>200	0-10	Long	Frequent	---	None
		February	0	>200	0-10	Long	Frequent	---	None
		March	0	>200	0-10	Long	Frequent	---	None
		April	0	>200	0-10	Long	Frequent	Brief	Occasional
		May	0	>200	0-5	Long	Frequent	Brief	Occasional
		June	0	>200	0-5	Long	Frequent	Brief	Occasional
		July	69	>200	---	---	None	---	None
		August	69	>200	---	---	None	---	None
		September	69	>200	---	---	None	---	None
		October	0	>200	0-5	Long	Frequent	Brief	Occasional
		November	0	>200	0-5	Long	Frequent	Brief	Occasional
		December	0	>200	0-10	Long	Frequent	Brief	Occasional

Table 27.—Water Features—Continued

Map symbol and soil name	Hydrologic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			cm	cm	*cm*				
8000:									
Purple	A/D								
		January	0	>200	0-10	Long	Frequent	---	None
		February	0	>200	0-10	Long	Frequent	---	None
		March	0	>200	0-10	Long	Frequent	---	None
		April	0	>200	0-10	Long	Frequent	Brief	Occasional
		May	0	>200	0-5	Long	Frequent	Brief	Occasional
		June	0	>200	0-5	Long	Frequent	Brief	Occasional
		July	69	>200	---	---	None	---	None
		August	69	>200	---	---	None	---	None
		September	69	>200	---	---	None	---	None
		October	0	>200	0-5	Long	Frequent	Brief	Occasional
		November	0	>200	0-5	Long	Frequent	Brief	Occasional
		December	0	>200	0-10	Long	Frequent	Brief	Occasional
Bacon	A/D								
		January	0	>200	0-10	Long	Frequent	---	None
		February	0	>200	0-10	Long	Frequent	---	None
		March	0	>200	0-10	Long	Frequent	---	None
		April	0	>200	0-10	Long	Frequent	Brief	Occasional
		May	0	>200	0-5	Long	Frequent	Brief	Occasional
		June	20	>200	0-5	Long	Frequent	Brief	Occasional
		July	25	>200	---	---	None	---	None
		August	25	>200	---	---	None	---	None
		September	25	>200	---	---	None	---	None
		October	20	>200	0-5	Long	Frequent	Brief	Occasional
		November	0	>200	0-5	Long	Frequent	Brief	Occasional
		December	0	>200	0-10	Long	Frequent	Brief	Occasional
8006:									
Stetattle, deciduous	A								
		Jan-Dec	---	---	---	---	None	---	None
Forbidden	A								
		Jan-Dec	---	---	---	---	None	---	None
Triumph	A								
		Jan-Dec	---	---	---	---	None	---	None

Table 27.—Water Features—Continued

Map symbol and soil name	Hydrologic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			cm	cm	*cm*				
8007:									
Kimtah	B/D								
		January	50	>200	---	---	None	---	None
		February	50	>200	---	---	None	---	None
		March	50	>200	---	---	None	---	None
		April	50	>200	---	---	None	---	None
		May	60	>200	---	---	None	---	None
		June	100	>200	---	---	None	---	None
		July	100	>200	---	---	None	---	None
		August	160	>200	---	---	None	---	None
		September	160	>200	---	---	None	---	None
		October	140	>200	---	---	None	---	None
		November	80	>200	---	---	None	---	None
		December	50	>200	---	---	None	---	None
Bacon	A/D								
		January	0	>200	0-10	Long	Frequent	---	None
		February	0	>200	0-10	Long	Frequent	---	None
		March	0	>200	0-10	Long	Frequent	---	None
		April	0	>200	0-10	Long	Frequent	Brief	Occasional
		May	0	>200	0-5	Long	Frequent	Brief	Occasional
		June	20	>200	0-5	Long	Frequent	Brief	Occasional
		July	25	>200	---	---	None	---	None
		August	25	>200	---	---	None	---	None
		September	25	>200	---	---	None	---	None
		October	20	>200	0-5	Long	Frequent	Brief	Occasional
		November	0	>200	0-5	Long	Frequent	Brief	Occasional
		December	0	>200	0-10	Long	Frequent	Brief	Occasional
Yawning	A								
		Jan-Dec	---	---	---	---	None	---	None
8009:									
Chilliwack, warm	A								
		Jan-Dec	---	---	---	---	None	---	None
Perfect	A								
		Jan-Dec	---	---	---	---	None	---	None

Table 27.—Water Features—Continued

Map symbol and soil name	Hydrologic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			cm	cm	*cm*				
8009:									
Terror	A/D								
		January	80	>200	---	---	None	---	None
		February	75	>200	---	---	None	---	None
		March	70	>200	---	---	None	---	None
		April	60	>200	---	---	None	Brief	Occasional
		May	65	>200	---	---	None	Brief	Occasional
		June	140	>200	---	---	None	---	None
		July	160	>200	---	---	None	---	None
		August	170	>200	---	---	None	---	None
		September	160	>200	---	---	None	---	None
		October	140	>200	---	---	None	Brief	Occasional
		November	90	>200	---	---	None	Brief	Occasional
		December	80	>200	---	---	None	---	None
8010:									
Perfect	A								
		Jan-Dec	---	---	---	---	None	---	None
Spickard	A								
		Jan-Dec	---	---	---	---	None	---	None
Stetattle, deciduous	A								
		Jan-Dec	---	---	---	---	None	---	None
8011:									
Chilliwack	A								
		Jan-Dec	---	---	---	---	None	---	None
Forbidden, cold	A								
		Jan-Dec	---	---	---	---	None	---	None
Stetattle, deciduous	A								
		Jan-Dec	---	---	---	---	None	---	None
8014:									
Chilliwack, dry	A								
		Jan-Dec	---	---	---	---	None	---	None
Tepeh	A								
		Jan-Dec	---	---	---	---	None	---	None

Table 27.—Water Features—Continued

Map symbol and soil name	Hydrologic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			cm	cm	*cm*				
8014:									
Kimtah, dry	B/D								
		January	50	>200	---	---	None	---	None
		February	50	>200	---	---	None	---	None
		March	50	>200	---	---	None	---	None
		April	50	>200	---	---	None	---	None
		May	60	>200	---	---	None	---	None
		June	100	>200	---	---	None	---	None
		July	100	>200	---	---	None	---	None
		August	160	>200	---	---	None	---	None
		September	160	>200	---	---	None	---	None
		October	140	>200	---	---	None	---	None
		November	80	>200	---	---	None	---	None
		December	50	>200	---	---	None	---	None
8500:									
Primus	A								
		Jan-Dec	---	---	---	---	None	---	None
Noca	A								
		Jan-Dec	---	---	---	---	None	---	None
Stehekin	A								
		Jan-Dec	---	---	---	---	None	---	None
8501:									
Stehekin	A								
		Jan-Dec	---	---	---	---	None	---	None
Primus	A								
		Jan-Dec	---	---	---	---	None	---	None
9001:									
Noca	A								
		Jan-Dec	---	---	---	---	None	---	None
Perfect, dry	A								
		Jan-Dec	---	---	---	---	None	---	None
9003:									
Stetattle	A								
		Jan-Dec	---	---	---	---	None	---	None
Doubtful	B								
		Jan-Dec	---	---	---	---	None	---	None

Table 27.—Water Features—Continued

Map symbol and soil name	Hydrologic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			cm	cm	*cm*				
9003:									
Arriva	B								
		Jan-Dec	---	---	---	---	None	---	None
9008:									
Mox	A								
		Jan-Dec	---	---	---	---	None	---	None
Doubtful	B								
		Jan-Dec	---	---	---	---	None	---	None
Perfect, cold	A								
		Jan-Dec	---	---	---	---	None	---	None
9010:									
Doubtful	B								
		Jan-Dec	---	---	---	---	None	---	None
Treen	D								
		Jan-Dec	---	---	---	---	None	---	None
Rock outcrop	D								
		Jan-Dec	---	---	---	---	None	---	None
9012:									
Spickard	A								
		Jan-Dec	---	---	---	---	None	---	None
Tepeh, moist	A								
		Jan-Dec	---	---	---	---	None	---	None
Maggib	B								
		Jan-Dec	---	---	---	---	None	---	None
9016:									
Doubtful	B								
		Jan-Dec	---	---	---	---	None	---	None
Triumph	A								
		Jan-Dec	---	---	---	---	None	---	None
Perfect, cold	A								
		Jan-Dec	---	---	---	---	None	---	None

Table 27.—Water Features—Continued

Map symbol and soil name	Hydrologic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			cm	cm	*cm*				
9501:									
Stehekin	A								
		Jan-Dec	---	---	---	---	None	---	None
Primus	A								
		Jan-Dec	---	---	---	---	None	---	None
Stetattle	A								
		Jan-Dec	---	---	---	---	None	---	None
9997:									
Rock outcrop	D								
		Jan-Dec	---	---	---	---	None	---	None
Despair	D								
		Jan-Dec	---	---	---	---	None	---	None
9998:									
Rock outcrop	D								
		Jan-Dec	---	---	---	---	None	---	None
Glaciers	---	---	---	---	---	---	---	---	---
Harlequin	D								
		Jan-Dec	---	---	---	---	None	---	None
9999:									
Water, freshwater	---	---	---	---	---	---	---	---	---

Table 28.—Soil Features

(See text for definitions of terms used in this table. Absence of an entry indicates that the feature is not a concern or that data were not estimated. Depths are in centimeters.)

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		cm	*cm*				
6000:							
Manlywham	---	---	---	---	High	High	High
Nohokomeen	---	---	---	---	Low	High	Moderate
Roland	---	---	---	---	Moderate	Moderate	Moderate
6009:							
Ragged, deciduous	---	---	---	---	Moderate	High	Moderate
Tricouni, deciduous	---	---	---	---	High	Moderate	Moderate
Cosho	Lithic bedrock	50-100	---	Indurated	Moderate	High	Moderate
6010:							
Roland	---	---	---	---	Moderate	Moderate	Moderate
Skymo	---	---	---	---	Low	Moderate	High
Deerlick	---	---	---	---	High	High	Moderate
6014:							
Thorton	---	---	---	---	Moderate	High	Moderate
Ragged	---	---	---	---	Moderate	High	Moderate
Ledeir	---	---	---	---	Low	High	High
6015:							
Tricouni	---	---	---	---	High	Moderate	Moderate
Ragged	---	---	---	---	Moderate	High	Moderate
Easy	---	---	---	---	Moderate	High	Moderate
6500:							
Sandalee	---	---	---	---	Low	High	Moderate
Kettling	---	---	---	---	Moderate	High	Moderate
Torment	---	---	---	---	Low	Moderate	High

Table 28.—Soil Features—Continued

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		cm	*cm*				
6502:							
Mesahchie	---	---	---	---	Low	High	Moderate
Inspiration	---	---	---	---	---	High	Moderate
Lyall	---	---	---	---	Moderate	High	Moderate
6505:							
Farway	---	---	---	---	Low	High	Moderate
Lyall	---	---	---	---	Moderate	High	Moderate
Inspiration	---	---	---	---	---	High	Moderate
7003:							
Damnation	Lithic bedrock	25-50	---	Indurated	High	High	Moderate
Ragged	---	---	---	---	Moderate	High	Moderate
Rock outcrop	Lithic bedrock	---	---	Indurated	---	---	---
7015:							
Thorton	---	---	---	---	Moderate	High	Moderate
Ragged	---	---	---	---	Moderate	High	Moderate
Damnation	Lithic bedrock	25-50	---	Indurated	High	High	Moderate
7500:							
Inspiration	---	---	---	---	---	High	Moderate
Mesahchie	---	---	---	---	Low	High	Moderate
Sawtooth	Lithic bedrock	50-100	---	Indurated	High	Moderate	Moderate
7501:							
Despair	Lithic bedrock	25-50	---	Indurated	High	High	Moderate
Goode	---	---	---	---	Low	High	Moderate
Rock outcrop	Lithic bedrock	---	---	Indurated	---	---	---
7502:							
Farway	---	---	---	---	Low	High	Moderate
Sawtooth	Lithic bedrock	50-100	---	Indurated	High	Moderate	Moderate

Table 28.—Soil Features—Continued

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		cm	*cm*				
7502:							
Despair	Lithic bedrock	25-50	---	Indurated	High	High	Moderate
8000:							
Beaverpass	---	---	---	---	High	Moderate	High
Purple	---	---	---	---	Moderate	High	High
Bacon	---	---	---	---	High	High	High
8006:							
Stetattle, deciduous	---	---	---	---	Moderate	High	High
Forbidden	---	---	---	---	High	Moderate	Moderate
Triumph	Paralithic bedrock	100-150	---	Moderately cemented	Moderate	High	Moderate
8007:							
Kimtah	---	---	---	---	Moderate	High	High
Bacon	---	---	---	---	High	High	High
Yawning	---	---	---	---	Moderate	High	Moderate
8009:							
Chilliwack, warm	---	---	---	---	Moderate	High	Moderate
Perfect	---	---	---	---	Low	Moderate	Moderate
Terror	---	---	---	---	Moderate	High	High
8010:							
Perfect	---	---	---	---	Low	Moderate	Moderate
Spickard	---	---	---	---	High	High	Moderate
Stetattle, deciduous	---	---	---	---	Moderate	High	High
8011:							
Chilliwack	---	---	---	---	Moderate	High	Moderate
Forbidden, cold	---	---	---	---	High	Moderate	Moderate
Stetattle, deciduous	---	---	---	---	Moderate	High	High

Table 28.—Soil Features—Continued

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		cm	*cm*				
8014:							
Chilliwack, dry	---	---	---	---	Moderate	High	Moderate
Tepeh	---	---	---	---	High	High	High
Kimtah, dry	---	---	---	---	Moderate	High	High
8500:							
Primus	---	---	---	---	Low	High	Moderate
Noca	---	---	---	---	Moderate	High	Moderate
Stehekin	---	---	---	---	Moderate	High	Moderate
8501:							
Stehekin	---	---	---	---	Moderate	High	Moderate
Primus	---	---	---	---	Low	High	Moderate
9001:							
Noca	---	---	---	---	Moderate	High	Moderate
Perfect, dry	---	---	---	---	Low	Moderate	Moderate
9003:							
Stetattle	---	---	---	---	Moderate	High	High
Doubtful	Lithic bedrock	50-100	---	Indurated	High	High	Moderate
Arriva	---	---	---	---	High	High	Moderate
9008:							
Mox	---	---	---	---	High	High	Moderate
Doubtful	Lithic bedrock	50-100	---	Indurated	High	High	Moderate
Perfect, cold	---	---	---	---	Low	Moderate	Moderate
9010:							
Doubtful	Lithic bedrock	50-100	---	Indurated	High	High	Moderate
Treen	Lithic bedrock	25-50	---	Indurated	High	High	High
Rock outcrop	Lithic bedrock	---	---	Indurated	---	---	---

Table 28.—Soil Features—Continued

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		cm	*cm*				
9012:							
Spickard	---	---	---	---	High	High	Moderate
Tepeh, moist	---	---	---	---	High	High	High
Maggib	Lithic bedrock	50-100	---	Indurated	Moderate	High	Moderate
9016:							
Doubtful	Lithic bedrock	50-100	---	Indurated	High	High	Moderate
Triumph	Paralithic bedrock	100-150	---	Moderately cemented	Moderate	High	Moderate
Perfect, cold	---	---	---	---	Low	Moderate	Moderate
9501:							
Stehekin	---	---	---	---	Moderate	High	Moderate
Primus	---	---	---	---	Low	High	Moderate
Stetattle	---	---	---	---	Moderate	High	High
9997:							
Rock outcrop	Lithic bedrock	---	---	Indurated	---	---	---
Despair	Lithic bedrock	25-50	---	Indurated	High	High	Moderate
9998:							
Rock outcrop	Lithic bedrock	0-0	---	Indurated	---	---	---
Glaciers	---	---	---	---	---	---	---
Harlequin	Lithic bedrock	25-50	---	Indurated	Moderate	High	High
9999:							
Water, freshwater	---	---	---	---	---	---	---

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