

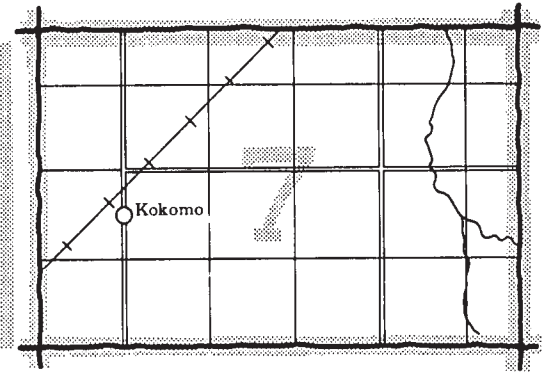
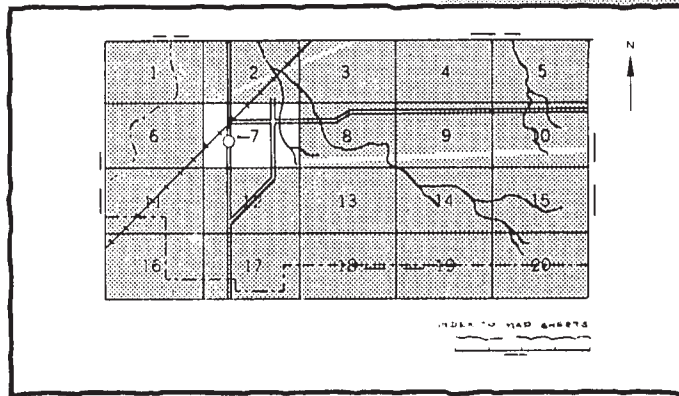
**SOIL SURVEY**  
**Idaho County Area, Idaho**  
**Western Part**



**United States Department of Agriculture, Soil Conservation Service**  
**United States Department of the Interior, Bureau of Indian Affairs**  
**in cooperation with**  
**University of Idaho, College of Agriculture**

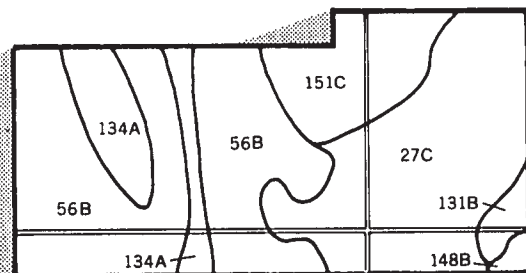
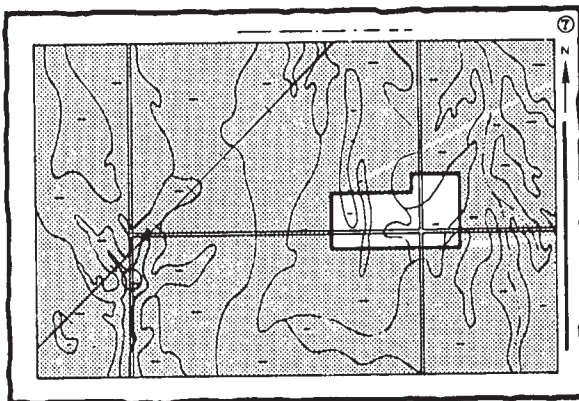
# HOW TO USE

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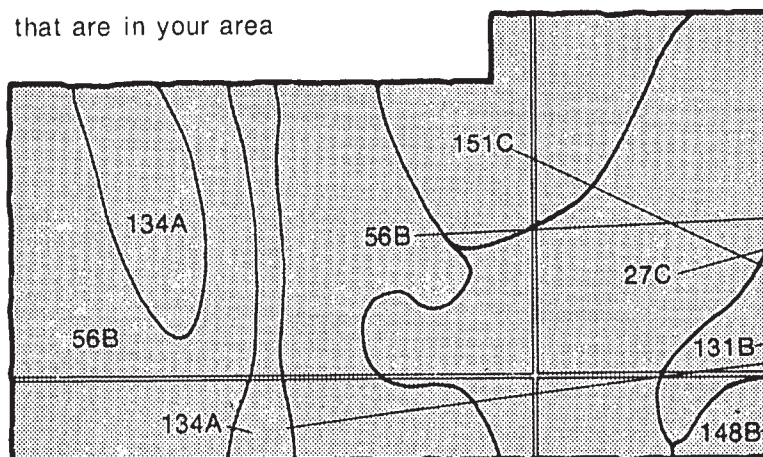


2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.



4. List the map unit symbols that are in your area



## Symbols

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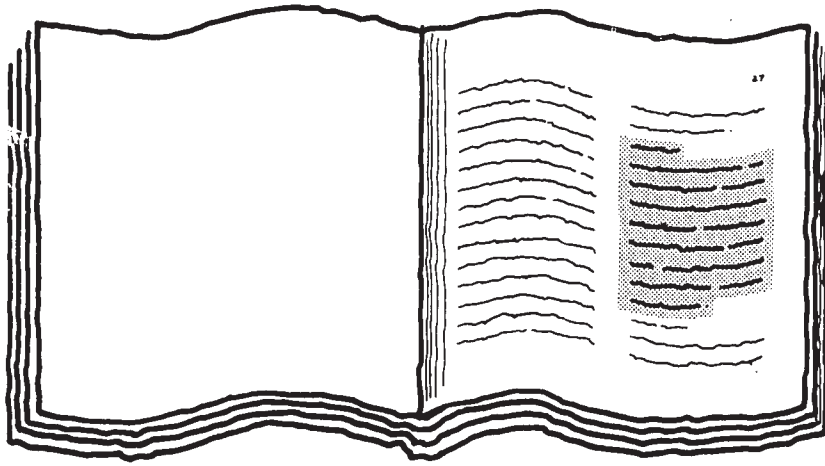
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# THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



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**6.** See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.

Summary of Tables" (following the  
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specific soil use.

7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; for specialists in wildlife management, waste disposal, or pollution control.

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 Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was performed in the period 1961-76. Soil names and descriptions were approved in 1976. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1976. This survey was made cooperatively by the Soil Conservation Service, the Bureau of Indian Affairs, and the University of Idaho, College of Agriculture. It is part of the technical assistance furnished to the Idaho Soil and Water Conservation District.

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

**Cover: Area of grassland in canyon along the Salmon River.  
Bluespruce soils are south facing, and Lawyer soils are north facing.  
Rock outcrop is basalt.**



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## Foreword

This soil survey contains information that can be used in land-planning programs in Idaho County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

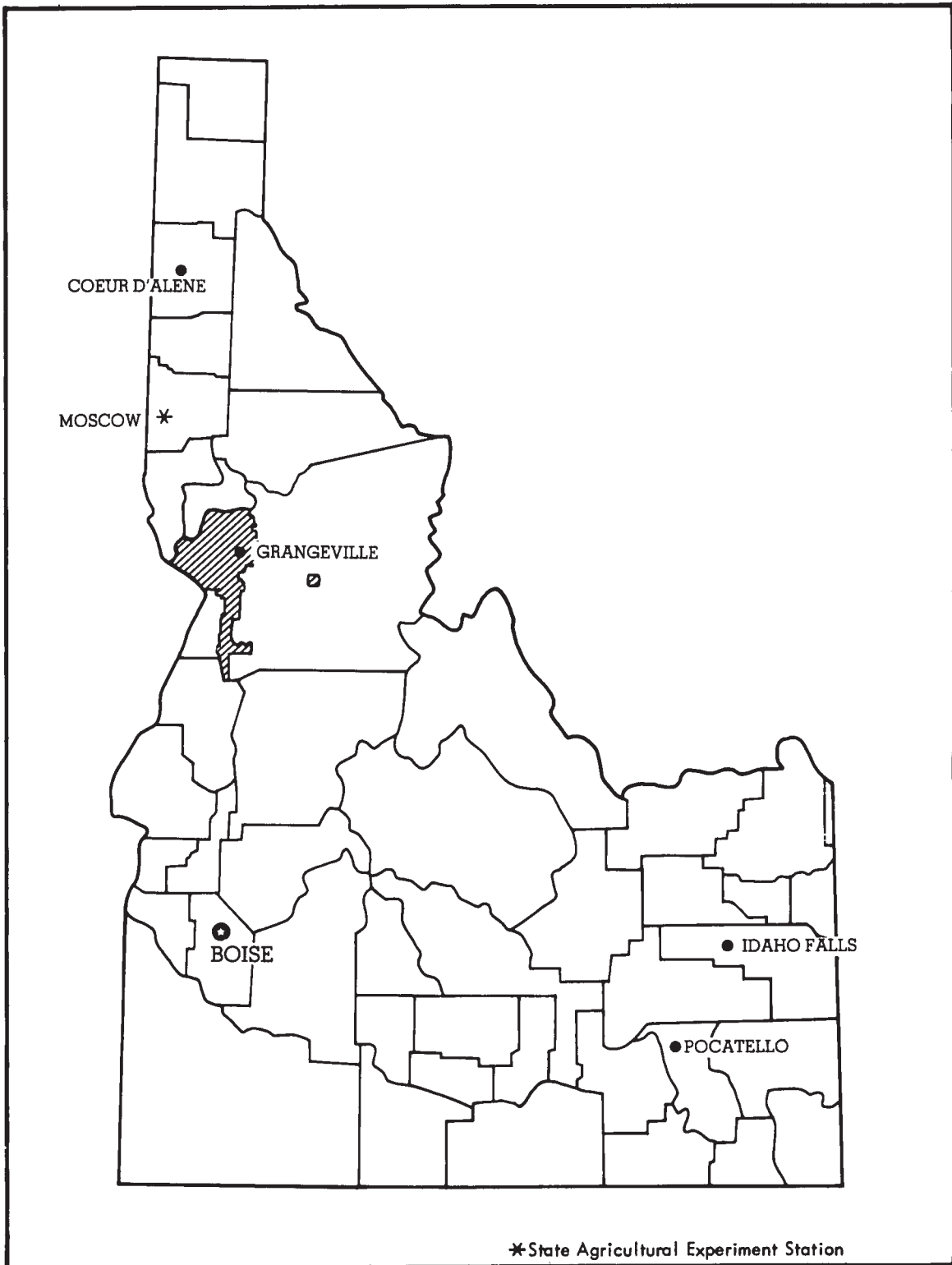
This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.

A large, stylized handwritten signature in black ink, reading "Amos I. Garrison, Jr." with a large flourish at the end.

Amos I. Garrison, Jr.  
State Conservationist  
Soil Conservation Service



*Location of Idaho County Area, Western Part, in Idaho.*

# SOIL SURVEY OF Idaho County Area, Idaho, Western Part

By Raymond J. Barker, Soil Conservation Service

Fieldwork by Raymond J. Barker, H. C. McCarver, S. R. Base, and Charles F. Swenson, Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service, and United States Department of the Interior, Bureau of Indian Affairs, in cooperation with the University of Idaho, College of Agriculture

Idaho County Area, Idaho, Western Part, is in north-central Idaho. Its area is 747,040 acres, or about 1,167 square miles. Elk City Township, though not contiguous with the rest of the Area, is included. The rest of Idaho County is national forest and is not mapped in this survey.

Grangeville, the county seat and the largest town, had a population of 3,636 in 1970. Other towns within the survey area are Cottonwood, Elk City, Ferdinand, Riggins, and White Bird.

The northern part of the survey area is a broad, loess-covered plateau at about 3,500 feet above sea level (fig. 1). The soils are generally very deep, loamy, and gently sloping to moderately sloping. Most of this area is farmed, mainly to wheat, barley, and peas.

Deep canyons, some of the deepest in North America dominate the southern part of the survey area (fig. 1). The soils generally are shallow and moderately deep in south-facing areas and very deep on north-facing areas. These soils are very steep. Rock fragments are common. Rangeland is mostly on south-facing sides of the canyons and at lower elevations on north-facing sides. There are large ranches here. Higher elevations of north-facing canyon sides have a coniferous forest. Also in this part of the survey area are steep mountains where logging is common. Elevation ranges from about 910 feet at the mouth of the Salmon River to 7,627 feet at the summit of an unnamed mountain southeast of Riggins.

## General nature of the area

This section provides general information about the Idaho County Area, Idaho, Western Part. It discusses settlement, natural resources, climate, farming, and recreation.

## Settlement

Idaho County, of which this soil survey area is but a small part, was created by the Washington Legislature in 1861, twenty-nine years before Idaho became a state. The first county seat was Florence, a mining town, about 15 miles northeast of the present town of Riggins. The county seat is now at Grangeville.

The Nez Perce Indian Reservation was established in 1855 but was reduced in size in 1863. The present reservation boundaries include the northern part of the survey area.

The first sizable acreage of Camas Prairie north of Grangeville was broken out and farmed in 1870. By 1900 a large percentage of the principal farming area was under cultivation.

## Natural resources

Soil is the most important natural resource in the area. Crops produced on the farms, livestock that graze the grassland, and trees that are harvested from the woodland are all derived from the soil.

In most of the area, water is adequate for domestic use and watering livestock. Underground water has not been found in sufficient volume for irrigation. A large volume of water flows through the area in rivers, but it is not adjacent enough to arable land to be important for irrigation under present conditions.

## Climate

In this Area, summer is warm or hot in most valleys and much cooler in the mountains. Winter is cold in the mountains, but valleys are colder than the lower parts of adjacent mountains because of cold-air drainage. Precipitation falls in the mountains throughout the year, and a deep snowpack accumulates during winter. Snowmelt usually supplies much more water than can be used for agriculture in the Area. In valleys precipitation in summer



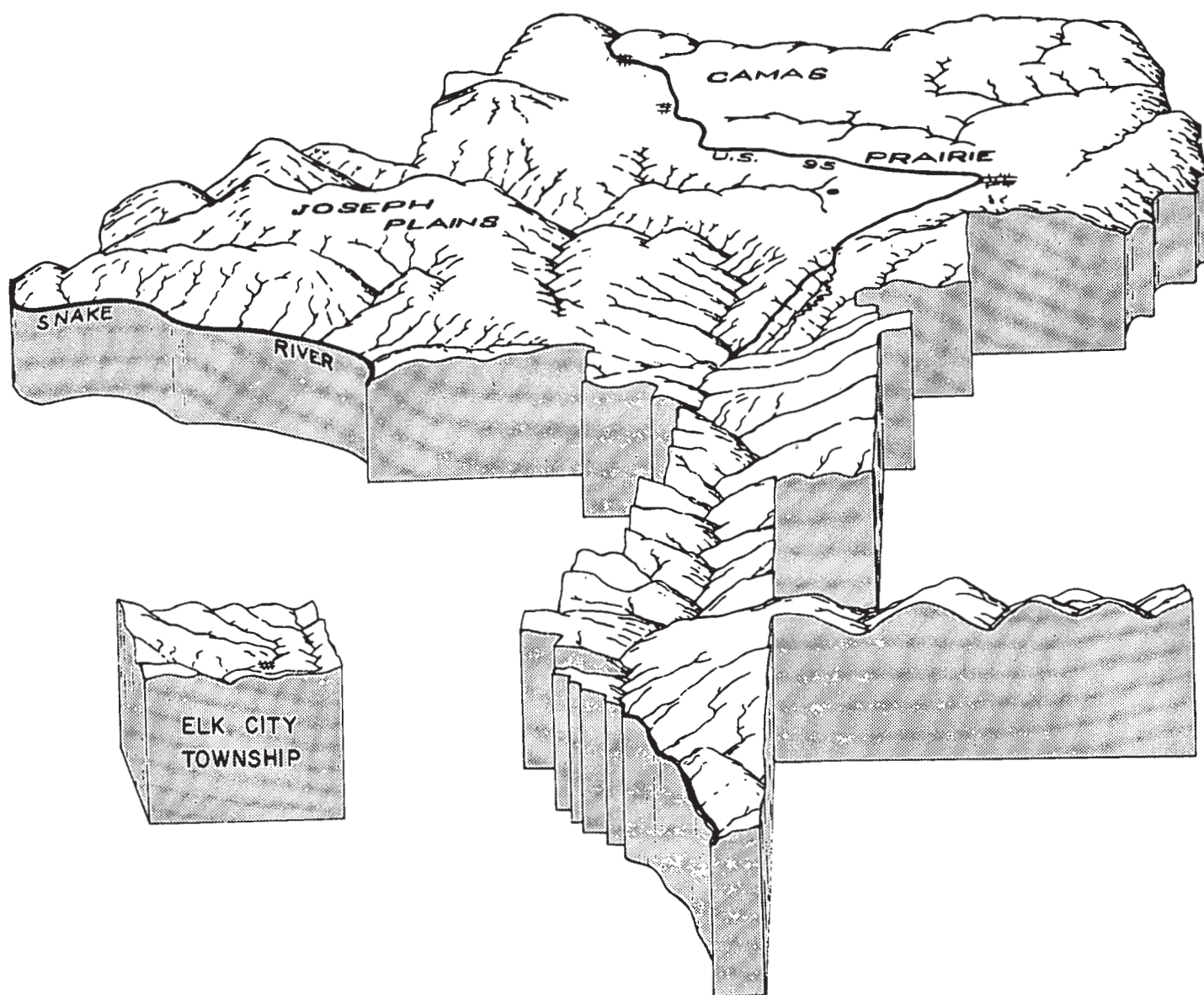


Figure 1.—Diagram of Idaho County Area, Western Part.

falls as showers; some thunderstorms occur. In winter the ground is covered with snow much of the time. Warm and dry chinook winds often melt and evaporate the snow.

Tables 1 and 2 give data on temperature and precipitation for the survey area as recorded at Grangeville, which is typical of the higher prairie areas, and at Riggins, which is typical of the lower areas, for the period 1951-1975. Tables 3 and 4 show probable dates of the first freeze in fall and the last freeze in spring. Tables 5 and 6 provide data on length of the growing season.

In winter the average temperatures at Grangeville and Riggins are 31 and 37 degrees F. The average daily lows are 22 degrees at Grangeville and 30 degrees at Riggins. The lowest temperatures on record are -25 degrees at Grangeville on December 30, 1968, and -10 degrees at Riggins on January 27, 1957. In summer, the average temperatures are 63 degrees at Grangeville and 73 degrees at Riggins. The average daily highs are 79 degrees at Grangeville and 90 degrees at Riggins. The highest recorded temperature, which occurred at Riggins on August 20, 1967, is 115 degrees F.

Growing degree days, shown in tables 1 and 2, are equivalent to heat units. During each month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

Of the total annual precipitation, 50 percent usually falls between April and September, which includes the growing season for most crops. In 2 years out of 10, the rainfall in this period is less than 10 inches at Grangeville and less than 6 inches at Riggins. The heaviest rainfall in one day during the period of record was 3.01 inches at Grangeville on September 14, 1955, and 1.58 inches at Riggins on January 29, 1965. Thunderstorms occur on about 15 days each year; most are in summer.

Average seasonal snowfall is 57 inches at Grangeville and only 8 inches at Riggins. The greatest snow depths during the period of record were 21 inches at Grangeville and 4 inches at Riggins. On the average, 22 days at Grangeville and 1 day at Riggins have at least 1 inch of snow on the ground, but the number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 50 percent. Humidity is higher at night, and average humidity at dawn is about 60 percent.

Climatic data for this section were especially prepared for the Soil Conservation Service by the National Climatic Center, Asheville, North Carolina.

## Farming

Most of the gently sloping and moderately sloping Camas Prairie north and west of Grangeville is farmed to wheat, barley, and Austrian winter peas. Smaller acreages are also used for spring peas, oats, and seeds of various grasses. Grasses and legumes are the main forage crops.

The Camas Prairie is one of the major winter wheat producing areas in Idaho; production is high. The area also produces a major proportion of the Austrian winter peas grown in the United States.

A small acreage of suitable land along the Salmon and Clearwater Rivers is irrigated and produces hay, orchards, and truck crops.

The Salmon River Soil Conservation District was formed in 1956 and included primarily the very steep canyon rangelands along the Snake River and on both sides of the Salmon River from Whitebird Summit south to the county line. In 1961 the Prairie Soil Conservation District was organized and included the Camas Prairie area, the timbered Cottonwood Butte area, and steep rangelands along the Clearwater River. In 1966 these districts were consolidated into the Prairie-Salmon River Soil Conservation District. Then in February 1969, all of Idaho County was consolidated into the Idaho Soil and Water Conservation District.

## How this survey was made

Soil scientists made this survey to learn what soils are in the survey area, where they are, and how they can be used. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; and the kinds of rock. They dug many holes to study soil profiles. A profile is the sequence of natural layers, or horizons, in a soil. It extends from the surface down into the parent material, which has been changed very little by leaching or by plant roots.

The soil scientists recorded the characteristics of the profiles they studied and compared those profiles with others in nearby counties and in more distant places. They classified and named the soils according to nationwide uniform procedures. They drew the boundaries of the soils on aerial photographs. These photographs show trees, buildings, fields, roads, and other details that help in drawing boundaries accurately. The soil maps at the back of this publication were prepared from aerial photographs.

The areas shown on a soil map are called map units. Most map units are made up of one kind of soil. Some are made up of two or more kinds. The map units in this survey area are described under "General soil map for broad land use planning" and "Soil maps for detailed planning."

While a soil survey is in progress, samples of some soils are taken for laboratory measurements and for engineering tests. All soils are field tested to determine their characteristics. Interpretations of those characteristics may be modified during the survey. Data are assembled from other sources, such as test results, records, field experience, and state and local specialists. For example, data on crop yields under defined management are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it can be used by farmers, rangeland and woodland managers, engineers, planners, developers and builders, home buyers, and others.

## General soil map for broad land use planning

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



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

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

### **Gently sloping to very steep soils mostly on plateaus**

These deep and very deep soils are mostly well drained and moderately well drained. They have a clayey subsoil that formed in loess or a loamy subsoil that formed in weathered basalt and granite. These soils are mainly in the northern part of the survey area and at the lower elevations around Elk City.

Elevation ranges from 2,500 to 4,800 feet. Annual precipitation ranges from 22 to 34 inches, annual air temperature ranges from 38 to 46 degrees F, and the frost-free period ranges from 60 to 120 days.

The five map units in this group make up 34 percent of the Area. They are used mainly for dryland crops and woodland.

#### **1. Fenn-Shebang**

*Very deep, gently sloping to moderately steep, well drained and moderately well drained soils that have clayey subsoil or underlying material; formed in old weathered loess*

This map unit consists of a broad, gently sloping plateau about 2 to 7 miles west of Grangeville. This unit covers about 1 percent of the survey area. This map unit is about 60 percent Fenn soils, 30 percent Shebang soils, and 10 percent minor soils. Fenn soils in most places are slightly lower than Shebang soils.

Fenn soils are well drained. Typically, the surface layer is very dark gray silty clay about 6 inches thick over very dark gray clay about 11 inches thick. The upper part of the underlying material is dark grayish brown clay 10 inches thick, and the lower part is brown clay to a depth of 63 inches.

Shebang soils have a perched water table for short periods in spring and are moderately well drained. Typically, the surface layer is dark gray silt loam about 9 inches thick, and the subsurface layer is gray silt loam about 1 inch thick. The subsoil is very dark gray, dark grayish brown, and brown clay to a depth of 60 inches.

The minor soils include moderately deep, well drained Ferdinand soils, moderately well drained Nez Perce soils, and somewhat poorly drained Fenn Variant soils.

These soils are used mainly for winter wheat. These soils should be cultivated when they are neither too wet nor too dry. A large area of Fenn soils is stony silty clay and is used for native pasture.

Wildlife habitat is limited because of the predominance of clean-till farming. Hungarian partridge, some Chinese pheasant, mourning dove, and occasionally deer live on this map unit. Songbirds, hawks, and owls are also common.

#### **2. Nez Perce-Uhlorn-Shebang**

*Very deep, gently sloping to moderately steep, moderately well drained and well drained soils that have a clayey and loamy subsoil; formed in loess*

This map unit consists of a large, undulating and rolling plateau between Grangeville and Ferdinand. This unit covers about 23 percent of the survey area. This map unit is about 50 percent Nez Perce soils, 15 percent Uhlorn soils, 10 percent Shebang soils, and 25 percent minor soils. Nez Perce soils face south, east, and west, and Uhlorn soils face north; Shebang soils are on southerly exposures on the prairie.

Nez Perce soils are moderately well drained. Typically, the surface layer is dark gray and grayish brown silt loam about 17 inches thick. The subsurface layer is light brownish gray silt loam about 3 inches thick. The upper part of the subsoil is pale brown and brown silty clay about 22 inches thick, and the lower part is light brownish gray silty clay to a depth of 60 inches.

Uhlorn soils are well drained. Typically, the surface layer is dark gray and dark grayish brown silt loam about 13 inches thick. The upper part of the subsoil is brown silt loam about 5 inches thick, and the lower part is yellowish brown and brown silty clay loam to a depth of 60 inches.

Shebang soils are moderately well drained. Typically, the surface layer is dark gray silt loam about 9 inches thick. The subsurface layer is gray silt loam about 1 inch thick. The subsoil is very dark gray, dark grayish brown and brown, and dark brown clay to a depth of 60 inches.

The minor soils include well drained Fenn, Ferdinand, and Meland soils; moderately well drained Chicane soils; and somewhat poorly drained Westlake and Wilkins soils.

These soils are used mainly for wheat and barley. Some areas are used for Austrian winter peas, hay, and pasture. Water erosion is the main problem.

Wildlife habitat is limited because of the predominance of clean-till farming. Hungarian partridge, some Chinese pheasant, mourning doves, and occasionally deer live on this map unit. Songbirds, hawks, and owls are also common.

#### **3. Boles-Kooskia**

*Very deep, gently sloping to moderately steep, moderately well drained soils that have a clayey subsoil; formed in loess*

This map unit consists of several small, undulating and rolling plateaus generally adjacent to the larger prairie of Nez Perce and Uhlorn soils. This unit covers about 2



percent of the survey area. This map unit is about 55 percent Boles soils, 25 percent Kooskia soils, and 20 percent minor soils. Boles soils are higher than Kooskia soils.

Typically, Boles soils have a surface layer of dark grayish brown and very dark grayish brown silt loam about 9 inches thick. The subsoil is dark brown silt loam about 5 inches thick. The buried subsurface layer is light gray silt loam about 5 inches thick. The buried subsoil is dark grayish brown and brown silty clay and clay to a depth of 60 inches.

Typically, Kooskia soils have a surface layer of dark grayish brown silt loam about 9 inches thick. The subsoil is brown silt loam about 5 inches thick. The buried subsurface layer is light gray silt loam about 7 inches thick. The buried subsoil is yellowish brown and brown silty clay to a depth of 60 inches.

The minor soils include well drained Ferdinand, Suloaf, De Masters, Uptmor, and Meland soils and somewhat poorly drained Westlake and Wilkins soils.

These soils are used mainly for wheat, barley, hay, and pasture, and some woodland. Water erosion is the main problem.

The main kinds of wildlife are black bear, deer, and forest grouse. Less common are racoon, rabbits, and bobcat. Songbirds, rodents, and other small mammals also are present.

#### 4. Suloaf-Telcher-Uptmor

*Deep and very deep, gently sloping to steep, well drained soils; formed in loess and material derived from basalt*

This map unit is on mountain foot slopes south of Grangeville and west of Cottonwood and on the plateau across the Salmon River southwest of Cottonwood. This unit covers about 7 percent of the survey area. This map unit is about 25 percent Suloaf soils, 15 percent Telcher soils, 15 percent Uptmor soils, 10 percent De Masters soils and 35 percent minor soils. The Suloaf soils are in the drier and warmer parts, and the Telcher soils are in the wetter and cooler parts. The Uptmor soils are throughout the areas, and the De Masters soils are mostly on northerly exposures.

Suloaf soils are deep. Typically, the surface layer is brown silt loam about 17 inches thick. The subsoil is light yellowish brown and light brown gravelly silt loam about 24 inches thick. The substratum is reddish yellow gravelly sandy loam. Partially decomposed basalt bedrock is at a depth of 54 inches.

Telcher soils are very deep. Typically, the surface layer is yellowish brown silt loam about 12 inches thick. The subsurface layer is light yellowish brown silt loam about 8 inches thick. The upper part of the subsoil is yellowish brown and yellow silty clay loam about 24 inches thick, and the lower part is very pale brown gravelly clay loam to a depth of 60 inches.

Uptmor soils are very deep. Typically, the surface layer is dark grayish brown silt loam about 4 inches thick. The

upper part of the subsoil is brown and light brown silty clay loam and silty clay about 21 inches thick, and the lower part is strong brown cobbly silty clay about 21 inches thick. The substratum is brownish yellow very gravelly clay loam to a depth of 61 inches.

De Masters soils are deep. Typically, the upper part of the surface layer is dark grayish brown silt loam about 15 inches thick, and the lower part is dark brown silt loam about 18 inches thick. The upper part of the subsoil is yellowish brown silty loam and cobbly silty clay loam about 14 inches thick, and the lower part is yellowish brown very cobbly clay loam about 8 inches thick. Slightly weathered basalt bedrock is at a depth of 55 inches.

The minor soils include well drained Flybow, Johnson, Keuterville, and Zaza soils; moderately well drained Boles soils; and somewhat poorly drained Westlake and Wilkins soils.

These soils are used mainly for woodland, woodland grazing, hay, and pasture. Some of the warmer parts at lower elevations can be used for barley and wheat.

The main kinds of wildlife are black bear, deer, and forest grouse. Less common are racoon, rabbits, bobcat, and wintering elk. Songbirds, wild turkey, rodents, and other small mammals also are present.

#### 5. Ericson-Jughandle

*Very deep and deep, gently sloping to very steep, well drained and somewhat excessively drained soils; formed in granitic material and some volcanic ash*

This map unit is in a mountain valley near Elk City. This unit covers about 1 percent of the survey area. This map unit is about 60 percent Ericson soils, 25 percent Jughandle soils, and 15 percent minor soils. The Ericson soils face south, east, and west, and the Jughandle soils face north.

Ericson soils are very deep and well drained. Typically, the surface layer is brown loam about 2 inches thick. The subsurface layer is pale brown loam about 10 inches thick. The subsoil is light yellowish brown loam and yellowish brown fine gravelly loam to a depth of 60 inches.

Jughandle soils are deep and somewhat excessively drained. They have volcanic ash in the surface layer. Typically, the surface layer is brown loam about 11 inches thick. The underlying material is pale brown and light brown loam and sandy loam about 30 inches thick. Decomposing granitic gneiss is at a depth of 41 inches.

The minor soils include somewhat poorly drained Jughandle Variant soils.

These soils are used mainly for woodland and woodland grazing. Some areas are used for hay and pasture.

The main kinds of wildlife are deer, black bear, moose, elk, and bobcat. Songbirds and forest grouse are common. Stream fishing is important.

## **Sloping to very steep soils on canyonsides and mountains**

These moderately deep to very deep, well drained and somewhat excessively drained soils are on canyon walls and mountains. They formed mainly in loess and weathered basalt and granite. They have a loamy subsoil. In many places, the subsoil contains more than 35 percent rock fragments. These soils are along the Snake, Salmon, and Clearwater Rivers; at higher elevations south and east of Riggins, southeast of Slate Creek, and south of Grangeville; and around Cottonwood Butte and Elk City.

Elevation ranges from 910 to 7,627 feet. Annual precipitation ranges from 18 to 34 inches, annual air temperature ranges from 38 degrees to 48 degrees F, and the frost-free season ranges from 50 to 170 days.

The four map units in this group make up 66 percent of the survey area. They are used mainly for grazing and woodland.

### **6. Rock outcrop-Bluesprin-Tannahill**

*Rock outcrop and moderately deep and deep, very steep, well drained soils; formed in loess and in residuum and colluvium derived from basalt*

This map unit is in the deep canyons along the Snake and Salmon Rivers. This unit covers about 33 percent of the survey area. The map unit is about 20 percent Rock outcrop, 15 percent Bluesprin soils, 10 percent Tannahill soils, 10 percent Brower soils, 10 percent Ferdinand soils, 5 percent Lawyer soils, and 30 percent minor soils. The soils are mostly south facing.

Rock outcrop intermingled with the soils consists mostly of Columbia River Basalt or Seven Devils Volcanics.

Bluesprin soils are moderately deep. Typically, the surface layer is dark grayish brown very cobbly loam about 12 inches thick. The subsoil is dark yellowish brown very cobbly clay loam about 19 inches thick. Basalt bedrock is at a depth of 31 inches.

Tannahill soils are deep. Typically, the surface layer is dark brown cobbly loam and gravelly silty clay loam about 10 inches thick. The subsoil is brown very gravelly silty clay loam about 9 inches thick. The substratum is pale brown and very pale brown, strongly calcareous very gravelly loam about 33 inches thick. Fractured, weathered basalt bedrock is at a depth of 52 inches.

Brower soils are very deep. Typically, the upper part of the surface layer is brown, very gravelly loam about 10 inches thick, and the lower part is grayish brown very gravelly loam about 16 inches thick. The underlying material is brown very gravelly loam to a depth of 60 inches.

Ferdinand soils are moderately deep. Typically, the surface layer is dark grayish brown silt loam about 13 inches thick. The upper part of the subsoil is grayish brown cobbly silty clay loam about 6 inches thick, and

the lower part is brown angular very cobbly silty clay about 13 inches thick. Basalt bedrock is at a depth of 32 inches.

The minor soils include well drained Banner, Chard, Lawyer, Meland, Oland, Oland Variant, Riggins soils and somewhat excessively drained Chard Variant soils.

These soils are used mainly for range. Some moderately sloping soils on small benches are used for hay and pasture. Small areas along the Salmon River are used for irrigated hay, pasture, and truck crops.

The wildlife is unique on these soils. Chukar partridge are common in the canyons, and birds of prey frequent the skies. Deer, black bear, elk, raccoon, and bobcat also live here, as do songbirds and various small mammals, including rodents. Cougar prowl more remote parts. Stream and river fishing is a prime recreational use.

### **7. Klickson-Bluesprin-Suloaf**

*Moderately deep to very deep, moderately sloping to very steep, well drained soils; formed in loess and in material derived from basalt*

This map unit is along the Snake, Salmon, and Clearwater Rivers. It covers about 22 percent of the survey area. This unit is about 20 percent Klickson soils, 15 percent Bluesprin soils, 15 percent Suloaf soils, and 50 percent minor soils. The Klickson and Suloaf soils face north and the Bluesprin soils face south.

Klickson soils are very deep. Typically, the surface layer is dark grayish brown silt loam and brown cobbly loam about 15 inches thick. The upper part of the subsoil is brown cobbly silt loam and very cobbly loam about 36 inches thick, and the lower part, which is absent in places, is brown very cobbly clay to a depth of 60 inches.

Bluesprin soils are moderately deep. Typically, the surface layer is dark grayish brown very cobbly loam about 12 inches thick. The subsoil is dark yellowish brown very cobbly clay loam about 19 inches thick. Basalt bedrock is at a depth of 31 inches.

Suloaf soils are deep. Typically, the surface layer is brown silt loam about 17 inches thick. The subsoil is light yellowish brown and light brown gravelly silt loam about 24 inches thick. The substratum is reddish yellow gravelly sandy loam. Partially decomposed basalt bedrock is at a depth of 54 inches.

The minor soils include well drained Ferdinand, Oland, Spokel, and Brower soils. Rock outcrop occurs in places.

This map unit is used mostly for range, woodland, and woodland grazing.

Wildlife habitat is important on this map unit. There are deer, elk, black bear, and several of the furbearers. Cougar prowl the more remote parts. Wild turkey, bobcat, raccoon, rodents, and various small mammals are common, as are a great variety of songbirds and forest grouse. Stream fishing is a prominent activity in the perennial streams.



### 8. Nazaton-Suttler-Telcher

*Very deep, gently sloping to very steep, well drained soils; formed in loess, in granitic residuum and colluvium, and in material derived from basalt*

This map unit is at higher elevations south and east of Riggins, southeast of Slate Creek, south of Grangeville, and around Cottonwood Butte. This map unit covers about 5 percent of the survey area. This unit is about 30 percent Nazaton soils, 15 percent Telcher soils, 10 percent Spokel soils, and 30 percent minor soils. The Nazaton soils are in the lower parts, the Suttler soils are in the higher parts, the Telcher soils are in the wetter and cooler parts, and the Spokel soils are in the driest parts.

Nazaton soils are very steep. Typically, the surface layer is dark grayish brown and dark brown gravelly loam about 20 inches thick. The upper part of the subsoil is brown gravelly loam about 15 inches thick, and the lower part is light yellowish brown and light brown very gravelly loam and light brown very gravelly sandy loam about 15 inches thick. The substratum is light yellowish brown very gravelly sandy loam to a depth of 60 inches or more.

Suttler soils are very steep. Typically, the surface layer is brown loam about 10 inches thick. The upper part of the subsoil is light yellowish brown gravelly loam and gravelly sandy loam about 29 inches thick, and the lower part is light yellowish brown very gravelly sandy loam to a depth of 60 inches or more.

Telcher soils are gently sloping to steep. They formed in loess and material derived from basalt. Typically, the surface layer is yellowish brown silt loam about 12 inches thick. The upper part of the subsoil is yellowish brown and yellow silt loam and silty clay loam about 32 inches thick, and the lower part is very pale brown gravelly loam to a depth of 60 inches.

Spokel soils are very steep. Typically, the surface layer is grayish brown very stony loam about 10 inches thick. The subsoil is pale brown and light yellowish brown very gravelly sandy loam about 28 inches thick. The substratum is light yellowish brown very gravelly loam to a depth of 60 inches.

The minor soils include well drained Klickson, Wapshilla, and Naz soils and somewhat excessively drained Jughandle soils. Rock outcrop occurs in places.

This map unit is used mostly for woodland and woodland grazing.

Wildlife habitat is important on this map unit. There are elk, black bear, and several of the furbearers. Cougar inhabit the more remote parts except upper Cottonwood Butte. There are also bobcat, racoon, and rodents. Various small mammals are common, as are a great variety of songbirds and forest grouse. Fishing is a prominent activity in the perennial streams.

### 9. Jughandle-Brody

*Deep and moderately deep, sloping to very steep, somewhat excessively drained and well drained soils; formed*

*in volcanic ash, in granitic residuum, and in material derived from basalt*

This map unit is at the highest elevations in the survey area around Elk City, southeast of Riggins, south of Grangeville, and at the top of Cottonwood Butte. This unit covers about 6 percent of the survey area. This map unit is about 45 percent Jughandle soils, 30 percent Brody cool soils, and 25 percent minor soils. The Jughandle soils are mostly around Elk City and southeast of Riggins, and the Brody soils are mostly south of Grangeville and around Cottonwood Butte.

Jughandle soils are deep and somewhat excessively drained. They formed in volcanic ash and granitic residuum. Typically, the surface layer is brown loam about 11 inches thick. The underlying material is pale brown and light brown loam and sandy loam about 30 inches thick. Decomposing granitic gneiss is at a depth of 41 inches.

Brody soils are moderately deep, and well drained. They formed in volcanic ash and basalt material. Typically, the surface layer is brown and light brown cobbly loam about 22 inches thick. The subsoil is light yellowish brown and reddish yellow very cobbly loam about 17 inches thick. Basalt bedrock is at a depth of 39 inches.

The minor soils include well drained Wapshilla, Erickson, and Zaza soils. Rock outcrop occurs in places.

This map unit is used mostly for woodland.

Wildlife habitat is important on this map unit. There are elk, black bear, and several of the furbearers. Cougar inhabit the more remote parts except upper Cottonwood Butte. There are also bobcat, racoon, rodents, various small mammals, a great variety of songbirds, and forest grouse. Moose roam near Elk City. Fishing is a prominent activity in the perennial streams.

### Broad land use considerations

The soils in this Area vary widely in their potential for major land uses. About 42 percent of the survey area is range. Most of the range is in map units 6 and 7. The main soils are Bluesprine, Tannahill, and Brower soils.

About 22 percent of the survey area is used for cultivated crops, mainly wheat, barley, and peas. This cropland is concentrated in map units 1, 2, and 3. The main soils in these units are Nez Perce, Uhlorn, Shebang, Boles, Fenn, and Kooskia soils. Erosion by water is the main hazard.

About 5 percent of the survey area is in hay and pasture. Map units 1, 2, 3, 4, and 5 have good potential for grasses and legumes. The major soils in hay and pasture in these units are those used for crops and Suloaf, Telcher, and Erickson soils.

About 30 percent of the survey area is woodland, mostly in map units 4, 5, 7, 8, and 9. The major soils in these units are Klickson, Suloaf, Jughandle, Brody, Telcher, Nazaton, and Suttler soils. Very steep soils, mostly in map units 7, 8, and 9, have severe equipment limitations. About two-thirds of the woodland has potential for grazing.

About 8,740 acres of the survey area (about 1 percent) is urban or built-up areas and water. In general, areas of gently sloping to sloping soils in map units 1, 2, 3, 4, and 5 have the best potential for urban uses. However, most of the soils in map units 1, 2, and 3 have a clayey subsoil with a high shrink-swell potential that must be overcome in designing roads and streets and small buildings. The slow permeability in these soils severely limits septic tank absorption fields. Only small, isolated tracts within map units 6, 7, 8, and 9 can be developed for urban uses.

The potential for recreation ranges from poor to good, depending on the intensity of expected use. Map units 1, 2, 3, 4, and 5 have the best potential for intensive recreational development such as playgrounds and camp areas. The very steep soils that dominate map units 6, 7, 8, and 9 are more suitable for hiking and horseback riding. The scenery in these areas is excellent.

Potential for openland wildlife habitat is good in map units 1, 2, 3, 4, and fair in map unit 5. The potential for woodland wildlife habitat is good in map units 4, 5, 8, and 9. Only a few acres in map units 2, 3, 4, and 5 have some limited potential for habitat for wetland wildlife. Only small isolated areas can be developed as shallow water areas for waterfowl. Waterfowl make limited use of rivers and streams.

## Soil maps for detailed planning

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and management of the soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil, a brief description of the soil profile, and a listing of the principal hazards and limitations to be considered in planning management.

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

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil

phase commonly indicates a feature that affects use or management. For example, Nez Perce silt loam, 2 to 7 percent slopes, is one of several phases in the Nez Perce series.

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

A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Riggins-Meland complex is an example.

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

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

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

Table 7 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

This survey was mapped at two levels of detail. At the most detailed level, map units are narrowly defined. This means that soil boundaries were plotted and verified at closely spaced intervals. At the less detailed level, map units are broadly defined. Soil boundaries were plotted and verified at wider intervals. The broadly defined units are indicated by an asterisk in the soil map legend. The detail of mapping was selected to meet the anticipated long-term use of the survey, and the mapping units were designed to meet the needs for that use.

## Soil descriptions

**1—Banner silt loam, 3 to 7 percent slopes.** This gently sloping soil is on benches and long sloping ridges. It is very deep and well drained. Elevation is 2,000 to 2,600 feet. This soil formed in loess and basalt residuum. The average annual precipitation is about 16 inches,



the average annual air temperature is about 52 degrees F, and the frost-free period is about 170 days.

Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. The subsoil is dark brown and brown silty clay about 25 inches thick. The substratum is very pale brown silty clay loam and yellowish brown gravelly loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Tannahill loam, cobbly areas, and areas of a soil that is similar to Banner soils but that has bedrock at a depth of 40 to 60 inches.

In this Banner soil, permeability is slow. Effective rooting depth is 60 inches or more. Available water capacity is high. The soil is moderately calcareous in the lower part of the subsoil and strongly calcareous in the substratum. Reaction is neutral and moderately alkaline in the surface layer and moderately alkaline and strongly alkaline in the subsoil and substratum. Runoff is medium, and the hazard of erosion is moderate.

This soil is used mainly for hay and pasture. It is also used for range.

This soil is well suited to pasture and hay. Under a high level of management, including a well balanced fertilization program, production is good. Grazing should be rotated during the growing season, and a minimum height of stubble should be maintained. Topar and Luna pubescent wheatgrass and intermediate wheatgrass are suitable for planting.

The potential native vegetation is mainly bluebunch wheatgrass. If range condition declines, the proportion of bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and annual plants become more abundant if range condition declines further. A planned rotation-deferred grazing system is essential in maintaining or improving range condition. Providing adequate stock water is often difficult, especially during the hot, dry, summer. Mechanical seeding is possible.

The use of this soil for septic tank absorption fields is restricted by the slow permeability of the subsoil. The tendency of the soil to be sticky when wet restricts use for sanitary landfills. Slope restricts use for sewage lagoons. The design of roads and dwellings should compensate for the shrink-swell potential of the soil and its inherent low strength. Excavation can be hindered by the high clay content of the subsoil. Slope and the slow permeability of the subsoil can cause erosion in grassed waterways and diversions.

This soil can be used for recreation. However, the surface tends to be dusty when dry.

This soil is in capability subclass IIe.

**2—Banner silt loam, 7 to 12 percent slopes.** This sloping soil is on benches and long sloping ridges. It is very deep and well drained. Elevation is 2,000 to 2,600 feet. This soil formed in loess and basalt residuum. The average annual precipitation is about 16 inches, the average annual air temperature is about 52 degrees F, and the frost-free period is about 170 days.

Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. The subsoil is dark brown and brown silty clay about 25 inches thick. The substratum is very pale brown silty clay loam and yellowish brown gravelly loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Tannahill loam, frequent cobbly spots, and areas of a soil that is similar to Banner soils but that has bedrock at a depth of 40 to 60 inches.

In this Banner soil, permeability is slow. Effective rooting depth is 60 inches or more. Available water capacity is high. The soil is moderately calcareous in the lower part of the subsoil and strongly calcareous in the substratum. Reaction is neutral and moderately alkaline in the surface layer and moderately alkaline and strongly alkaline in the subsoil and substratum. Runoff is rapid, and the hazard of erosion is severe.

This soil is used mainly for hay and pasture. It is also used for range.

This soil is well suited to pasture and hay. Under a high level of management, including a well balanced fertilization program, production is good. Grazing should be rotated during the growing season, and a minimum height of stubble should be maintained. Topar and Luna pubescent wheatgrass and intermediate wheatgrass are suitable for planting.

The potential native vegetation is mainly bluebunch wheatgrass. If range condition declines, the proportion of bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and annual plants become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition. Providing adequate stock water is often a problem, especially during the hot, dry summer. Mechanical seeding is possible.

The use of this soil for septic tank absorption fields is restricted by the slow permeability of the subsoil and by slope. The tendency of the soil to be sticky when wet restricts use for sanitary landfills. The design of roads and dwellings should compensate for the shrink-swell potential of the soil and its inherent low strength. Excavation can be hindered by the high clay content of the subsoil. The construction of ponds is limited by slope. The erodibility of the soil should be considered in designing grassed waterways and diversions.

This soil can be used for recreation. However, the surface tends to be dusty when dry. Slope restricts the use of this soil for playgrounds.

This soil is in capability subclass IIIe.

**3—Banner silt loam, 12 to 25 percent slopes.** This moderately steep soil is on benches and long sloping ridges. It is very deep and well drained. Elevation is 2,000 to 2,600 feet. This soil formed in loess and basalt residuum. The average annual precipitation is about 16 inches, the average annual air temperature is about 52 degrees F, and the frost-free period is about 170 days.

Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. The subsoil is dark brown and



brown silty clay about 25 inches thick. The substratum is very pale brown silty clay loam and yellowish brown gravelly loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Tannahill loam, frequent cobbly spots, and areas of a soil that is similar to Banner soils but that has bedrock at a depth of 40 to 60 inches.

In this Banner soil, permeability is slow. Effective rooting depth is 60 inches or more. Available water capacity is high. The soil is moderately calcareous in the lower part of the subsoil and strongly calcareous in the substratum. Reaction is neutral and moderately alkaline in the surface layer and moderately alkaline and strongly alkaline in the subsoil and substratum. Runoff is rapid, and the hazard of erosion is severe.

This soil is used mainly for hay and pasture. It is also used for range.

This soil is well suited to pasture and hay. Under a high level of management, including a well-balanced fertilization program, production is good. Grazing should be rotated during the growing season and a minimum height of stubble should be maintained. Topar and Luna pubescent wheatgrass and intermediate wheatgrass are suitable for planting.

The potential native vegetation is mainly bluebunch wheatgrass. If range condition declines, the proportion of bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and annual plants become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition. Providing adequate stock water is often a problem, especially during the hot, dry summer. Mechanical seeding is possible.

The use of this soil for septic tank absorption fields is restricted by slope and the slow permeability of the subsoil. Slope and the tendency of the soil to be sticky when wet restrict use for sewage lagoons and sanitary landfills. The design of roads and dwellings should compensate for the shrink-swell potential of the soil, its inherent low strength, and slope. Excavation can be hindered by the high clay content of the subsoil and by slope.

The construction of ponds is limited by slope. Slope and the erodibility of the soil should be considered in designing grassed waterways and diversions.

The surface tends to be dusty when dry, but the soil can be used for paths and trails. Slope is the main restriction for other kinds of recreation.

This soil is in capability subclass IIIe.

**4—Bluesprink-Keuterville association.** This association consists of very steep soils on canyon sides. Slopes are 40 to 90 percent. Elevation is 2,200 to 3,500 feet. This association is about 40 percent Bluesprink very cobbly loam and 25 percent Keuterville very cobbly loam. The Bluesprink soil is south facing and the Keuterville soil is north facing.

Included with these soils in mapping are small areas where slopes are less than 40 percent and small areas

of Klickson cobbly loam, Suloaf cobbly silt loam, Rock outcrop, and soils that have bedrock at a depth of 40 to 60 inches.

The Bluesprink soil is moderately deep and well drained. It formed in loess and colluvium and residuum from basic igneous rock, mainly basalt and andesite. The average annual precipitation is about 18 inches, the average annual air temperature is about 48 degrees F, and the frost-free period is about 140 days.

Typically the surface layer is dark grayish brown very cobbly loam about 12 inches thick. The subsoil is dark yellowish brown very cobbly clay loam about 19 inches thick. Bedrock is at a depth of 31 inches.

Permeability is moderately slow. The effective rooting depth is 20 to 40 inches. Available water capacity is low. Reaction is slightly acid and neutral throughout. Runoff is very rapid, and the hazard of erosion is very severe.

The Keuterville soil is very deep and well drained. It formed in basalt residuum and colluvium that have some loess mixed into the upper part. The average annual precipitation is about 24 inches, the average annual air temperature is about 47 degrees F, and the frost-free period is about 125 days.

Typically, the surface layer is dark brown very cobbly loam about 10 inches thick. The upper part of the subsoil is brown gravelly loam about 8 inches thick, and the lower part is brown very gravelly silty clay loam and strong brown cobbly loam to a depth of 60 inches.

Permeability is moderately slow. Effective rooting depth is 60 or more inches. Available water capacity is low. Reaction is slightly acid and neutral. Runoff is rapid and very rapid, and the hazard of erosion is severe and very severe.

The Bluesprink soil is used for range, and the Keuterville soil is used for woodland and woodland grazing.

The potential native vegetation on the Bluesprink soil is mainly bluebunch wheatgrass and Idaho fescue. If range condition declines, the proportion of bluebunch wheatgrass and Idaho fescue decreases and the proportion of forbs and shrubs increases. Weeds and annual plants become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition. Potential forage production is good. Providing adequate stock water is often a problem, especially during the hot, dry summer.

The Keuterville soil is suited to ponderosa pine. It can produce about 3,400 cubic feet of wood per acre from trees 0.6 inch and more in diameter in 40 years, or it can produce 38,000 board feet (Scribner rule) of merchantable timber 11.6 inches or more in diameter in 130 years in an unmanaged stand based on the culmination of the mean annual increment. The main problems in managing timber are the very steep slopes and very severe erosion hazard. This soil is too steep for conventional methods of tree harvest. Special logging methods that cause the least soil disturbance should be used to prevent excessive soil loss. Road construction is also restricted by the very steep slopes.

The Keuterville soil has excellent potential for producing forage. The overstory is normally quite open, allowing ample light to reach the understory. The potential native understory is mainly pine reedgrass, bluebunch wheatgrass, white spirea, and snowberry. If grazing is excessive, the proportion of bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and annual plants become more abundant if grazing condition declines further.

The vegetation should be managed to permit timber regeneration and to maintain enough litter for soil protection. A planned grazing system is essential for maintaining or improving grazing condition.

The very steep slopes limit movement of livestock and accessibility of forage. This soil will produce forage almost continually if managed as woodland. Depending on the level of management annual production will vary from 1,500 pounds of air-dry herbage per acre to less than 440 pounds.

The very steep slopes restrict the use of these soils for all construction and recreation.

This association is in capability subclass VIIe.

**5—Bluesprin-Klickson association.** This association consists of very steep soils in canyons and on mountains. Slopes are 40 to 90 percent. Elevation is 2,200 to 5,000 feet. This association is about 50 percent Bluesprin very cobbly loam and 20 percent Klickson silt loam. The Bluesprin soil is south facing, and the Klickson soil is north facing.

Included with these soils in mapping are small areas of Lawyer silt loam, Suloaf silt loam, Keuterville very cobbly loam, and Rock outcrop. Also included are areas of a soil that is similar to Bluesprin soils but that is deeper to bedrock and areas of a soil that is similar to Klickson soils but that is shallower to bedrock.

The Bluesprin soil is moderately deep and well drained. It formed in loess and colluvium and residuum from basic igneous rock, mainly basalt and andesite. The average annual precipitation is about 18 inches, the average annual air temperature is about 48 degrees F, and the frost-free period is about 140 days.

Typically the surface layer is dark grayish brown very cobbly loam about 12 inches thick. The subsoil is dark yellowish brown very cobbly clay loam about 19 inches thick. Bedrock is at a depth of 31 inches.

Permeability is moderately slow. The effective rooting depth is 20 to 40 inches. Available water capacity is low. Reaction is slightly acid and neutral throughout. Runoff is very rapid, and the hazard of erosion is very severe.

The Klickson soil is very deep and well drained. It formed in loess and colluvium and residuum from basic igneous rocks. The average annual precipitation is about 26 inches, the average annual air temperature is about 42 degrees F, and the frost-free period is about 80 days.

Typically, the surface layer is dark grayish brown and brown silt loam about 15 inches thick. The upper part of the subsoil is brown cobbly silt loam and cobbly loam

about 36 inches thick, and the lower part is brown very cobbly clay to a depth of 60 inches or more. The very cobbly clay subsoil layer is absent in some areas.

Permeability is moderate. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Reaction is slightly acid. Runoff is very rapid, and the hazard of erosion is very severe.

The Bluesprin soil is used for range, and the Klickson soil is used for woodland and woodland grazing.

The potential native vegetation on the Bluesprin soil is mainly bluebunch wheatgrass and Idaho fescue. If range condition declines, the proportion of bluebunch wheatgrass and Idaho fescue decreases and the proportion of forbs and shrubs increases. Weeds and annual plants become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition. Potential forage production is good, but the very steep slopes limit movement of livestock and accessibility of forage. Providing adequate stock water is often a problem, especially during the hot, dry summer.

The Klickson soil is suited to Douglas-fir and ponderosa pine. It can produce about 4,100 cubic feet of wood per acre from trees 0.6 inch and more in diameter in 40 years, or it can produce 44,600 board feet (Scribner rule) of merchantable timber 11.6 inches and more in diameter in 120 years in an unmanaged stand based on the culmination of the mean annual increment. The main problems in managing timber are the very steep slopes and very severe erosion hazard. This soil is too steep for conventional methods of tree harvest. Specialized logging methods that cause the least soil disturbance should be used to prevent excessive soil loss. Road construction is also restricted by the very steep slopes.

The Klickson soil has potential for producing forage if the canopy is opened by logging, fire, or other disturbance. When the canopy is open or sparse, the main native forage plants include elk sedge, pine reedgrass, and rose. Forage production can be increased and soil protected by seeding disturbed areas to suitable grasses such as orchardgrass, timothy, and tall fescue. The vegetation should be managed to permit timber regeneration and to maintain enough litter for soil protection. The very steep slopes limit movement of livestock and accessibility of forage. This soil will produce forage for 15 to 25 years following opening of the canopy. During this period, annual production will vary from about 2,200 pounds of air-dry herbage per acre under an open canopy to less than 350 pounds as the canopy closes.

The very steep slopes restrict use of these soils for all construction and recreation.

This soil is in capability subclass VIIe.

**6—Bluesprin-Lawyer association.** This association consists of very steep, convex soils on canyon sides. Slopes are 40 to 90 percent. Elevation is 2,400 to 4,000 feet. This association is about 50 percent Bluesprin very cobbly loam and 20 percent Lawyer silt loam. The Blues-



prin soil is south facing, and the Lawyer soil is north facing.

Included with these soils in mapping are small areas of Keuterville very cobbly loam, Riggins very gravelly silt loam, Tannahill very cobbly loam, and Rock outcrop. The Riggins and Tannahill soils and Rock outcrop are mainly in areas of the Bluesprin soils. The Keuterville soils are mainly in areas of the Lawyer soils.

The Bluesprin soil is moderately deep and well drained. It formed in loess and colluvium and residuum from basic igneous rock, mainly basalt and andesite. The average annual precipitation is about 18 inches, the average annual air temperature is about 48 degrees F, and the frost-free period is about 140 days.

Typically, the surface layer is dark grayish brown very cobbly loam about 12 inches thick. The subsoil is dark yellowish brown very cobbly clay loam about 19 inches thick. Bedrock is at a depth of 31 inches.

Permeability is moderately slow. The effective rooting depth is 20 to 40 inches. Available water capacity is low. Reaction is slightly acid and neutral throughout. Runoff is very rapid, and the hazard of erosion is very severe.

The Lawyer soil is very deep and well drained. It formed in loess mixed with colluvium and residuum from basic igneous rocks. The average annual precipitation is about 20 inches, the average annual air temperature is about 47 degrees F, and the frost-free period is about 130 days.

Typically, the surface layer is very dark grayish brown silt loam and gravelly loam about 23 inches thick. The subsoil is dark grayish brown and brown very gravelly clay loam to a depth of 72 inches.

Permeability is slow. The effective rooting depth is 60 inches or more. Available water capacity is moderate. Reaction is neutral. Runoff is very rapid, and the hazard of erosion is very severe.

This association is used for range.

The potential native vegetation on the Bluesprin soil is mainly bluebunch wheatgrass and Idaho fescue. If range condition declines, the proportion of bluebunch wheatgrass and Idaho fescue decreases and the proportion of forbs and shrubs increases. Weeds and annual plants become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition. Potential forage production is good, but the very steep slopes limit movement of livestock and accessibility of forage. Providing adequate stock water is often a problem, especially during the hot, dry summer.

The potential native vegetation on the Lawyer soil is mainly Idaho fescue, bluebunch wheatgrass, and many forbs. If range condition declines, the proportion of Idaho fescue and bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and sod-forming bluegrass become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition. This soil should be avoided during wet, freezing weather

to reduce the hazard of livestock injury caused by slipping and falling. Forage production is excellent, but the very steep slopes limit movement of livestock and accessibility of forage.

The very steep slopes restrict use of these soils for all construction and recreation.

This association is in capability subclass VIIe.

**7—Bluesprin-Rock outcrop complex.** This complex consists of very steep, south-facing soils and Rock outcrop canyonsides (fig. 2). Slopes are 40 to 90 percent. Elevation is 2,200 to 5,000 feet. This complex is about 45 percent Bluesprin very cobbly loam and 25 percent Rock outcrop.

Included in mapping are small areas of Ferdinand very cobbly loam and Riggins very gravelly silt loam.

The Bluesprin soil is moderately deep and well drained. It formed in loess and residuum and colluvium from Columbia River Basalt or Seven Devils Volcanics. The average annual precipitation is about 18 inches, the average annual air temperature is about 48 degrees F, and the frost-free period is about 140 days.

Typically, the surface layer is dark grayish brown very cobbly loam about 12 inches thick. The subsoil is dark yellowish brown very cobbly clay loam about 19 inches thick. Bedrock is at a depth of about 31 inches.

Permeability is moderately slow. The effective rooting depth is 20 to 40 inches. Available water capacity is low. Reaction is slightly acid and neutral throughout. Runoff is very rapid, and the hazard of erosion is very severe.

Rock outcrop consists of Columbia River Basalt or Seven Devils Volcanics.

This complex is used for range.

The potential native vegetation on the Bluesprin soil is mainly bluebunch wheatgrass and Idaho fescue. If range condition declines, the proportion of bluebunch wheatgrass and Idaho fescue decreases and the proportion of unpalatable forbs and shrubs increases. Weeds and annual plants become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition. Potential forage production is good, but the very steep slopes and Rock outcrop limit movement of livestock and accessibility of forage. Providing adequate stock water is often a problem, especially during the hot, dry summer.

The very steep slopes and Rock outcrop restrict use of this complex for all construction and recreation.

This complex is in capability subclass VIIe.

**8—Boles silt loam, 3 to 7 percent slopes.** This gently sloping soil is on timbered plateaus. It is very deep and moderately well drained. Elevation is 3,500 to 4,500 feet. This soil formed mainly in loess that contains some residuum from Columbia River Basalt. The average annual precipitation is about 23 inches, the average annual air temperature is about 43 degrees F, and the frost-free period is about 100 days.

Typically the surface layer is dark grayish brown and very dark grayish brown silt loam about 9 inches thick.





Figure 2.—Area of Bluesprin-Rock outcrop complex, which is south facing.

The subsoil is dark brown silt loam about 5 inches thick. The buried subsurface layer is light gray silt loam about 5 inches thick. The buried subsoil is dark grayish brown and brown silty clay and brown clay to a depth of 60 inches or more.

Included with this soil in mapping are small areas of a soil that is similar to Boles soils but that lacks an A2 horizon, areas of De Masters silt loam, and areas where slopes are more than 7 percent.

In this Boles soil, permeability is slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is slightly acid and neutral throughout. Runoff is medium, and the hazard of erosion is moderate. A seasonal perched water table is at a depth of 1.5 to 2.5 feet.

This soil is used mainly for hay (fig. 3), pasture, barley, and winter wheat. It is also used for woodland and woodland grazing.

The use of this soil for crops is limited mainly by the hazard of erosion. Production is good. Soil can be conserved by growing annual crops such as small grains or forage crops, practicing minimum tillage, and returning crop residue to the soil. Nitrogen, sulfur, and sometimes phosphorus are necessary. Weed control is important. Grassed waterways prevent formation of gullies in the natural drainageways. Grasses and legumes are beneficial and are good alternative crops.

After timber is harvested from this soil the area can be converted to pasture and hay. Under a high level of management, production is good. A well-balanced fertilization program is needed. Nitrogen and sulfur are essential. If legumes are included in the stand, phosphorus is also needed. Grazing should be rotated during the growing season to maintain a minimum height stubble. Latar orchardgrass, manchar smooth brome, intermediate wheatgrass, and Regar brome are suitable for grazing.





Figure 3.—Area of Boles soils cleared of ponderosa pine and seeded to alfalfa hay.

This soil is suited to ponderosa pine. It can produce about 2,750 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 40 years, or it can produce 31,500 board feet (Scribner rule) of merchantable timber 11.6 inches or more in diameter in 140 years in an unmanaged stand based on the culmination of the mean annual increment. Conventional methods can be used for tree harvest.

This soil has excellent potential for producing forage. The overstory is normally quite open, allowing light to reach the understory. The potential native understory is mainly bluebunch wheatgrass, Idaho fescue, common snowberry, and arrowleaf balsamroot. If grazing is excessive, the proportion of Idaho fescue and bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and annual plants become more abundant if grazing condition declines further. The vegetation should be managed to permit timber regeneration and to maintain enough litter for soil protection. A planned grazing system is essential for maintaining or improving forage value. This soil will produce forage for livestock almost continually if managed as a woodlot.

Depending on the level of management, annual production varies from 2,000 pounds of air-dry herbage per acre to less than 500 pounds.

The use of this soil for septic tank absorption fields is restricted by the slow permeability of the subsoil and the seasonal perched water table. Sewage lagoon construction is restricted by slope. Sanitary landfill construction is restricted by the seasonal high water table and the tendency of the soil to be sticky when wet. The design of roads and dwellings should compensate for the shrink-swell potential of the soil and its inherent low strength. Excavation can be hindered by the high clay content of the subsoil. This soil is a suitable source of topsoil. Embankment construction is restricted by the inherent low strength of the soil and its shrink-swell potential. Slope and the erodibility of the soil should be considered in designing grassed waterways.

This soil is suited to most kinds of recreation, but the surface tends to be dusty when dry. Slope restricts use for playgrounds.

This soil is in capability subclass IIe.

**9—Boles silt loam, 7 to 25 percent slopes.** This sloping and moderately steep soil is on timbered plateaus. It is very deep and moderately well drained. Elevation is 3,500 to 4,500 feet. This soil formed mainly in loess that contains some residuum weathered from Columbia River Basalt. The average annual precipitation is about 23 inches, the average annual air temperature is about 43 degrees F, and the frost-free period is about 100 days.

Typically, the surface layer is dark grayish brown and very dark grayish brown silt loam about 9 inches thick. The subsoil is dark brown silt loam about 5 inches thick. The buried subsurface layer is light gray silt loam about 5 inches thick. The buried subsoil is dark grayish brown and brown silty clay and brown clay to a depth of 60 inches or more. A seasonal perched water table is at a depth of 1.5 to 2.5 feet.

Included with this soil in mapping are small areas of a soil that is similar to Boles soils but that lacks an A2 horizon, areas of De Masters silt loam, and areas where slopes are less than 7 percent.

In this Boles soil, permeability is slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is slightly acid and neutral throughout. Runoff is rapid, and the hazard of erosion is severe.

This soil is used mainly for hay, pasture, barley, and winter wheat. It is also used for woodland and woodland grazing.

The use of this soil for crops is limited mainly by the hazard of erosion. Production is good. Soil can be conserved by growing small grains or forage crops, practicing minimum tillage, returning crop residue to the soil, and cross-slope planting. Contour farming, divided-slope farming, field stripcropping, and building terraces and structures for water and sediment control also reduce erosion. Nitrogen, sulfur, and sometimes phosphorus are necessary. Weed control is important. Grassed waterways prevent formation of gullies in the natural drainageways. Grasses and legumes are beneficial and are good alternative crops.

After timber is harvested from this soil, the area can be converted to pasture and hay. Under a high level of management, production is good. A well balanced fertilization program is needed. Nitrogen and sulfur are essential. If legumes are included in the stand, phosphorus is also needed. Grazing should be rotated during the growing season to maintain minimum height of stubble. Latar orchardgrass, Manchar smooth brome, intermediate wheatgrass, and Regar brome are suitable for planting.

This soil is suited to ponderosa pine. It can produce about 2,750 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 40 years, or it can produce 31,500 board feet (Scribner rule) of merchantable timber 11.6 inches or more in diameter in 140 years in an unmanaged stand based on the culmination of the mean annual increment. Conventional methods can be used for tree harvest, but logging roads, skid trails, and landings should be carefully planned to minimize soil loss.

This soil has excellent potential for producing forage. The overstory is normally quite open, allowing light to reach the understory. The potential native understory is mainly bluebunch wheatgrass, Idaho fescue, common snowberry, and arrowleaf balsamroot. If grazing is excessive, the proportion of Idaho fescue and bluebunch wheatgrass decreases and the proportion of less palatable forbs and shrubs increases. Weeds and annual plants become more abundant if grazing condition declines further. The vegetation should be managed to permit timber regeneration and maintain enough litter for soil protection. A planned grazing system is essential for maintaining or improving forage value. This soil will produce forage for livestock almost continually if managed as a woodlot. Depending on the level of management, annual production varies from 2,000 pounds of air-dry herbage per acre to less than 500 pounds.

The use of this soil for septic tank absorption fields is restricted by the slow permeability of the subsoil, the seasonal perched water table, and slope. Construction of sewage lagoons is restricted by slope. Sanitary landfill construction is restricted by the seasonal high water table, slope, and the tendency of the soil to be sticky when wet. The design of roads and dwellings should compensate for the shrink-swell potential of the soil, its inherent low strength, and slope. Excavation can be hindered by the high clay content of the subsoil and by slope. In the flatter areas, this soil is suitable as a source of topsoil. The wetness, slope, and the erodibility of the soil should be considered in designing grassed waterways.

This soil can be used for paths and trails. Slope restricts use for playgrounds, campsites, and picnic areas.

This soil is in capability subclass IIIe.

**10—Brody cobbly loam, cool, 12 to 40 percent slopes.** This moderately steep and steep soil is on mountainsides. It is moderately deep and well drained. Elevation is 3,800 to 7,000 feet. This soil formed in volcanic ash and residuum and colluvium from Columbia River Basalt and Seven Devils Volcanics. The average annual precipitation is about 34 inches, the average annual air temperature is about 38 degrees F, and the frost-free period is about 60 days.

Typically, the surface layer is brown and light brown cobbly loam about 22 inches thick. The subsoil is light yellowish brown and reddish yellow very cobbly loam about 17 inches thick. Bedrock is at a depth of about 39 inches.

Included with this soil in mapping are small areas of a soil that is similar to Brody soils but that has less than 35 percent rock fragments in the subsoil. Also included are small areas of Brody loam, cool, Wapshilla loam, and Zaza loam.

In this Brody soil, permeability is moderate. Effective rooting depth is 20 to 40 inches. Available water capacity is low. Reaction is medium acid and slightly acid throughout. Runoff is very rapid, and the hazard of erosion is very severe.



This soil is used for woodland and woodland grazing.

After timber is harvested from this soil, the area can be converted to pasture. Under a high level of management, production is good. A well balanced fertilization program is needed. Nitrogen and sulfur are essential. If legumes are included in the stand, phosphorus is also needed. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Regar brome, smooth brome, and tall fescue are suitable for grazing.

This soil is suited to grand fir, Douglas-fir, western larch, lodgepole pine, and spruce. It can produce about 11,850 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 100 years, or it can produce 70,500 board feet (Scribner rule) of merchantable timber 12.6 inches or more in diameter in 140 years in an unmanaged mixed conifer stand, based on the culmination of the mean annual increment. The main problem in managing timber is the erosion hazard. Conventional methods can be used for tree harvest, but logging roads, skid trails, and landings must be carefully planned to minimize soil loss.

This soil has potential for producing forage if the canopy is opened by fire or logging. When the canopy is sparse and open, the main native forage plants include elk sedge, Columbia brome, and redstem ceanothus. Forage production can be increased and soil protected by seeding disturbed areas to suitable plants such as timothy, tall fescue, and White Dutch clover. The vegetation should be managed to permit timber regeneration and maintain enough litter for soil protection. Once the canopy is opened this soil will produce forage for 10 to 15 years. During this period, annual production will vary from about 1,500 pounds of air-dry herbage per acre under an open canopy to less than 200 pounds as the canopy closes.

The main restrictions on the use of this soil for homesites and sanitary facilities are depth to rock and slope. The designs of roads and dwellings should compensate for the depth to rock and slope. Slope and the depth to rock should be considered in designing terraces and diversions.

This soil can be used for paths and trails. Slope and the tendency of the surface to be dusty when dry restrict use for most kinds of recreation.

This soil is in capability subclass VIe.

**11—Brody-Telcher complex.** This complex consists of moderately steep and steep soils on high timbered plateaus and mountain footslopes. Slopes are 12 to 40 percent. Elevation is 3,800 to 4,500 feet. This complex is about 45 percent Brody loam, cool, and 35 percent Telcher silt loam.

Included with these soils in mapping are small areas of a soil that is similar to Brody soils but that has less than 35 percent rock fragments in the subsoil and small areas of Wapshilla loam.

The Brody soil is moderately deep and well drained. It formed in volcanic ash and residuum and colluvium

weathered from Columbia River Basalt and Seven Devils Volcanics. The mean annual precipitation is about 34 inches, the mean annual air temperature is about 38 degrees F, and the frost-free period is about 60 days.

Typically, the surface layer is brown and light brown loam about 22 inches thick. The subsoil is light yellowish brown and reddish yellow very cobbly loam about 17 inches thick. Bedrock is at a depth of 39 inches.

Permeability is moderate. Effective rooting depth is 20 to 40 inches. Available water capacity is low. Reaction is medium acid and slightly acid throughout. Runoff is very rapid, and the hazard of erosion is very severe.

The Telcher soil is very deep and well drained. It formed in loess and residuum from Columbia River Basalt and Seven Devils Volcanics. The average annual precipitation is about 28 inches, the average annual air temperature is about 42 degrees F, and the frost-free period is about 90 days.

Typically, the surface layer is yellowish brown silt loam about 12 inches thick. The subsurface layer is light yellowish brown silt loam about 8 inches thick. The upper part of the subsoil is light yellowish brown and yellow silty clay loam about 24 inches thick, and the lower part is very pale brown gravelly clay loam to a depth of 60 inches.

Permeability is moderately slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is neutral above a depth of 6 inches and slightly acid below that depth. Runoff is very rapid, and the hazard of erosion is very severe.

This complex is used mainly for woodland and woodland grazing. It is also used for hay and pasture.

After timber is harvested from these soils the area can be converted to pasture or hay. Under a high level of management, production is good. A well balanced fertilization program is needed. Nitrogen and sulfur are essential. If legumes are included in the stand, phosphorus is also needed. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Regar brome, smooth brome, tall fescue, and intermediate wheatgrass are suitable for planting, as are clovers, trefoil, and alfalfa. Latar orchardgrass is also suitable for planting on the Telcher soil.

The Brody soil is suited to grand fir, Douglas-fir, western larch, lodgepole pine, and spruce. The Telcher soil is suited to grand fir, Douglas-fir, and ponderosa pine. Both soils produce about 11,850 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 100 years, or they can produce 70,500 board feet (Scribner rule) of merchantable timber 12.6 inches or more in diameter in 140 years in an unmanaged mixed conifer stand based on the culmination of the mean annual increment. The main problem in managing these soils for timber is the erosion hazard. Conventional methods can be used for tree harvest, but logging roads, skid trails, and landings must be carefully planned to minimize soil loss.

These soils have potential for producing forage if the canopy is opened by fire or logging. When the canopy is



sparse or open, native forage plants include Columbia brome, elk sedge, snowberry, and redstem ceanothus. Forage production can be increased by seeding disturbed areas to suitable plants such as timothy, tall fescue, orchardgrass, and White Dutch clover. The vegetation should be managed to permit timber regeneration and maintain enough litter for soil protection. Once the canopy is opened these soils will produce forage for 10 to 20 years. During this period, annual production will vary from about 1,700 pounds of air-dry herbage per acre under an open canopy to less than 250 pounds as the canopy closes.

Use of these soils for homesites and sanitary facilities is restricted by slope, by the moderately slow permeability in the subsoil of the Telcher soil, and by the depth to rock in the Brody soil. Roads and dwellings are restricted by the depth to rock in the Brody soil and the shrink-swell potential of the Telcher soil and by slope.

Slope restricts use of these soils for recreation. Paths and trails can be developed in the flatter areas.

This complex is in capability subclass VIe.

**12—Brody-Wapshilla association.** This association consists of very steep soils on mountainsides. Slopes are 40 to 90 percent. Elevation is 3,800 to 5,000 feet. This association is about 50 percent Brody cobbly loam, cool, and 30 percent Wapshilla loam. The Brody soil is north facing, and the Wapshilla soil is south facing.

Included with these soils in mapping are small areas of Zaza loam, and Rock outcrop and areas where slopes are less than 40 percent.

The Brody soil is moderately deep and well drained. It formed in volcanic ash residuum and colluvium weathered from Columbia River Basalt and Seven Devils Volcanics. The average annual precipitation is about 34 inches, the average annual air temperature is about 38 degrees F, and the frost free period is about 60 days.

Typically, the surface layer is brown and light brown cobbly loam about 22 inches thick. The subsoil is light yellowish brown and reddish yellow very cobbly loam about 17 inches thick. Bedrock is at a depth of 39 inches.

Permeability is moderate. Effective rooting depth is 20 to 40 inches. Available water capacity is low. Reaction is medium acid and slightly acid throughout. Runoff is very rapid, and the hazard of erosion is very severe.

The Wapshilla soil is very deep and well drained. It formed in loess mixed with basalt residuum and colluvium. The average annual precipitation is about 28 inches, the average annual air temperature is about 42 degrees F, and the frost-free period is about 90 days.

Typically, the surface layer is brown loam about 14 inches thick. The subsoil is light brown gravelly loam and light yellowish brown very gravelly loam to a depth of 60 inches.

Permeability is moderate. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Reaction is medium acid in the upper part of the surface

layer and slightly acid and neutral below. Runoff is very rapid, and the hazard of erosion is very severe.

This association is used for woodland and woodland grazing.

The Brody soil is suited to Douglas-fir, grand fir, western larch, lodgepole pine, and spruce. The Wapshilla soil is suited to grand fir, Douglas-fir, western larch, lodgepole pine, and ponderosa pine. They can produce about 11,850 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 100 years, or they can produce 70,500 board feet (Scribner rule) of merchantable timber 12.6 inches or more in diameter in 140 years in an unmanaged mixed conifer stand based on the culmination of the mean annual increment. The main problems in managing these soils for timber are the very steep slopes, very severe erosion hazard, and depth to rock. These soils are too steep for conventional methods of tree harvest. Specialized logging methods that cause the least soil disturbance should be used to prevent excessive soil loss. Road construction is also restricted by the very steep slopes and depth to rock.

These soils have potential for producing forage if the canopy is opened by fire or logging. When the canopy is sparse or open, the main native forage plants include Columbia brome, elk sedge, snowberry, and redstem ceanothus. Forage production can be increased by seeding disturbed areas to suitable plants such as timothy, tall fescue, orchardgrass, and White Dutch clover. The vegetation should be managed to permit timber regeneration and maintain enough litter for soil protection. Once the canopy is opened these soils will produce forage for 10 to 20 years. During this period, the annual production will vary from about 1,700 pounds of air-dry herbage per acre under an open canopy to less than 100 pounds as the canopy closes.

The very steep slopes restrict the use of these soils for all construction and recreation.

This association is in capability subclass VIIe.

**13—Brower very gravelly loam, 40 to 90 percent slopes.** This steep and very steep, south facing soil is on canyonsides. It is very deep and well drained. Elevation is 1,700 to 4,500 feet. This soil formed in colluvium and residuum from granitic rocks and some loess. The average annual precipitation is about 20 inches, the average annual air temperature is about 49 degrees F, and the frost-free period is about 140 days.

Typically, the upper part of the surface layer is brown very gravelly loam about 9 inches thick, and the lower part is grayish brown very gravelly loam about 16 inches thick. The underlying material is brown very gravelly loam to a depth of 60 inches.

Included with this soil in mapping are small areas of Spokel very gravelly loam, Nazaton gravelly silt loam, and Rock outcrop of granite and some limestone. Also included are areas of a soil that is similar to Brower very gravelly loam but that is more shallow to bedrock.

In this Brower soil, permeability is moderate. Effective rooting depth is 60 inches or more. Available water ca-



capacity is low. Reaction is neutral throughout. Runoff is very rapid, and the hazard of erosion is very severe.

This soil is used for range.

The potential native vegetation is mainly bluebunch wheatgrass, Idaho fescue, arrowleaf balsamroot, and lupine. If range condition declines, the proportion of bluebunch wheatgrass and Idaho fescue decreases and the proportion of forbs and shrubs increases. Weeds, shrubs, and annuals become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition. The very steep slopes limit movement of livestock and accessibility of forage.

The very steep slopes restrict use of this soil for all construction and recreation.

This soil is in capability subclass VIIe.

**14—Brower-Brownlee complex.** This complex consists of moderately steep and steep soils on steptoes. Slopes are 12 to 40 percent. Elevation is 3,000 to 4,200 feet. This complex is about 50 percent Brower very gravelly loam and 25 percent Brownlee loam.

Included with these soils in mapping are small areas of Brownlee soils having slopes of less than 12 percent and small areas of Nez Perce loam and Rock outcrop.

The Brower soil is very deep and well drained. It formed in colluvium and residuum weathered from granitic rocks and some loess. The average annual precipitation is about 20 inches, the average annual air temperature is about 49 degrees F, and the frost-free period is about 140 days.

Typically, the upper part of the surface layer is brown very gravelly loam about 9 inches thick, and the lower part is grayish brown very gravelly loam about 16 inches thick. The underlying material is brown very gravelly loam to a depth of 60 inches.

Permeability is moderate. Effective rooting depth is 60 inches or more. Available water capacity is low. Reaction is neutral. Runoff is rapid and very rapid, and the hazard of erosion is severe and very severe.

The Brownlee soil is deep and well drained. It formed in residuum and colluvium weathered from granitic rocks with some loess in the upper part. The mean annual precipitation is about 22 inches, the mean annual air temperature is about 47 degrees F, and the frost-free period is about 120 days.

Typically, the surface layer is dark gray loam about 8 inches thick. The subsoil is dark grayish brown and pale brown clay loam and loam about 34 inches thick. Decomposing granitic bedrock is at a depth of 42 inches.

Permeability is moderately slow. Effective rooting depth is 40 to 60 inches. Available water capacity is moderate. Reaction is neutral in the surface layer and neutral and slightly acid in the subsoil. Runoff is rapid and very rapid, and the hazard of erosion is severe and very severe.

This complex is used for range.

The potential native vegetation on these soils is mainly bluebunch wheatgrass, Idaho fescue, arrowleaf balsam-

root, and lupine. If range condition declines, the proportion of bluebunch wheatgrass and Idaho fescue decreases and the proportion of forbs and shrubs increases. Weeds, shrubs, and annuals become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition.

The main restriction on use of these soils for homesites, sanitary facilities, and shallow excavations is slope. In areas of high population density, use of community sewage systems should be considered. The design of roads should compensate for slope and for the inherent low strength of the Brownlee soil. Slope restricts use of the Brownlee soil as a source of topsoil.

Use of these soils for recreation is restricted mainly by small stones in the Brower soil and by slope. The Brownlee soil is suited to paths and trails and picnic sites in the flatter areas.

This complex is in capability subclass IVe.

**15—Brower-Rock outcrop complex.** This complex consists of very steep, south-facing soils and Rock outcrop on canyonsides. Slopes are 40 to 90 percent. Elevation is 1,700 to 4,500 feet. This complex is about 50 percent Brower very gravelly loam and 25 percent Rock outcrop.

Included in mapping are small areas of a soil that is similar to Brower soils but that is more shallow to bedrock and small areas of Spokel very gravelly loam.

The Brower soil is very deep and well drained. It formed in colluvium and residuum weathered from granitic rocks and some loess. The average annual precipitation is about 20 inches, the average annual air temperature is about 49 degrees F, and the frost-free period is about 140 days.

Typically, the upper part of the surface layer is brown very gravelly loam about 9 inches thick, and the lower part is grayish brown very gravelly loam about 16 inches thick. The underlying material is brown very gravelly loam to a depth of 60 inches.

Permeability is moderate. The effective rooting depth is 60 inches or more. Available water capacity is low. Reaction is neutral. Runoff is very rapid, and the hazard of erosion is very severe.

Rock outcrop consists of schist, gneiss, or similar granitic rock. Around Lucile, there are outcroppings of limestone.

This complex is used for range.

The potential native vegetation on the Brower soil is mainly bluebunch wheatgrass, Idaho fescue, arrowleaf balsamroot, and lupine. If range condition declines, the proportion of bluebunch wheatgrass and Idaho fescue decreases and the proportion of forbs and shrubs increases. Weeds, shrubs, and annuals become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition. The very steep slopes and Rock outcrop limit movement of livestock and accessibility of forage.



The very steep slopes and Rock outcrop restrict the use of this complex for all construction and recreation. This complex is in capability subclass VIIe.

**16—Brownlee loam, 2 to 7 percent slopes.** This gently sloping, south-facing soil is on steptoes. It is deep and well drained. Elevation is 3,000 to 4,500 feet. This soil formed in residuum and colluvium weathered from granitic rocks with some loess in the upper part. The average annual precipitation is about 22 inches, the average annual air temperature is about 47 degrees F, and the frost-free period is about 120 days.

Typically, the surface layer is dark gray loam about 8 inches thick. The subsoil is dark grayish brown and pale brown clay loam and loam about 34 inches thick. Decomposing granitic bedrock is at a depth of 42 inches.

Included with this soil in mapping are small areas of Nez Perce loam and Uhlorn silt loam.

In this Brownlee soil, permeability is moderately slow. Effective rooting depth is 40 to 60 inches. Available water capacity is moderate. Reaction is neutral in the surface layer and neutral and slightly acid in the subsoil. Runoff is medium, and the hazard of erosion is moderate.

This soil is used mainly for winter wheat, barley, and some hay and pasture. It is also used for range.

The use of this soil for crops is limited mainly by the hazard of erosion. Occasional rocky patches interfere with cropping. Production is good. Soil can be conserved by continuously growing small grains and forage crops, practicing minimum tillage, and returning crop residue to the soil. Grassed waterways prevent formation of gullies in the natural drainageways. Nitrogen, sulfur, and sometimes phosphorus are necessary. Weed control is important. Grasses and legumes are beneficial and are good alternative crops.

This soil is well suited to pasture and hay. Under a high level of management production is good. A well balanced fertilization program is needed. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Orchardgrass, brome, intermediate wheatgrass, and alfalfa are suitable for planting.

The potential native vegetation is mainly bluebunch wheatgrass, Idaho fescue, lupine, and arrowleaf balsamroot. If range condition declines, the proportion of Idaho fescue and bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Undesirable weeds and shrubs become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition.

The main restrictions on the use of this soil for homesites are low strength and shrink-swell potential. The installation of sanitary facilities is restricted by the depth to rock. Septic tank absorption fields are also restricted by the moderately slow permeability of the subsoil. The design of roads should compensate for the low strength. This soil is suitable for grassed waterways and diversions. Pond construction is restricted because only a thin layer is suitable for the embankment.

This soil is well suited to most kinds of recreation. This soil is in capability subclass IIe.

**17—Brownlee loam, 7 to 12 percent slopes.** This sloping soil is on south-facing steptoes. It is deep and well drained. Elevation is 3,000 to 4,500 feet. This soil formed in residuum and colluvium weathered from granitic rocks and some loess in the upper part. The mean annual precipitation is about 22 inches, the mean annual air temperature is about 47 degrees F, and the frost-free period is about 120 days.

Typically, the surface layer is dark gray loam about 8 inches thick. The subsoil is dark grayish brown and pale brown clay loam and loam about 34 inches thick. Decomposing granitic bedrock is at a depth of 42 inches.

Included with this soil in mapping are small areas of Nez Perce loam and Uhlorn silt loam.

In this Brownlee soil, permeability is moderately slow. Effective rooting depth is 40 to 60 inches. Available water capacity is moderate. Reaction is neutral in the surface layer and neutral and slightly acid in the subsoil. Runoff is rapid, and the hazard of erosion is severe.

This soil is used mainly for winter wheat, barley, and some hay and pasture. It is also used for range.

The use of this soil for crops is limited mainly by the hazard of erosion. Production is good. Soil can be conserved by continuously growing small grains and forage crops, keeping tillage to a minimum, and returning crop residue to the soil. Grassed waterways prevent formation of gullies in the natural drainageways. Contour farming, divided-slope farming, field strip-cropping and building terraces and structures for water control also reduce erosion. Nitrogen, sulfur, and sometimes phosphorus are necessary. Weed control is important. Grasses and legumes are beneficial and are good alternative crops.

This soil is well suited to pasture and hay. Under a high level of management, production is good. A well balanced fertilization program is needed. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Orchardgrass, brome, intermediate wheatgrass, and alfalfa are suitable for planting.

The potential native vegetation is mainly bluebunch wheatgrass, Idaho fescue, lupine, and arrowleaf balsamroot. If range condition declines, the proportion of Idaho fescue and bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and shrubs become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition.

The main restrictions on use of this soil for homesites are slope, shrink-swell potential, and low strength. The installation of sanitary facilities is restricted by the depth to rock and slope. Septic tank absorption fields are also restricted by the moderately slow permeability of the subsoil. The design of roads should compensate for the low strength of the soil. Slope is the main restriction on use for diversions and grassed waterways.



This soil is suited to paths and trails. Slope limits use of this soil for camp areas, picnic areas, and playgrounds.

This soil is in capability subclass IIIe.

**18—Brownlee loam, 12 to 25 percent slopes.** This moderately steep, south-facing soil is on steptoes. It is deep and well drained. Elevation is 3,000 to 4,500 feet. This soil formed in residuum and colluvium weathered from granitic rocks with some loess in the upper part. The average annual precipitation is about 22 inches, the average annual air temperature is about 47 degrees F, and the frost-free period is about 120 days.

Typically, the surface layer is dark gray loam about 8 inches thick. The subsoil is dark grayish brown and pale brown clay loam and loam about 34 inches thick. Decomposing granitic bedrock is at a depth of 42 inches.

Included with this soil in mapping are small areas of Nez Perce loam and Uhlorn silt loam.

In this Brownlee soil, permeability is moderately slow. Effective rooting depth is 40 to 60 inches. Available water capacity is moderate. Reaction is neutral in the surface layer and neutral and slightly acid in the subsoil. Runoff is rapid, and the hazard of erosion is severe.

This soil is used mainly for winter wheat, barley, and some hay and pasture. It is also used for range.

The use of this soil for crops is limited mainly by the hazard of erosion. Production is good. Soil can be conserved by continuously growing small grains and forage crops, keeping tillage to a minimum, and returning crop residue to the soil. Grassed waterways prevent formation of gullies in the natural drainageways. Contour farming, divided-slope farming, field strip cropping, and building terraces and structures for water control also reduce erosion. Nitrogen, sulfur, and sometimes phosphorus are necessary. Weed control is important. Grasses and legumes are beneficial and are good alternative crops.

This soil is well suited to pasture and hay. Under a high level of management, production is good. A well balanced fertilization program is needed. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Orchardgrass, brome, intermediate wheatgrass, and alfalfa are suitable for planting.

The potential native vegetation is mainly bluebunch wheatgrass, Idaho fescue, lupine, and arrowleaf balsamroot. If range condition declines, the proportion of Idaho fescue and bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and shrubs become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition.

The main restriction on the use of this soil for homesites and sanitary facilities is slope. Use for septic tank absorption fields is also restricted by the moderately slow permeability of the subsoil. The design of roads should compensate for the low strength of the soil and slope. Slope also restricts use for grassed waterways and diversions.

This soil is suited to paths and trails. Slope limits use of this soil for camp areas, playgrounds, and picnic areas.

This soil is in capability subclass IIIe.

**19—Brownlee loam, 25 to 40 percent slopes.** This steep, south-facing soil is on steptoes. It is deep and well drained. Elevation is 3,000 to 4,500 feet. This soil formed in residuum and colluvium weathered from granitic rocks and some loess in the upper part. The average annual precipitation is about 22 inches, the average annual air temperature is about 47 degrees F, and the frost-free period is about 120 days.

Typically, the surface layer is dark gray loam about 8 inches thick. The subsoil is dark grayish brown and pale brown clay loam and loam about 34 inches thick. Decomposing granitic bedrock is at a depth of 42 inches.

Included with this soil in mapping are small areas of Uhlorn silt loam and Brownlee cobbly loam.

In this Brownlee soil, permeability is moderately slow. Effective rooting depth is 40 to 60 inches. Available water capacity is moderate. Reaction is neutral in the surface layer and neutral and slightly acid in the subsoil. Runoff is very rapid, and the hazard of erosion is very severe.

This soil is used for hay, pasture, barley, winter wheat, and range.

The use of this soil for crops is limited mainly by the hazard of erosion. Production is high if this soil is kept in forage or grass crops at least half the time and spring wheat is grown without fall tillage the rest of the time so that the soil is usually protected by a plant cover. Grassed waterways prevent formation of gullies in the natural drainageways. Contour farming, divided-slope farming, and field strip cropping also reduce erosion. Nitrogen, sulfur, and sometimes phosphorus are necessary. Weed control is important. Grasses and legumes are beneficial and are good alternative crops.

This soil is well suited to pasture and hay. Under a high level of management, production is good. A well balanced fertilization program is needed. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Orchardgrass, brome, intermediate wheatgrass, and alfalfa are suitable for planting.

The potential native vegetation is mainly bluebunch wheatgrass, Idaho fescue, arrowleaf balsamroot, and lupine. If range condition declines, the proportion of Idaho fescue and bluebunch wheatgrass decreases and the proportion of forbs and shrubs increase. Weeds and annual plants become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition. Providing adequate stock water is often a problem, especially during the hot, dry summer.

Slope is the main restriction on the use of this soil for all construction and recreation.

This soil is in capability subclass IVe.



**20—Chard sandy loam, 3 to 7 percent slopes.** This gently sloping soil is on stream terraces. It is very deep and well drained. Elevation is 950 to 1,800 feet. This soil formed in loamy alluvium. The average annual precipitation is about 14 inches, the average annual air temperature is about 54 degrees F, and the frost-free period is about 180 days.

Typically, the upper part of the surface layer is dark grayish brown sandy loam about 8 inches thick, and the lower part is brown sandy loam about 8 inches thick. The subsoil is pale brown sandy loam about 14 inches thick. The substratum is very pale brown loamy sand to a depth of 60 inches.

Included with this soil in mapping are small areas of Chard Variant loamy fine sand and Tannahill loam and areas where slopes are more than 7 percent. Also included are small areas of soil that is similar to Chard soils but that has a loam and clay loam subsoil.

In this Chard soil, permeability is moderately rapid. Effective rooting depth is 60 inches or more. Available water capacity is moderate. The soil is strongly calcareous in the upper part of the substratum and moderately calcareous in the lower part. Reaction is neutral in the

surface layer and subsoil and strongly alkaline in the substratum. Runoff is medium, and the hazard of erosion is moderate.

This soil is used mainly for nonirrigated hay and pasture. It is also used for range and for irrigated hay, pasture, orchards, and truck crops.

Low annual precipitation, the hazard of erosion, and the small size of areas limit the use of this soil for crops, especially small grain. Some forage crops are grown without irrigation, but production is low. These soils are suitable for irrigation, but the irregular terrain and small areas limit this use. A few of the larger areas are used for fruit orchards (fig. 4.) Forage production is good under irrigation; this soil produces about 5 tons of grass-legume hay per acre. If this soil is irrigated, a conservation cropping system and a well designed irrigation system with structures for water control are important. Good irrigation water management is needed. On pasture, grazing should be rotated, a minimum stubble height should be maintained, and the plants should be allowed to regrow between grazing periods. Later orchardgrass, smooth brome, and Regar brome are suitable for planting in irrigated areas. Crested and pubes-



Figure 4.—Sprinkler-irrigated<sup>1</sup> peach orchard on Chard soils along the Salmon River.



cent wheatgrass are suitable for planting in nonirrigated areas.

The potential native vegetation is mainly bluebunch wheatgrass. If range condition declines, the proportion of bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and rabbitbrush become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition. This soil is well suited to producing forage for grazing in winter and early spring. Providing livestock water can be a problem during drier seasons. Seeding is possible on this soil, and a seedbed can be easily prepared with conventional equipment.

There are few restrictions on the use of this soil for homesites. The installation of sanitary landfills is restricted by the moderately rapid permeability of the subsoil. This soil is suited to septic tank absorption fields, but ground water may be polluted by seepage from the field. Use of sewage lagoons is severely restricted because of the possibility of seepage. The low strength limits use for roads.

This soil is well suited to most kinds of recreation.

This soil is in capability subclass IIIe.

**21—Chard sandy loam, 7 to 12 percent slopes.** This sloping soil is on stream terraces. It is very deep and well drained. Elevation is 950 to 1,800 feet. This soil formed in loamy alluvium. The average annual precipitation is about 14 inches, the average annual air temperature is about 54 degrees F, and the frost-free period is about 180 days.

Typically, the upper part of the surface layer is dark grayish brown sandy loam about 8 inches thick, and the lower part is brown sandy loam about 8 inches thick. The subsoil is pale brown sandy loam about 14 inches thick. The substratum is very pale brown loamy sand to a depth of 60 inches.

Included with this soil in mapping are small areas of Chard Variant loamy fine sand and Tannahill loam and areas where slopes are more than 12 percent. Also included are small areas of a soil that is similar to Chard soils but that has a loam and clay loam subsoil.

In this Chard soil, permeability is moderately rapid. Effective rooting depth is 60 inches or more. Available water capacity is moderate. This soil is strongly calcareous in the upper part of the substratum and mildly calcareous in the lower part. Reaction is neutral in the surface layer and subsoil and strongly alkaline in the substratum. Runoff is medium, and the hazard of erosion is moderate.

This soil is used mainly for nonirrigated hay and pasture. It is also used for range and for irrigated hay, pasture, and orchards.

Low annual precipitation, the hazard of erosion, and the small size of areas limit the use of this soil for crops, especially small grain. Some forage crops are grown without irrigation, but production is low. This soil is suit-

able for irrigation, but the irregular terrain and small areas limit this use. A few of the larger areas are used for fruit orchards. Forage crop production is good under irrigation; this soil will produce about 4 tons of grass-legume hay per acre. If this soil is irrigated, irrigation water management, a conservation cropping system, and a well designed irrigation system with structures for water control are important. On pasture, grazing should be rotated, a minimum stubble height should be maintained, and the plants should be allowed to regrow between grazing periods. Latar orchardgrass, smooth brome, and Regar brome are suitable for planting in irrigated areas. Crested and pubescent wheatgrass are suitable for planting in nonirrigated areas.

This soil is well suited to producing forage for grazing in winter and early spring. The potential native vegetation is mainly bluebunch wheatgrass. If range condition declines, the proportion of bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and rabbitbrush become more abundant if range condition declines further. Providing water for livestock can be difficult during drier seasons. Seeding is possible, and a seedbed can be easily prepared with conventional equipment.

The main restriction on the use of this soil for homesites is slope. The installation of sanitary landfills is restricted by slope and the moderately rapid permeability. Sewage lagoons are severely restricted by slope and seepage problems. Slope and low strength limit use for roads.

Slope limits use of this soil for campsites and picnic areas. Playgrounds are severely limited by slope.

This soil is in capability subclasses IIIe, nonirrigated, and IVe, irrigated.

**22—Chard sandy loam, 12 to 25 percent slopes.** This moderately steep soil is on stream terraces. It is very deep and well drained. Elevation is 950 to 1,800 feet. This soil formed in loamy alluvium. The average annual precipitation is about 14 inches, the average annual air temperature is about 54 degrees F, and the frost-free period is about 180 days.

Typically, the upper part of the surface layer is dark grayish brown sandy loam about 8 inches thick, and the lower part is brown sandy loam about 8 inches thick. The subsoil is pale brown sandy loam about 14 inches thick. The substratum is very pale brown loamy sand to a depth of 60 inches.

Included with this soil in mapping are small areas of Chard Variant loamy fine sand and Tannahill loam and areas where slopes are more than 25 percent. Also included are small areas of a soil that is similar to Chard soils but that has a loam and clay loam subsoil.

In this Chard soil, permeability is moderately rapid. Effective rooting depth is 60 inches or more. Available water capacity is moderate. This soil is strongly calcareous in the upper part of the substratum and mildly calcareous in the lower part. Reaction is neutral in the

surface layer and subsoil and strongly alkaline in the substratum. Runoff is rapid, and the hazard of erosion is severe.

This soil is used mainly for pasture. It is also used for range. For the best pasture production, grazing should be rotated, a minimum stubble height should be maintained, and the plants should be allowed to regrow between grazing periods. Seeding is possible, and the seedbed can be easily prepared with conventional equipment. Crested wheatgrass, Luna pubescent wheatgrass, and sand dropseed are suitable for planting.

This soil is well suited to producing forage for grazing in winter and early spring. The potential native vegetation is mainly bluebunch wheatgrass. If range condition declines, the proportion of bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and rabbitbrush become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition. Providing livestock water can be difficult during drier seasons.

Slope is the main restriction on use of this soil for homesites and sanitary facilities. Use for sewage lagoons and sanitary landfills is restricted by seepage. The low strength of this soil should be considered in designing roads and dwellings. Slope restricts use for recreation.

This soil is in capability subclass IIIe.

### **23—Chard sandy loam, 25 to 40 percent slopes.**

This steep soil is on stream terraces. It is very deep and well drained. Elevation is 950 to 1,800 feet. This soil formed in loamy alluvium. The average annual precipitation is about 14 inches, the average annual air temperature is about 54 degrees F, and the frost-free period is about 180 days.

Typically, the upper part of the surface layer is dark grayish brown sandy loam about 8 inches thick, and the lower part is brown sandy loam about 8 inches thick. The subsoil is pale brown sandy loam about 14 inches thick. The substratum is very pale brown loamy sand to a depth of 60 inches.

Included with this soil in mapping are small areas where slopes are less than 25 percent and small areas of Tannahill loam. Also included are areas of a soil that is similar to Chard soils but that has a loam and clay loam subsoil.

In this Chard soil, permeability is moderately rapid. Effective rooting depth is 60 inches or more. Available water capacity is moderate. This soil is strongly calcareous in the upper part of the substratum and mildly calcareous in the lower part. Reaction is neutral in the surface layer and subsoil and strongly alkaline in the substratum. Runoff is rapid, and the hazard of erosion is severe.

This soil is used mainly for range. It is also used for pasture.

This soil is suited to pasture. Grazing should be rotated during the growing season to maintain a minimum height of stubble.

This soil is well suited to producing forage for grazing in winter and early spring. The potential native vegetation is mainly bluebunch wheatgrass. If range condition declines, the proportion of bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and rabbitbrush become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition. Providing livestock water can be a problem during drier seasons.

Slope is the main restriction on use of this soil for all construction and recreation.

This soil is in capability subclass VIe.

### **24—Chard Variant loamy fine sand, 2 to 7 percent slopes.**

This gently sloping soil is on stream terraces. It is deep over stratified gravel and cobbles and is somewhat excessively drained. Elevation is 950 to 1,500 feet. This soil formed in sandy and gravelly alluvium. The average annual precipitation is about 14 inches, the average annual air temperature is about 54 degrees F, and the frost-free period is about 180 days.

Typically the upper part of the surface layer is dark grayish brown and grayish brown loamy fine sand about 8 inches thick, and the lower part is grayish brown silt loam about 4 inches thick. The upper part of the underlying material is light gray, dark grayish brown, and light brownish gray loamy fine sand, coarse sand, and sand about 38 inches thick; and the lower part is stratified sand, gravel, and cobbles to a depth of 60 inches. Included with this soil in mapping are small areas of Chard sandy loam and Tannahill loam, and areas where slopes are more than 7 percent. Also included are small areas of a soil that is similar to Chard Variant soils but that has more than 35 percent rock fragments in the underlying layers.

In this Chard Variant soil, permeability is rapid. Effective rooting depth is more than 60 inches. Available water capacity is low. Reaction is neutral and slightly acid in the surface layer and neutral and mildly alkaline in the underlying material. Runoff is slow, and the hazard of erosion is slight or moderate.

This soil is used mainly for nonirrigated pasture. It is also used for range and irrigated hay and pasture.

The use of this soil for crops is limited by the low available water capacity and the low annual precipitation. Nonirrigated crops are not grown. This soil is suited to irrigation, but the irregular terrain and small areas limit that use. The larger areas are suitable for fruit orchards. Forage crop production is good under irrigation.

This soil is suited to irrigated pasture and hay under a high level of management, production is good. A well balanced fertilization program is needed. Good water management is essential. Grazing should be rotated during the growing season to maintain a minimum height



of stubble. Latar orchardgrass, smooth brome, and alfalfa are suitable for planting on irrigated areas. Luna pubescent wheatgrass, crested wheatgrass, and Ladak alfalfa are suitable for nonirrigated areas.

The potential native vegetation is dominated by bluebunch wheatgrass, arrowleaf balsamroot, and lupine. If range condition declines, the proportion of bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds, shrubs, and annual grasses become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range and pasture condition. Seeding is possible, and a good seedbed should be prepared before drilling.

The main restriction on use of this soil for sanitary facilities is the rapid permeability of the subsoil. This soil is suited to septic tank absorption fields, but ground water may become polluted. Community sewage systems should be considered in areas of high population density. This soil is suited to dwellings. Excavation banks should be sloped or shored to prevent caving.

Most kinds of recreation are restricted by droughtiness. Irrigation is needed to maintain a good ground cover.

This soil is in capability subclasses VIs, nonirrigated, and IIle, irrigated.

**25—Chard Variant loamy fine sand, 7 to 25 percent slopes.** This sloping and moderately steep soil is on stream terraces. It is deep over stratified gravel and cobbles and is somewhat excessively drained. Elevation is 950 to 1,500 feet. This soil formed in sandy and gravelly alluvium. The average annual precipitation is about 14 inches, the average annual air temperature is about 54 degrees F, and the frost-free period is about 180 days.

Typically, the surface layer is dark grayish brown and grayish brown loamy fine sand about 12 inches thick. The upper part of the underlying material is light gray, dark grayish brown, and light brownish gray loamy fine sand, coarse sand, and sand about 38 inches thick; the lower part is stratified sand, gravel, and cobbles to a depth of 60 inches.

Included with this soil in mapping are small areas of Chard sandy loam, Tannahill loam, and a soil that is similar to Chard Variant soils but that has more than 35 percent rock fragments in the underlying layers.

In this Chard Variant soil, permeability is rapid. Effective rooting depth is 60 inches or more. Available water capacity is low. Reaction is neutral and slightly acid in the surface layer and neutral and mildly alkaline in the underlying material. Runoff is rapid, and the hazard of erosion is severe.

This soil is used mainly for range.

The potential native vegetation is mainly bluebunch wheatgrass, arrowleaf balsamroot, and lupine. If range condition declines, the proportion of bluebunch wheatgrass decreases and the proportion of forbs and shrubs

increases. Weeds, shrubs, and grasses become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition. Mechanical seeding is possible. A good seedbed should be prepared before seeding or drilling.

The main restrictions on the use of this soil for sanitary facilities are the rapid permeability of the subsoil and slope. Slope restricts use for dwellings, roads, and streets. Excavation banks should be sloped or shored to prevent caving.

Slope restricts use for most kinds of recreation.

This soil is in capability subclass VIs.

**26—Chicane silt loam, 2 to 7 percent slopes.** This gently sloping soil is in north-facing areas. It is very deep and moderately well drained. Elevation is 3,000 to 4,200 feet. This soil formed in loess. The average annual precipitation is about 23 inches, the average annual air temperature is about 44 degrees F, and the frost-free period is about 110 days.

Typically, the upper part of the surface layer is very dark grayish brown silt loam about 5 inches thick, and the lower part is very dark grayish brown silty clay loam about 9 inches thick. The subsoil is dark grayish brown silty clay loam about 7 inches thick. The buried subsurface layer is pale brown silt loam about 7 inches thick. The buried subsoil is yellowish brown and dark yellowish brown clay to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Nez Perce and Uhlorn silt loams.

In this Chicane soil, permeability is slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is neutral or moderately alkaline. Runoff is medium, and the hazard of erosion is moderate.

This soil is used for winter wheat, barley, peas, clover seed, and some hay and pasture. No significant areas remain in native vegetation.

If this soil is properly managed, production of all locally grown crops is good. A restrictive layer in the subsoil retards the movement of water and the growth of roots. Soil can be conserved by growing annual crops of small grains and peas, keeping tillage to a minimum, and returning crop residue to the soil. Grassed waterways prevent formation of gullies in the natural drainageways. Crops of legumes and grasses are also suited to this soil and help control erosion. Nitrogen, sulfur, and sometimes phosphorus are necessary. Weed control is important.

This soil is well suited to pasture and hay. Under a high level of management, including a well balanced fertilization program, production is good. Grazing should be rotated during the growing season, and a minimum height of stubble should be maintained. Latar orchardgrass, smooth brome, Regar brome, intermediate wheatgrass, and alfalfa are suitable for planting.

The use of this soil for septic tank absorption fields is restricted by the slow permeability of the subsoil and the



seasonal perched water table. Sewage lagoon construction is restricted by slope. Sanitary landfill construction is restricted by the seasonal perched water table and the tendency of the soil to be sticky when wet. The design of roads and dwellings should compensate for the shrink-swell potential of the soil and its inherently low load-supporting capacity. Excavation can be hindered by the high clay content of the subsoil. This soil is suitable as a source of topsoil. Embankment construction is restricted by the perched water table and the difficulty of compacting this soil. Slope and the slow permeability of the soil should be considered in designing drainage systems.

This soil is suited to most kinds of recreation but the surface tends to be dusty when dry and the perched water table may limit some uses. Slope restricts use for playgrounds.

This soil is in capability subclass IIe.

**27—Chicane silt loam, 7 to 12 percent slopes.** This sloping soil is in north-facing areas. It is very deep and moderately well drained. Elevation is 3,000 to 4,200 feet. This soil formed in loess. The average annual precipitation is about 23 inches, the average annual air temperature is about 44 degrees F, and the frost-free period is about 110 days.

Typically, the upper part of the surface layer is very dark grayish brown silt loam about 5 inches thick, and the lower part is very dark grayish brown silty clay loam about 9 inches thick. The subsoil is dark grayish brown silty clay loam about 7 inches thick. The buried subsurface layer is pale brown silt loam about 7 inches thick. The buried subsoil is dark yellowish brown and yellowish brown clay to a depth of 60 inches or more.

Included with this soil in mapping are small areas where slopes are less than 7 percent and small areas of Nez Perce and Uhlorn silt loams.

In this Chicane soil, permeability is slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is neutral or moderately alkaline throughout. Runoff is rapid, and the hazard of erosion is severe. A seasonal perched water table is at a depth of 2 to 3 feet.

This soil is used for winter wheat, barley, peas, clover seed, and some hay and pasture. No significant areas remain in native vegetation.

If this soil is properly managed, production of all locally grown crops is good. The hazard of erosion is severe if the soil is tilled intensively, as in summer-fallow practice. A restrictive layer in the subsoil retards the movement of water and growth of roots. Soil can be conserved by growing annual crops of small grains and peas, tilling across the slope, keeping tillage to a minimum, and returning crop residue to the soil. Grassed waterways prevent formation of gullies in the natural drainageways. Crops of legume and grasses are suited to this soil and help control erosion. Nitrogen, sulfur, and sometimes phosphorus are necessary. Weed control is important.

This soil is well suited to pasture and hay. Under a high level of management, including a well balanced fertilization program, production is good. Grazing should be rotated during the growing season, and a minimum height of stubble should be maintained. Latar orchard-grass, smooth brome, Regar brome, intermediate wheat-grass, and alfalfa are suitable for planting.

The use of this soil for septic tank absorption fields is restricted by the slow permeability of the subsoil, a seasonal perched water table, and slope. Sewage lagoon construction is restricted by slope. Sanitary landfill construction is restricted by the seasonal perched water table, slope, and the tendency of this soil to be sticky when wet. The design of roads and dwellings should compensate for the shrink-swell potential of the soil, its inherent low strength, and slope. Excavation can be hindered by the high clay content of the subsoil. This soil is suitable as a source of topsoil. Embankment construction is restricted by the perched water table and the difficulty of compacting this soil.

This soil is suited to most kinds of recreation but the surface tends to be dusty when dry. Slope is also a restriction.

This soil is in capability subclass IIIe.

**28—Chicane silt loam, 12 to 25 percent slopes.** This moderately steep soil is in north-facing areas. It is very deep and moderately drained. Elevation is 3,000 to 4,200 feet. This soil formed in loess. The average annual precipitation is about 23 inches, the average annual air temperature is about 44 degrees F, and the frost-free period is about 110 days.

Typically, the upper part of the surface layer is very dark grayish brown silt loam about 5 inches thick, and the lower part is very dark grayish brown silty clay loam about 14 inches thick. The subsoil is dark grayish brown silty clay loam about 7 inches thick. The buried subsurface layer is pale brown silt loam about 7 inches thick. The buried subsoil is dark yellowish brown and yellowish brown clay to a depth of 60 inches or more.

Included with this soil in mapping are small areas where slopes are less than 12 percent and small areas of Nez Perce and Uhlorn silt loam.

In this Chicane soil, permeability is slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is neutral or moderately alkaline throughout. Runoff is rapid, and the hazard of erosion is severe. A seasonal perched water table is at a depth of 2 to 3 feet.

This soil is used for winter wheat, barley, peas, clover seed, and some hay and pasture. No significant areas remain in native vegetation.

If this soil is properly managed, production of all locally grown crops is good. The hazard of erosion is severe if the soil is tilled intensively, as in the summer-fallow practice. A restrictive layer in the subsoil retards the movement of water and growth of roots. Soil can be conserved by growing annual crops of small grains and



peas, keeping tillage to a minimum, and returning crop residue to the soil. Grassed waterways prevent formation of gullies in the natural drainageways. Contour farming, divided-slope farming, using gradient terraces, and field stripcropping also reduce erosion. Crops of legumes and grasses are also suited to this soil and help control erosion. Nitrogen, sulfur, and sometimes phosphorus are necessary. Weed control is important.

This soil is well suited to pasture and hay. Under a high level of management, including a well balanced fertilization program, production is good. Grazing should be rotated during the growing season, and a minimum height of stubble should be maintained. Latar orchard-grass, smooth brome, Regar brome, intermediate wheat-grass, and alfalfa are suitable for planting.

The use of this soil for septic tank absorption fields is restricted by slope, the slow permeability of the subsoil, and the seasonal perched water table. Sewage lagoon construction is restricted by slope. Sanitary landfill construction is restricted by the seasonal perched water table, slope, and the tendency of the soil to be sticky when wet. The design of roads and dwellings should compensate for slope, the shrink-swell potential of the soil, and its inherent low strength. Excavation can be hindered by the high clay content of the subsoil and by slopes. Slope restricts use of this soil as a source of topsoil.

Slope and the tendency of the surface to be dusty when dry restrict use for recreation.

This soil is in capability subclass IIIe.

#### **29—Chicane silt loam, 25 to 40 percent slopes.**

This steep soil is in north-facing areas. It is very deep and moderately well drained. Elevation is 3,000 to 4,200 feet. This soil formed in loess. The average annual precipitation is about 23 inches, the average annual air temperature is about 44 degrees F, and the frost-free period is about 110 days.

Typically, the upper part of the surface layer is very dark grayish brown silt loam about 5 inches thick, and the lower part is very dark grayish brown silty clay loam about 9 inches thick. The subsoil is dark grayish brown silty clay loam about 7 inches thick. The buried subsurface layer is pale brown silt loam about 7 inches thick. The buried subsoil is dark yellowish brown and yellowish brown clay to a depth of 60 inches or more.

Included with this soil in mapping are small areas where slopes are less than 25 percent, small areas of Nez Perce and Uhlorn silt loams, and areas that have a few cobbles.

In this Chicane soil, permeability is slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is neutral or moderately alkaline throughout. Runoff is very rapid, and the hazard of erosion is very severe. A seasonal perched water table is at a depth of 2 to 3 feet.

This soil is used for winter wheat, barley, hay, and pasture. No significant areas remain in native vegetation.

If this soil is properly managed, production of all locally grown crops is good. The hazard of erosion is very severe if the soil is tilled intensively, as in summer-fallow practice. A restrictive layer in the subsoil retards the movement of water and the growth of roots. Soil can be conserved by keeping a permanent cover crop on the soil at least half of the time, annual cropping, tilling across the slope, keeping tillage to a minimum, and returning crop residue to the soil. Grassed waterways prevent formation of gullies in the natural drainageways. Contour farming, divided-slope farming, field stripcropping, and building structures for water and sediment control also reduce erosion. Chiseling in the stubble in fall helps to slow runoff and reduces soil loss in years when the snow melts rapidly while the surface is frozen. Crops of legumes and grasses can be grown and help control erosion. Nitrogen, sulfur, and sometimes phosphorus are necessary. Weed control is important.

This soil is well suited to pasture and hay. Under a high level of management, including a well balanced fertilization program, production is good. Grazing should be rotated during the growing season, and a minimum height of stubble should be maintained. Latar orchard-grass, smooth brome, Regar brome, intermediate wheat-grass, and alfalfa are suitable for planting.

Slope is the main restriction on use of this soil for all construction and recreation. Construction of sanitary facilities is also restricted by the seasonal perched water table, the slow permeability of the subsoil, and the tendency of the soil to be sticky when wet. The design of roads and dwellings should compensate for the shrink-swell potential of the soil and its low load-supporting capacity. Excavation can be hindered by the high clay content of the subsoil and by slope.

This soil is in capability subclass IVe.

#### **30—De Masters silt loam, 7 to 25 percent slopes.**

This sloping and moderately steep, north-facing soil is on timbered side slopes and plateaus. It is deep and well drained. Elevation is 3,500 to 5,000 feet. This soil formed in loess and material weathered from Columbia River Basalt or Seven Devils Volcanics. The average annual precipitation is about 24 inches, the average annual air temperature is about 43 degrees F, and the frost-free period is about 100 days.

Typically, the upper part of the surface layer is dark grayish brown silt loam about 15 inches thick, and the lower part is dark brown silt loam about 18 inches thick. The upper part of the subsoil is yellowish brown silt loam and cobbly silty clay loam about 14 inches thick, and the lower part is yellowish brown very cobbly clay loam about 8 inches thick. Slightly weathered basalt bedrock is at a depth of 55 inches.

Included with this soil in mapping are small areas of Boles silt loam, Meland silt loam, and Suloaf silt loam. Also included are small areas of a soil that is similar to De Masters soils but that is more than 60 inches deep to bedrock.





Figure 5.—Area of De Masters soils cleared of ponderosa pine and seeded to hay.

In this De Masters soil, permeability is moderate. Effective rooting depth is 40 to 60 inches or more. Available water capacity is high. Reaction is slightly acid in the upper part of the surface layer and medium acid in the lower part of the surface layer and in the subsoil. Runoff is rapid, and the hazard of erosion is severe.

This soil is used mainly for woodland. It is also used for hay (fig. 5), pasture, and woodland grazing.

This soil is well suited to pasture and hay. Under a high level of management, including a well balanced fertilization program, production is good. Grazing should be rotated during the growing season, and a minimum height of stubble should be maintained. Lata orchard-grass, smooth brome, Regar brome, and alfalfa are suitable for planting.

This soil is suited to ponderosa pine. It can produce about 2,750 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 40 years, or it can produce 31,500 board feet (Scribner rule) of merchantable timber

11.6 inches or more in diameter in 140 years in an unmanaged stand based on the culmination of the mean annual increment. Conventional methods can be used for tree harvest, but roads, skid trails, and landings should be carefully planned to minimize soil loss.

This soil has excellent potential for producing forage. The overstory is normally quite open, allowing ample light to reach the understory. The potential native understory is mainly bluebunch wheatgrass, Idaho fescue, lupine, and other forbs. If grazing is excessive, the proportion of Idaho fescue and bluebunch wheatgrass decreases and the proportion of less palatable forbs and shrubs increases. Weeds and annual plants become more abundant if grazing condition declines further. The vegetation should be managed to permit timber regeneration and maintain enough litter for soil protection. A planned grazing system is essential for maintaining or improving forage value. This soil will produce forage for livestock almost continually if managed as woodland. Depending on the kind of management, annual produc-



tion varies from 1,500 pounds of air-dry herbage per acre to less than 400 pounds.

The use of this soil for homesites and sanitary facilities is moderately restricted by the depth to rock, the moderate permeability of the soil, and slope. The design of roads and dwellings should compensate for the depth to rock and slope. Slope and rooting depth should be considered in designing grassed waterways and diversions.

This soil is suited to most kinds of recreation, but the surface tends to be dusty when dry. Slope is a restriction in the steeper areas.

This soil is in capability subclass IIIe.

### **31—De Masters silt loam, 25 to 40 percent slopes.**

This steep, north-facing soil is on timbered side slopes and plateaus. It is deep and well drained. Elevation is 3,500 to 5,000 feet. This soil formed in loess and material weathered from Columbia River Basalt or Seven Devils Volcanics. The average annual precipitation is about 24 inches, the average annual air temperature is about 43 degrees F, and the frost-free period is about 100 days.

Typically, the upper part of the surface layer is dark grayish brown silt loam about 15 inches thick, and the lower part is dark brown silt loam about 18 inches thick. The upper part of the subsoil is yellowish brown silt loam and cobbly silty clay loam about 14 inches thick, and the lower part is yellowish brown very cobbly clay loam about 8 inches thick. Slightly weathered basalt bedrock is at a depth of 55 inches.

Included with this soil in mapping are small areas of Meland silt loam, Suloaf silt loam, and Keuterville gravelly loam and areas that have a few cobbles.

In this De Masters soil, permeability is moderate. Effective rooting depth is 40 to 60 inches or more. Available water capacity is high. Reaction is slightly acid in the upper part of the surface layer and medium acid in the lower part of the surface layer and in the subsoil. Runoff is very rapid, and the hazard of erosion is very severe.

This soil is used mainly for woodland. It is also used for hay, pasture, and woodland grazing.

This soil is moderately well suited to pasture and hay. Under a high level of management, including a well balanced fertilization program, production is good. Grazing should be rotated during the growing season, and a minimum height of stubble should be maintained. Latar orchardgrass, smooth brome, Regar brome, and alfalfa are suitable for planting.

This soil is suited to ponderosa pine. It can produce about 2,750 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 40 years, or it can produce 31,500 board feet (Scribner rule) of merchantable timber 11.6 inches or more in diameter in 140 years in an unmanaged stand based on the culmination of the mean annual increment. The main problem in managing timber is the erosion hazard. Conventional methods can be used for tree harvest, but roads, skid trails, and landings should be carefully planned to minimize soil loss.

This soil has excellent potential for producing forage. The overstory is normally quite open, allowing ample light to reach the understory. The potential native understory is mainly bluebunch wheatgrass, Idaho fescue, lupine, and other forbs. If grazing is excessive, the proportion of Idaho fescue and bluebunch wheatgrass decreases and the proportion of less palatable forbs and shrubs increases. Weeds and annual plants become more abundant if grazing condition declines further. The vegetation should be managed to permit timber regeneration and maintain enough litter for soil protection. A planned grazing system is essential for maintaining or improving forage value. This soil will produce forage for livestock almost continually if managed as woodland. Depending on the level of management, annual production varies from 1,500 pounds of air-dry herbage per acre to less than 400 pounds.

Slope is the main restriction on use of this soil for all construction and recreation.

This soil is in capability subclass IVe.

**32—De Masters-Riggins complex.** This complex consists of moderately sloping soils on plateaus. Slopes are 7 to 40 percent. Elevation is 3,500 to 4,500 feet. This complex is about 50 percent De Masters silt loam and 25 percent Riggins very gravelly silt loam. Riggins soils are south-facing.

Included with these soils in mapping are small areas of De Masters soils having slopes of less than 7 percent on more than 40 percent, small areas of Keuterville gravelly loam and Meland silt loam, and cobbly and very cobbly areas.

The De Masters soil is deep and well drained. It formed in loess and material weathered from Columbia River Basalt or Seven Devils Volcanics. The average annual precipitation is about 24 inches, the average annual air temperature is about 43 degrees F, and the frost-free period is about 100 days.

Typically, the upper part of the surface layer is dark grayish brown silt loam about 15 inches thick, and the lower part is dark brown silt loam about 18 inches thick. The upper part of the subsoil is yellowish brown silt loam and cobbly silty clay loam about 14 inches thick, and the lower part is yellowish brown very cobbly clay loam about 8 inches thick. Slightly weathered basalt bedrock is at a depth of 55 inches.

Permeability is moderate. The effective rooting depth is 40 to 60 inches or more. Available water capacity is high. Reaction is slightly acid and medium acid throughout. Runoff is rapid and very rapid, and the hazard of erosion is severe and very severe.

The Riggins soil is shallow and well drained. It formed in loess and colluvium and residuum from Columbia River Basalt or Seven Devils Volcanics. The average annual precipitation is about 18 inches, the average annual air temperature is about 48 degrees F, and the frost-free period is about 140 days.

Typically, the surface layer is dark grayish brown very gravelly silt loam about 8 inches thick. The subsoil is

brown very gravelly clay loam about 5 inches thick. Basalt bedrock is at a depth of 13 inches.

Permeability is moderately slow. The effective rooting depth is 10 to 20 inches. Available water capacity is very low. Reaction is neutral. Runoff is rapid and very rapid, and the hazard of erosion is severe and very severe.

This complex is used for woodland, woodland grazing, and range. It is also used for hay and pasture.

The De Masters soil is moderately well suited to pasture and hay. Under a high level of management, including a well balanced fertilization program, production is good. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Latar orchardgrass, smooth brome, Regar brome, and alfalfa are suitable for planting. The Riggins soil is normally not suitable for seeding to pasture and hay. The steeper areas of the De Masters soil are not very well suited to seeding.

The De Masters soil is suited to ponderosa pine. It can produce about 2,750 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 40 years, or it can produce 31,500 board feet (Scribner rule) of merchantable timber 11.6 inches or more in diameter in 140 years in an unmanaged stand based on the culmination of the mean annual increment. The main problem in managing timber is the erosion hazard. Conventional methods can be used for harvest, but roads, skid trails, and landings should be carefully planned to minimize soil loss.

The De Masters soil has excellent potential for producing forage. The overstory is normally quite open, allowing ample light to reach the understory. The potential native understory is mainly bluebunch wheatgrass, Idaho fescue, lupine, and other forbs. If grazing is excessive, the proportion of Idaho fescue and bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and annual plants become more abundant if grazing condition declines further. The vegetation should be managed to permit timber regeneration and maintain enough litter for soil protection. A planned grazing system is essential for maintaining or improving forage value. This soil will produce forage for livestock almost continually if managed as a woodlot. Depending on the level of management, annual production varies from 1,500 pounds of air-dry herbage per acre to less than 400 pounds.

The potential native vegetation on the Riggins soil is mainly bluebunch wheatgrass, Idaho fescue, and Sandberg bluegrass. If range condition declines, the proportion of Idaho fescue and bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and annual grasses become more abundant if range condition declines further.

Slope is the main restriction on use of the De Masters soil for homesites and sanitary facilities. The depth to rock and slope are the main restrictions on use of the Riggins soil for construction. The design of roads should compensate for slope. Slope and the rooting depth of the Riggins soil should be considered in designing grassed waterways and diversions.

Use of these soils for recreation is restricted by slope and the tendency of the surface to be dusty when dry. This complex is in capability subclass VIe.

**33—De Masters-Suloaf silt loams.** This complex consists of moderately sloping to steep soils on sloping plateaus. Slopes are 7 to 40 percent. Elevation is 3,500 to 4,500 feet. This complex is about 40 percent De Masters silt loam and 35 percent Suloaf silt loam.

Included with these soils in mapping are small areas of Boles silt loam, Keuterville gravelly loam and very cobbly loam, Riggins very gravelly silt loam, and Uptmor silt loam.

The De Masters soil is deep and well drained. It formed in loess and material weathered from Columbia River Basalt or Seven Devils Volcanics. The average annual precipitation is about 24 inches, the average annual air temperature is about 43 degrees F, and the frost-free period is about 100 days.

Typically, the upper part of the surface layer is dark grayish brown silt loam about 15 inches thick, and the lower part is dark brown silt loam about 18 inches thick. The upper part of the subsoil is yellowish brown silt loam and cobbly silty clay loam about 14 inches thick, and the lower part is yellowish brown very cobbly clay loam about 8 inches thick. Slightly weathered basalt bedrock is at a depth of 55 inches.

Permeability is moderate. The effective rooting depth is 40 to 60 inches or more. Available water capacity is high. Reaction is slightly acid and medium acid throughout. Runoff is rapid and very rapid, and the hazard of erosion is severe and very severe.

The Suloaf soil is deep and well drained. It formed in loess and residuum from Columbia River Basalt, Andesite, or Seven Devils Volcanics. The average annual precipitation is about 26 inches, the average annual air temperature is about 42 degrees F, and the frost-free period is about 90 days.

Typically, the surface layer is brown silt loam about 17 inches thick. The subsoil is light yellowish brown and light brown gravelly silt loam about 24 inches thick. The substratum is reddish yellow gravelly sandy loam about 13 inches thick. Basalt bedrock is at a depth of 54 inches.

Permeability is moderate. The effective rooting depth is 40 to 60 inches. Available water capacity is moderate. Reaction is neutral above a depth of 17 inches and slightly acid below that depth. Runoff is rapid and very rapid, and the hazard of erosion is severe and very severe.

This complex is used mainly for woodland and woodland grazing. It is also used for hay and pasture.

Where slopes are less than 20 percent, these soils are well suited to pasture and hay. Under a high level of management, including a well balanced fertilization program, production is good. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Latar orchardgrass, smooth brome, Regar brome, and alfalfa are suitable for planting.



The De Masters soil is suited to the production of ponderosa pine. It can produce about 2,750 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 40 years, or it can produce 31,500 board feet (Scribner rule) of merchantable timber 11.6 inches or more in diameter in 140 years in an unmanaged stand based on the culmination of the mean annual increment.

The Suloaf soil is suited to Douglas-fir and ponderosa pine. It can produce about 3,400 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 40 years, or it can produce 38,000 board feet (Scribner rule) of merchantable timber 11.6 inches or more in diameter in 130 years in an unmanaged stand based on the culmination of the mean annual increment.

The main problem in managing these soils for timber is the erosion hazard. Conventional methods can be used for tree harvest, but roads, skid trails, and landings must be carefully planned to minimize soil loss. Reforestation after harvest must be carefully managed to reduce competition from undesirable understory plants.

The De Masters soil has excellent potential for producing forage. The overstory is normally quite open, allowing ample light to reach the understory. The potential native understory is mainly bluebunch wheatgrass, Idaho fescue, lupine, and other forbs. If grazing is excessive, the proportion of Idaho fescue and bluebunch wheatgrass decreases and the proportion of less palatable forbs and shrubs increases. Weeds and annual plants become more abundant if grazing condition further declines. The vegetation should be managed to permit timber regeneration and maintain enough litter for soil protection. A planned grazing system is essential for maintaining or improving forage value. This soil will produce forage almost continually if managed as woodland. Depending on the level of management, annual production varies from 1,500 pounds of air-dry herbage per acre to less than 400 pounds.

The Suloaf soil has potential for producing forage if the canopy is opened by logging, fire, or other disturbance. The main native forage plants on this soil include creambush oceanspray, elk sedge, and pine reedgrass. Forage production can be increased and soil protected by seeding disturbed areas to suitable plants such as timothy, orchardgrass, tall fescue, and White Dutch clover. The vegetation should be managed to permit timber regeneration and to maintain enough litter for soil protection. This soil will produce forage for 15 to 20 years following opening of the canopy. During this period annual production will vary from about 1,500 pounds of air-dry herbage per acre to less than 400 pounds.

The main restriction on the use of these soils for homesites and sanitary facilities is slope. The design of roads should compensate for slope.

Use of these soils for recreation is restricted by slope. The surface tends to be dusty when dry. Paths and trails can be developed in the flatter areas.

This complex is in capability subclass VIe.

**34—Ericson loam, 4 to 25 percent slopes.** This gently sloping to moderately steep soil is in south-facing areas. It is very deep and well drained. Elevation is 3,800 to 4,800 feet. This soil formed in granitic residuum and colluvium. The average annual precipitation is about 30 inches, the average annual air temperature is about 40 degrees F, and the frost-free period is about 60 days.

Typically the surface layer is brown loam about 2 inches thick. The subsurface layer is pale brown loam about 10 inches thick. The subsoil is yellowish brown loam and light yellowish brown fine gravelly loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Jughandle loam and areas where slopes are more than 25 percent.

In this Ericson soil, permeability is moderately slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is strongly acid throughout. Runoff is rapid, and the hazard of erosion is severe.

This soil is used for hay, pasture, woodland, and woodland grazing.

After timber is harvested from this soil, the area can be converted to pasture or hay. Under a high level of management, production is good. A well balanced fertilization program is needed. Nitrogen and sulfur are essential. If legumes are included in the stand, phosphorus is also needed. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Latar orchardgrass, smooth brome, tall fescue, clover, and alfalfa are suitable for planting.

This soil is suited to subalpine fir, grand fir, Douglas-fir, lodgepole pine, western larch, and spruce. It can produce about 10,100 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 100 years, or it can produce 41,000 board feet (Scribner rule) of merchantable timber 12.6 inches or more in diameter in 140 years in an unmanaged, mixed conifer stand based on the culmination of the mean annual increment. Conventional methods can be used for tree harvest, but logging roads, skid trails, and landings should be carefully planned to minimize soil loss.

This soil has potential for producing forage if the canopy is opened by fire or logging. When the canopy is sparse or open, the native forage plants include pine reedgrass, elk sedge, and snowberry. Forage production can be increased by seeding disturbed areas to suitable grasses such as timothy, tall fescue, and orchardgrass. The vegetation should be managed to permit timber regeneration and to maintain enough litter for soil protection. Once the canopy is opened this soil will produce forage for 10 to 15 years. During this period, annual production varies from about 1,500 pounds of air-dry herbage per acre under an open canopy to less than 100 pounds as the canopy closes.

The use of this soil for septic tank absorption fields is restricted by the moderately slow permeability of the subsoil and by the slope in the steeper areas. This soil is suited to sewage lagoons and sanitary landfills in the flatter areas. This soil is a potential source of topsoil.

This soil is suited to most kinds of recreation, but slope is a restriction in the steeper areas.

This soil is in capability subclass IVe.

**35—Ericson loam, 25 to 40 percent slopes.** This steep soil is in south facing areas. It is very deep and well drained. Elevation is 3,800 to 4,800 feet. This soil formed in granitic residuum and colluvium. The average annual precipitation is about 30 inches, the average annual air temperature is about 40 degrees F, and the frost-free period is about 60 days.

Typically, the surface layer is brown loam about 2 inches thick. The subsurface layer is pale brown loam about 10 inches thick. The subsoil is yellowish brown loam and light yellowish brown fine gravelly loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Jughandle loam and areas where slopes are less than 25 percent.

In this Ericson soil, permeability is moderately slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is strongly acid throughout. Runoff is very rapid, and the hazard of erosion is very severe.

This soil is used for hay, pasture, woodland, and woodland grazing.

After timber is harvested from this soil, the area can be converted to pasture or hay. Under a high level of management, production is good. A well balanced fertilization program is needed. Nitrogen and sulfur are essential. If legumes are included in the stand, phosphorus is also needed. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Lata orchardgrass, smooth brome, tall fescue, clover, and alfalfa are suitable for planting.

This soil is suited to subalpine fir, grand fir, Douglas-fir, lodgepole pine, western larch, and spruce. It can produce about 10,100 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 100 years, or it can produce 41,000 board feet (Scribner rule) of merchantable timber 12.6 inches or more in diameter in 140 years in an unmanaged mixed conifer stand based on the culmination of the mean annual increment. The main problem in managing timber is the erosion hazard. Conventional methods can be used for tree harvest, but logging roads, skid trails, and landings should be carefully planned to minimize soil loss.

This soil has potential for producing forage if the tree canopy is opened by logging, fire, or other disturbance. When the canopy is open or sparse, the main native forage plants include pine reedgrass, sedges, snowberry, and willow. Forage production can be increased and soil protected by seeding disturbed areas to suitable plants such as timothy, tall fescue, and orchardgrass. The vegetation should be managed to permit timber regeneration and to maintain enough litter for soil protection. This soil will produce forage for 10 to 15 years following opening of the canopy. During this period annual produc-

tion will vary from about 1,500 pounds of air-dry herbage per acre under an open canopy to less than 100 pounds per acre as the canopy closes.

Slope is the main restriction on the use of this soil for all construction and recreation. Use for septic tank absorption fields is also restricted by the moderately slow permeability of the subsoil.

This soil is in capability subclass VIe.

**36—Ericson-Rock outcrop complex.** This complex consists of very steep, south-facing soils and Rock outcrop on side slopes. Slopes are 40 to 65 percent. Elevation is 3,800 to 4,800 feet. This complex is about 45 percent Ericson loam, and 30 percent Rock outcrop.

Included in mapping are small areas where slopes are less than 45 percent and small areas of Jughandle loam.

The Ericson soil is very deep and well drained. It formed in granitic residuum and alluvium. The average annual precipitation is about 30 inches, the average annual air temperature is about 40 degrees F, and the frost-free period is about 60 days.

Typically the surface layer is brown loam about 2 inches thick. The subsurface layer is pale brown loam about 10 inches thick. The subsoil is yellowish brown loam and light yellowish brown fine gravelly loam to a depth of 60 inches or more.

Permeability is moderately slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is strongly acid throughout. Runoff is very rapid, and the hazard of erosion is very severe.

Rock outcrop consists of exposed schist, gneiss, quartz diorite, or similar granitic rock.

This complex is used for woodland and woodland grazing.

The Ericson soil is suited to subalpine fir, grand fir, Douglas-fir, lodgepole pine, western larch, and spruce. It can produce about 10,100 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 100 years, or it can produce 41,000 board feet (Scribner rule) of merchantable timber 12.6 inches or more in diameter in 140 years in an unmanaged mixed conifer stand based on the culmination of the mean annual increment. The main problems in managing timber are the very steep slopes, Rock outcrop, and very severe erosion hazard. Slopes are too steep for conventional methods of tree harvest. Specialized logging methods that cause the least soil disturbance should be used to prevent excessive soil loss. Road construction is also restricted by the very steep slopes. The Rock outcrop limits tree felling.

The Ericson soil has potential for producing forage if the canopy is opened by fire, logging, or other disturbance. When the canopy is open or sparse, the main native forage plants include pine reedgrass, sedges, snowberry, and willow. Forage production can be increased and soil protected by seeding disturbed areas to suitable plants such as timothy, tall fescue, and orchardgrass. The vegetation should be managed to permit timber regeneration and to maintain enough litter for soil



protection. The very steep slopes and Rock outcrop limit movement of livestock and accessibility of forage. This soil will produce forage for 10 to 15 years following opening of the canopy. During this period, annual production will vary from about 1,500 pounds of air-dry herbage per acre under an open canopy to less than 100 pounds as the canopy closes.

The very steep slopes and the Rock outcrop restrict the use of this complex for all construction and recreation.

This complex is in capability subclass VIIe.

**37—Fenn silty clay, 2 to 7 percent slopes.** This gently sloping soil is on a prairie. It is very deep and well drained. Elevation is 3,000 to 3,600 feet. This soil formed in alluvium from loess and possibly residuum from basalt. The average annual precipitation is about 22 inches, the average annual air temperature is about 46 degrees F, and the frost-free period is about 120 days.

Typically, the upper part of the surface layer is very dark gray silty clay 6 inches thick, and the lower part is very dark gray clay about 11 inches thick. The underlying material is dark grayish brown, brown, and dark brown clay to a depth of 63 inches. Segregated secondary lime occurs at 27 to 36 inches.

Included with this soil in mapping are small areas of Shebang and Nez Perce silt loams and Fenn Variant silty clay.

In this Fenn soil, permeability is slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is slightly acid and neutral in the surface layer and neutral and moderately alkaline in the underlying material. Runoff is medium, and the hazard of erosion is moderate.

This soil is used for winter wheat, barley, peas, clover seed, and some hay and pasture. No significant areas remain in native vegetation.

If this soil is properly managed, production of all locally grown crops is good. The high clay content of the surface layer limits the period during which tillage is easy. A restrictive layer in the subsoil retards the movement of water and the growth of roots. Soil can be conserved by growing annual crops, keeping tillage to a minimum, and returning crop residue to the soil. Crops of legume and grasses are suited to this soil and help control erosion. Nitrogen, sulfur, and sometimes phosphorus are necessary. Weed control is important.

This soil is well suited to pasture and hay. Under a high level of management, including a well balanced fertilization program, production is good. Grazing should be rotated during the growing season and a minimum height of stubble should be maintained. Timothy, meadow and creeping foxtail, tall fescue, and clover are suitable for planting.

The use of this soil for septic tank absorption fields is restricted by the slow permeability of the subsoil. Use for trench-type sanitary landfills and for daily cover for landfills are restricted by the high clay content. The design of

roads and dwellings should compensate for the shrink-swell potential of the soil and its inherent low strength. Excavation can be hindered by the high clay content. Embankment construction is restricted by the difficulty of compacting this soil.

The high clay content of this soil restricts the use of this soil for recreation.

This soil is in capability subclass IIe.

**38—Fenn silty clay, 7 to 25 percent slopes.** This sloping and moderately steep soil is on a prairie. It is very deep and well drained. Elevation is 3,000 to 3,600 feet. This soil formed in alluvium from loess and possibly residuum from basalt. The average annual precipitation is about 22 inches, the average annual air temperature is about 46 degrees F, and the frost-free period is about 120 days.

Typically, the upper part of the surface layer is very dark gray silty clay about 6 inches thick, and the lower part is very dark gray clay about 8 inches thick. The underlying material is dark grayish brown, brown, and dark brown clay to a depth of 63 inches. Segregated secondary lime is between depths of 27 and 63 inches.

Included with this soil in mapping are small areas of Shebang silt loams, areas where slopes are less than 7 percent, and a few small cobbly areas.

In this Fenn soil, permeability is slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is slightly acid and neutral in the surface layer and neutral and moderately alkaline in the subsoil. Runoff is rapid and the hazard of erosion is severe.

This soil is used for winter wheat, barley, peas, clover seed, and some hay and pasture. No significant areas remain in native vegetation.

If this soil is properly managed, production of all locally grown crops is good. Intensive tillage, as in summer-fallow practice, causes a severe erosion hazard. The high clay content in the surface layer limits the period during which tillage is easy. A restrictive layer in the subsoil retards the movement of water and the growth of roots. Soil can be conserved by growing annual crops such as small grains and peas, keeping tillage to a minimum, and returning crop residue to the soil. Grassed waterways prevent formation of gullies in the natural drainageways. Crops of legumes and grasses are also suited to this soil and help control erosion. Nitrogen, sulfur, and sometimes phosphorus are necessary. Weed control is important.

This soil is well suited to pasture and hay. Under a high level of management, including a well balanced fertilization program, production is good. Grazing should be rotated during the growing season, and a minimum height of stubble should be maintained. Timothy, meadow and creeping foxtail, tall fescue, and clover are suitable for planting.

The use of this soil for septic tank absorption fields is restricted by the slow permeability of the subsoil and by slope. Use for trench-type sanitary landfills and daily

cover is restricted by slope and the high clay content. The design of roads and dwellings should compensate for slope, the shrink-swell potential of the soil, and its inherent low strength. Excavation can be hindered by the high clay content.

Slope and the high clay content restrict use of this soil for recreation.

This soil is in capability subclass IIIe.

**39—Fenn very stony silty clay, 2 to 25 percent slopes.** This gently sloping to moderately steep soil is on a prairie. It is very deep and well drained. Elevation is 3,000 to 3,600 feet. This soil formed in alluvium from loess and possibly residuum from basalt. The average annual precipitation is about 22 inches, the average annual air temperature is about 46 degrees F, and the frost-free period is about 120 days.

Typically, the upper part of the surface layer is very dark gray very stony silty clay about 6 inches thick, and the lower part is very dark gray cobbly clay about 11 inches thick. The underlying material is dark grayish brown, brown, and dark brown cobbly clay to a depth of 63 inches. Segregated lime is between depths of 27 and 63 inches.

Included with this soil in mapping are small areas of Fenn silty clay, Shebang silt loam, Ferdinand very cobbly loam, and very stony soils.

In this Fenn soil, permeability is slow. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Reaction is slightly acid and neutral in the surface layer and neutral and moderately alkaline in the underlying material. Runoff is rapid, and the hazard of erosion is severe.

This soil is used for range.

The potential native vegetation is mainly California danthonia, ovalhead sedge, camas, and Idaho fescue. If range condition declines, the proportion of California danthonia and sedges decreases and the proportion of forbs and shrubs increases. Weeds and annual grasses become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition. This soil is wet late into spring. Grazing must be delayed until the soil is dry enough to resist trampling damage. Surface stones severely restrict use of equipment to prepare a seedbed.

In the steeper areas, slope restricts use of this soil for sanitary facilities. Use for septic tank absorption fields is restricted by the slow permeability of the subsoil. Sewage lagoon construction is restricted by slope. Sanitary landfill construction is restricted by the high clay content. The design of roads and dwellings should compensate for the shrink-swell potential of the soil and its inherent low strength. Excavation can also be hindered by the high clay content. Embankment construction is restricted by the large stones, the difficulty in compacting this soil, and slope.

The high clay content restricts use of this soil for recreation. Slope is a restriction in the steeper areas.

This soil is in capability subclass VIc.

**40—Fenn Variant silty clay, 0 to 7 percent slopes.**

This nearly level and gently sloping soil is on bottom lands. It is very deep and somewhat poorly drained. Elevation is 3,000 to 3,600 feet. This soil formed in alluvium from loess and residuum from basalt. The average annual precipitation is about 23 inches, the average annual air temperature is about 46 degrees F, and the frost-free period is about 120 days.

Typically, the upper part of the surface layer is very dark gray silty clay about 19 inches thick, and the lower part is dark grayish brown clay about 12 inches thick. The underlying material is gray silty clay to a depth of 65 inches.

Included with this soil in mapping are small areas of Fenn silty clay, Fenn stony silty clay, and Shebang silt loam.

In this Fenn Variant soil, permeability is slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is neutral and moderately alkaline in the surface layer and moderately alkaline and strongly alkaline in the underlying material. Runoff is slow, and the hazard of erosion is none to slight. A seasonal high water table is at a depth of 1.5 to 2.5 feet.

This soil is used for hay and pasture. No significant areas remain in native vegetation.

This soil is suited to long-term hay and pasture. Under a high level of management, including a balanced fertilization program, production is good. Nitrogen, sulfur, and possibly phosphorus are needed. Grazing should be rotated during the growing season, and a minimum height of stubble should be maintained. Meadow and creeping foxtail, timothy, and tall fescue are suitable for planting. This soil can be grazed only in summer because of wetness.

The use of this soil for septic tank absorption fields is restricted by the slow permeability of the subsoil and by the high water table. Sanitary landfill construction is restricted by the high water table and the high clay content. The design of roads and dwellings should compensate for the shrink-swell potential of the soil, its inherent low strength, and the high water table. Excavation and use of this soil as a source of topsoil can be hindered by the high clay content and the high water table. Embankment construction is restricted by the water table and the difficulty of compacting this soil.

The high clay content restricts the use of this soil for recreation.

This soil is in capability subclass IIw.

**41—Ferdinand silt loam, 2 to 7 percent slopes.** This gently sloping soil is on a prairie or in south-facing areas. It is moderately deep and well drained. Elevation is 2,000 to 4,300 feet. This soil formed in loess and residuum weathered from Columbia River Basalt or Seven Devils Volcanics. The average annual precipitation is about 22 inches, the average annual air temperature is about 47 degrees F, and the frost-free period is about 135 days.



Typically, the surface layer is dark grayish brown silt loam about 13 inches thick. The upper part of the subsoil is grayish brown cobbly silty clay loam about 6 inches thick, and the lower part is brown angular very cobbly silty clay about 13 inches thick. Basalt bedrock is at a depth of 32 inches.

Included with this soil in mapping are small areas of Nez Perce and Meland silt loams and a soil that is similar to Ferdinand soils but that has fewer cobbles in the subsoil.

In this Ferdinand soil, permeability is slow. Effective rooting depth is 20 to 40 inches. Available water capacity is low. Reaction is slightly acid and neutral throughout. Runoff is medium, and the hazard of erosion is moderate.

This soil is used mainly for winter wheat, barley, peas, and some hay and pasture. It is also used for range.

The moderate depth to bedrock and the cobbly subsoil somewhat restrict use of this soil for crops and influences production and choice of crops. Soil can be conserved by growing annual crops of small grain and peas if minimum tillage is practiced and crop residue is returned to the soil. Crops of legumes and grasses are also suited to this soil and help control erosion. Nitrogen, sulfur, and sometimes phosphorus are necessary. Weed control is important.

This soil is well suited to pasture and hay. Under a high level of management, including a well balanced fertilization program, production is good. Nitrogen, sulfur, and possibly phosphorus are needed. Grazing should be rotated during the growing season, and a minimum height of stubble should be maintained. Smooth brome, Latah orchardgrass, intermediate wheatgrass, and alfalfa are suitable for planting.

The potential native vegetation is mainly Idaho fescue, bluebunch wheatgrass, lupine, and balsamroot. If range condition declines, the proportion of Idaho fescue and bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and shrubs become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition.

The main restrictions on the use of this soil for sanitary facilities are the depth to rock and the slow permeability in the subsoil. The design of roads and dwellings should compensate for the depth to rock and the inherent low strength of the soil. The rooting depth and the slow permeability of the subsoil should be considered in designing grassed waterways and diversions.

This soil is suited to recreation, but the surface tends to be dusty when dry.

This soil is in capability subclass IVe.

#### **42—Ferdinand silt loam, 7 to 25 percent slopes.**

This sloping and moderately steep soil is in south-facing areas on elevated plateaus and canyon sides. It is moderately deep and well drained. Elevation is 2,000 to 4,300 feet. This soil formed in loess and residuum

weathered from Columbia River Basalt or Seven Devils Volcanics. The average annual precipitation is about 22 inches, the average annual air temperature is about 47 degrees F, and the frost-free period is about 135 days.

Typically, the surface layer is dark grayish brown silt loam about 13 inches thick. The upper part of the subsoil is grayish brown cobbly silty clay loam about 6 inches thick, and the lower part is brown angular very cobbly silty clay about 13 inches thick. Basalt bedrock is at a depth of 32 inches.

Included with this soil in mapping are small areas of Nez Perce and Meland silt loams and a soil that is similar to Ferdinand soils but that has fewer cobbles in the subsoil.

In this Ferdinand soil, permeability is slow. Effective rooting depth is 20 to 40 inches. Available water capacity is low. Reaction is slightly acid and neutral throughout. Runoff is rapid, and the hazard of erosion is severe.

This soil is used mainly for winter wheat, barley, peas, and some hay and pasture. It is also used for range.

The cobbly subsoil and moderate depth to bedrock somewhat restrict the use of this soil for crops and influences production. The hazard of erosion is severe if the soil is tilled extensively, as in summer-fallow practice. Soil can be conserved by growing annual crops of small grains or forage crops if tillage is kept to a minimum and crop residue is returned to the soil. Grassed waterways prevent formation of gullies in the natural drainageways. Contour farming, divided-slope farming, using gradient terraces, and field strip cropping also reduce erosion. Crops of legumes and grasses are also suited to this soil and help control erosion. Nitrogen, sulfur, and sometimes phosphorus are necessary. Weed control is important.

This soil is well suited to pasture and hay. Under a high level of management, including a well balanced fertilization program, production is good. Nitrogen, sulfur, and possibly phosphorus are needed. Grazing should be rotated during the growing season, and a minimum height of stubble should be maintained. Smooth brome, Latah orchardgrass, intermediate wheatgrass, and alfalfa are suitable for planting.

The potential native vegetation is mainly Idaho fescue, bluebunch wheatgrass, lupine, and arrowleaf balsamroot. If range condition declines, the proportion of Idaho fescue and bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and shrubs become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition.

The main restrictions on the use of this soil for sanitary facilities are the depth to rock, the slow permeability of the subsoil, and slope. The design of roads and dwellings should compensate for the depth to rock, slope, and the inherent low strength of the soil. Slope, rooting depth, and the slow permeability of the subsoil should be considered in designing grassed waterways and diversions.

Slope restricts use for most kinds of recreation. The surface tends to be dusty when dry.

This soil is in capability subclass IVe.

#### **43—Ferdinand silt loam, 25 to 40 percent slopes.**

This steep soil is on a prairie or in south-facing areas. It is moderately deep and well drained. Elevation is 2,000 to 4,300 feet. This soil formed in loess and residuum weathered from Columbia River Basalt or Seven Devils Volcanics. The average annual precipitation is about 22 inches, the average annual air temperature is about 47 degrees F, and the frost-free period is about 135 days.

Typically, the surface layer is dark grayish brown silt loam about 13 inches thick. The upper part of the subsoil is grayish brown cobbly silty clay loam about 6 inches thick, and the lower part is brown angular very cobbly silty clay about 13 inches thick. Basalt bedrock is at a depth of 32 inches.

Included with this soil in mapping are small areas where slopes are less than 25 percent and small areas of Meland silt loam.

In this Ferdinand soil, permeability is slow. Effective rooting depth is 20 to 40 inches. Available water capacity is low. Reaction is slightly acid and neutral throughout. Runoff is very rapid, and the hazard of erosion is very severe.

This soil is used mainly for hay and pasture. It is also used for range.

This soil is well suited to long-term pasture and hay. Under a high level of management, including a well balanced fertilization program, production is good. Nitrogen, sulfur, and possibly phosphorus are needed. Grazing should be rotated during the growing season, and a minimum height of stubble should be maintained. Smooth brome, Latar orchardgrass, intermediate wheatgrass, and alfalfa are suitable for planting.

The potential native vegetation is mainly Idaho fescue, bluebunch wheatgrass, lupine, and arrowleaf balsamroot. If range condition declines, the proportion of Idaho fescue and bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and shrubs become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition.

Slope is the main restriction on the use of this soil for all construction and recreation. Homesites and sanitary facilities are also limited by depth to rock and the slow permeability of the subsoil. The construction of roads and dwellings is also restricted by depth to rock and the inherent low strength of the soil.

This soil is in capability subclass VIe.

**44—Ferdinand-Bluesprin very cobbly loams.** This complex consists of very steep, south-facing soils on canyon sides. Slopes are 40 to 90 percent. Elevation is 2,200 to 4,300 feet. This complex is about 45 percent Ferdinand very cobbly loam and 35 percent Bluesprin very cobbly loam.

Included with these soils in mapping are small areas of Lawyer cobbly silt loam, Riggins very gravelly silt loam, and Rock outcrop.

The Ferdinand soil is moderately deep and well drained. It formed in loess and residuum from Columbia River Basalt or Seven Devils Volcanics. The average annual precipitation is about 22 inches, the average annual air temperature is about 47 degrees F, and the frost-free period is about 135 days.

Typically, the surface layer is dark grayish brown very cobbly loam 13 inches thick. The subsoil is grayish brown and brown angular very cobbly silty clay about 26 inches thick. Basalt bedrock is at a depth of 39 inches.

Permeability is slow. The effective rooting depth is 20 to 40 inches. Available water capacity is very low. Reaction is slightly acid and neutral throughout. Runoff is very rapid, and the hazard of erosion is very severe.

The Bluesprin soil is moderately deep and well drained. It formed in loess, colluvium, and residuum from basic igneous rock, mainly basalt and andesite. The average annual precipitation is about 18 inches, the average annual air temperature is 48 degrees F, and the frost-free period is about 140 days.

Typically, the surface layer is dark grayish brown very cobbly loam about 12 inches thick. The subsoil is dark yellowish brown very cobbly clay loam about 19 inches thick. Bedrock is at a depth of 31 inches.

Permeability is moderately slow. Effective rooting depth is 20 to 40 inches. Available water capacity is low. Reaction is slightly acid and neutral throughout. Runoff is very rapid, and the hazard of erosion is very severe.

This complex is used for range.

The potential native vegetation is mainly bluebunch wheatgrass, Idaho fescue, lupine, and arrowleaf balsamroot on the Ferdinand soil and bluebunch wheatgrass and Idaho fescue on the Bluesprin soil. If range condition declines, the proportion of bluebunch wheatgrass and Idaho fescue decreases and the proportion of forbs and shrubs increases. Weeds, shrubs, and annual plants become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition. Potential forage production is good, but the very steep slopes limit accessibility of forage and movement of livestock. Providing adequate water for livestock is often a problem in areas of the Bluesprin soil, especially during the hot, dry summer.

The very steep slopes restrict the use of these soils for all construction and recreation.

This complex is in capability subclass VIIe.

**45—Ferdinand-Flybow-Riggins complex.** This complex consists of moderately sloping to steep, south-facing soils on edges of canyons. Slopes are 7 to 40 percent. Elevation is 3,500 to 4,300 feet. This complex is about 40 percent Ferdinand silt loam, 25 percent Flybow very cobbly loam, and 20 percent Riggins very gravelly silt loam.



Included with these soils in mapping are small areas of Meland silt loam.

The Ferdinand soil is moderately deep and well drained. It formed in loess and residuum from Columbia River Basalt or Seven Devils Volcanics. The average annual precipitation is about 22 inches, the average annual air temperature is about 47 degrees F, and the frost-free period is about 135 days.

Typically, the surface layer is dark grayish brown silt loam about 13 inches thick. The upper part of the subsoil is grayish brown cobbly silty clay loam about 6 inches thick, and the lower part is brown angular very cobbly silty clay about 13 inches thick. Basalt bedrock is at a depth of 32 inches.

Permeability is slow. The effective rooting depth is 20 to 40 inches. Available water capacity is low. Reaction is slightly acid and neutral throughout. Runoff is rapid and very rapid, and the hazard of erosion is severe and very severe.

The Flybow soil is very shallow and well drained. It formed in basalt residuum. The average annual precipitation is about 19 inches, the average annual air temperature is about 47 degrees F, and the frost-free period is about 140 days.

Typically, the surface layer is dark yellowish brown very cobbly loam. Basalt bedrock is at a depth of 5 inches.

Permeability is moderate. The effective rooting depth is 4 to 10 inches. Available water capacity is very low. Reaction is slightly acid throughout. Runoff is rapid and very rapid, and the hazard of erosion is severe.

The Riggins soil is shallow and well drained. It formed in loess and colluvium and residuum from Columbia River Basalt or Seven Devils Volcanics. The average annual precipitation is about 18 inches, the average annual air temperature is about 48 degrees F, and the frost-free period is about 140 days.

Typically, the surface layer is dark grayish brown very gravelly silt loam about 8 inches thick. The subsoil is brown very gravelly clay loam about 5 inches thick. Basalt bedrock is at a depth of about 13 inches.

Permeability is moderately slow. The effective rooting depth is 10 to 20 inches. Available water capacity is very low. Reaction is neutral throughout. Surface runoff is rapid and very rapid, and the erosion hazard is severe and very severe.

This complex is used for range.

The potential native vegetation on the Ferdinand soil is mainly Idaho fescue, bluebunch wheatgrass, lupine, and arrowleaf balsamroot. If range condition declines, the proportion of Idaho fescue and bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and shrubs become more abundant as range condition declines further. Potential forage production is good.

The potential native vegetation on the Flybow soil is mainly bluebunch wheatgrass, Sandberg bluegrass, and cutleaf balsamroot. If range condition declines, the pro-

portion of bluebunch wheatgrass and Sandberg bluegrass decreases and the proportion of forbs increases. Weeds and annuals become more abundant if range condition declines further. The other soils, being deeper, produce more forage than this soil.

The potential native vegetation on the Riggins soil is mainly bluebunch wheatgrass, Idaho fescue, and Sandberg bluegrass. If range condition declines, the proportion of Idaho fescue and bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and annual grasses become more abundant if range condition declines further.

A planned grazing system is essential in maintaining or improving range condition. Movement of livestock and accessibility of forage are somewhat limited on the steeper slopes.

The main restrictions on use of these soils for construction and recreation are slope in the steeper areas and the depth to rock. The slow permeability of the Ferdinand subsoil and the moderately slow permeability of the Riggins soil also limit use for septic tank absorption fields.

This complex is in capability subclass VIs.

**46—Ferdinand-Riggins complex.** This complex consists of moderately sloping to steep soils on elevated plateaus. Slopes are 7 to 40 percent. Elevation is 2,500 to 4,300 feet. This complex is about 45 percent Ferdinand silt loam and 30 percent Riggins very gravelly silt loam.

Included with these soils in mapping are small areas of Meland silt loam, Flybow very cobbly loam, and a soil that is similar to Riggins soils but that has a clayey subsoil with rock fragments.

The Ferdinand soil is moderately deep and well drained. It formed in loess and residuum from Columbia River Basalt or Seven Devils Volcanics. The average annual precipitation is about 22 inches, the average annual air temperature is about 47 degrees F, and the frost-free period is about 135 days.

Typically, the surface layer is dark grayish brown silt loam about 13 inches thick. The upper part of the subsoil is grayish brown cobbly silty clay loam about 6 inches thick, and the lower part is brown angular very cobbly silty clay about 13 inches thick. Basalt bedrock is at a depth of 32 inches.

Permeability is slow. The effective rooting depth is 20 to 40 inches. Available water capacity is low. Reaction is slightly acid and neutral throughout. Runoff is rapid and very rapid, and the hazard of erosion is severe and very severe.

The Riggins soil is shallow and well drained. It formed in loess and residuum from Columbia River Basalt or Seven Devils Volcanics. The average annual precipitation is about 18 inches, the average annual air temperature is about 48 degrees F, and the frost-free period is about 140 days.

Typically, the surface layer is dark grayish brown very gravelly silt loam about 8 inches thick. The subsoil is

brown very gravelly clay loam about 5 inches thick. Basalt bedrock is at a depth of 13 inches.

Permeability is moderately slow. The effective rooting depth is 10 to 20 inches. Available water capacity is very low. Reaction is neutral throughout. Runoff is rapid and very rapid, and the hazard of erosion is severe and very severe.

This complex is used mainly for range. It is also used for hay and pasture.

These soils are suited to long-term pasture and hay. Under a high level of management, including a well balanced fertilization program, production is good. Nitrogen, sulfur, and possibly phosphorus are needed. Grazing should be rotated during the growing season, and a minimum height of stubble should be maintained. Smooth brome, Latar orchardgrass, intermediate wheatgrass, and alfalfa are suitable for planting.

The potential native vegetation on the Ferdinand soil is mainly Idaho fescue, bluebunch wheatgrass, lupine, and balsamroot. If range condition declines, the proportion of Idaho fescue and bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and shrubs become more abundant if range condition declines further. Potential forage production is good.

The potential native vegetation on the Riggins soil is mainly bluebunch wheatgrass, Idaho fescue, and Sandberg bluegrass. If range condition declines, the proportion of Idaho fescue and bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and annual grasses become more abundant if range condition declines further.

A planned grazing system is essential in maintaining or improving range condition. Movement of livestock and accessibility of forage may be limited in the steeper areas.

The main restrictions on use of these soils for all construction and recreation are slope in the steeper areas and the depth to rock. The slow permeability and moderately slow permeability of the subsoil also limit use for septic tank absorption fields.

This complex is in capability subclass VIe.

**47—Jacket silt loam, 3 to 7 percent slopes.** This gently sloping soil is on benches and broad ridges in canyons. It is very deep and well drained. Elevation is 1,200 to 3,000 feet. This soil formed in loess and colluvium and residuum from Columbia River Basalt. The average annual precipitation is about 24 inches, the average annual air temperature is about 45 degrees F, and the frost-free period is about 120 days.

Typically, the surface layer is very dark grayish brown silt loam about 17 inches thick. The upper part of the subsoil is brown silty clay loam about 13 inches thick, and the lower part, to a depth of 63 inches, is brown silty clay with a few basalt pebbles and cobbles.

Included with this soil in mapping are small areas of Ferdinand silt loam and Nez Perce silt loam.

In this Jacket soil, permeability is slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is neutral in the surface layer and slightly acid and medium acid in the subsoil. Runoff is medium, and the hazard of erosion is moderate.

This soil is used mainly for hay, pasture, barley, and winter wheat. It is also used for range. This soil has a sparse stand of ponderosa pine in many places.

If the soil is properly managed, production of all locally grown crops is good. A restrictive layer in the subsoil retards the movement of water and the growth of roots. Soil can be conserved by growing annual crops of small grains and peas, keeping tillage to a minimum, and returning crop residue to the soil. Grassed waterways prevent formation of gullies in the natural drainageways. Crops of legumes and grasses are also suited to this soil and help control erosion. Nitrogen, sulfur, and sometimes phosphorus are necessary. Weed control is important.

This soil is well suited to pasture and hay. Under a high level of management, including a well balanced fertilization program, production is good. Grazing should be rotated during the growing season, and a minimum height of stubble should be maintained. Latar orchardgrass, smooth brome, Regar brome, intermediate wheatgrass, and alfalfa are suitable for planting.

The potential native vegetation is mainly Idaho fescue, hawthorn, and snowberry. If range condition declines, the proportion of Idaho fescue and bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and shrubs become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition. Mechanical seeding is possible.

The main restrictions on the use of this soil for homesites is the high shrink-swell potential of the subsoil. Use for sanitary facilities is restricted by the slow permeability. The design of roads should compensate for the shrink-swell potential of the soil and its low strength. Excavation can be hindered by the high clay content of the subsoil.

This soil is suited for most kinds of recreation, but the surface tends to be dusty when dry. Slope restricts use for playgrounds.

This soil is in capability subclass IIe.

**48—Jacket silt loam, 7 to 12 percent slopes.** This sloping soil is on benches and broad ridges in canyons. It is very deep and well drained. Elevation is 1,200 to 3,000 feet. This soil formed in loess and colluvium and residuum from Columbia River Basalt. The average annual precipitation is about 24 inches, the average annual air temperature is about 45 degrees F, and the frost-free period is about 120 days.

Typically, the surface layer is very dark grayish brown silt loam about 17 inches thick. The upper part of the subsoil is brown silty clay loam about 13 inches thick, and the lower part to a depth of 63 inches, is brown silty clay with a few basalt pebbles and cobbles.



Included with this soil in mapping are small areas of Ferdinand silt loam, Bluesprink silt loam, and Keuterville gravelly loam.

In this Jacket soil, permeability is slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is neutral in the surface layer and slightly acid and medium acid in the subsoil. Runoff is rapid, and the hazard of erosion is severe.

This soil is used mainly for hay, pasture, barley, and winter wheat. It is also used for range. This soil has a sparse stand of ponderosa pine in some places.

If this soil is properly managed, production of all locally grown crops is good. A restrictive layer in the subsoil retards the movement of water and the growth of roots. Soil can be conserved by growing annual crops of small grains and peas, keeping tillage to a minimum, and returning crop residue to the soil. Grassed waterways prevent formation of gullies in the natural drainageways. Structures are needed to control erosion and sediment. Crops of legumes and grasses are suited to this soil and help control erosion. Nitrogen, sulfur, and sometimes phosphorus are necessary. Weed control is important.

This soil is well suited to pasture and hay. Under a high level of management, including a well balanced fertilization program, production is good. Grazing should be rotated during the growing season, and a minimum height of stubble should be maintained. Latar orchard-grass, smooth brome, Regar brome, intermediate wheat-grass, and alfalfa are suitable for planting.

The potential native vegetation is mainly Idaho fescue, hawthorn, and snowberry. If range condition declines, the proportion of Idaho fescue and bluebunch wheat-grass decreases and the proportion of forbs and shrubs increases. Weeds and shrubs become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition. Mechanical seeding is possible.

The main restrictions on use of this soil for homesites is the high shrink-swell potential of the subsoil. Use for sanitary facilities is restricted by the slow permeability. The design of roads should compensate for the shrink-swell potential of the soil and its low strength. Excavation can be hindered by the high clay content.

Use of this soil for recreation is limited mainly by slope and the tendency of the surface to be dusty when dry.

This soil is in capability subclass IIIe.

**49—Jacket silt loam, 12 to 25 percent slopes.** This moderately steep soil is on benches and broad ridges in canyons. It is very deep and well drained. Elevation is 1,200 to 3,000 feet. This soil formed in loess and colluvium and residuum from Columbia River Basalt. The average annual precipitation is about 24 inches, the average annual air temperature is about 45 degrees F, and the frost-free period is about 120 days.

Typically, the surface layer is very dark grayish brown silt loam about 17 inches thick. The upper part of the subsoil is brown silty clay loam about 13 inches thick,

and the lower part, to a depth of 63 inches, is brown silty clay with a few basalt pebbles and cobbles.

Included with this soil in mapping are small areas of Ferdinand silt loam, Bluesprink silt loam, and Keuterville gravelly loam.

In this Jacket soil, permeability is slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is neutral in the surface layer and slightly acid and medium acid in the subsoil. Runoff is rapid, and the hazard of erosion is severe.

This soil is used mainly for hay, pasture, barley, and winter wheat. It is also used for range. This soil has a sparse stand of ponderosa pine in many places.

If this soil is properly managed, production of all locally grown crops is good. The hazard of erosion is severe if the soil is tilled intensively, as in summer-fallow practice. A restrictive layer in the subsoil retards the movement of water and the growth of roots. Soil can be conserved by growing annual crops of small grains and peas if minimum tillage is practiced and crop residue is returned to the soil. Grassed waterways prevent formation of gullies in the natural drainageways. Structures are needed to control erosion and sediment. Contour farming, divided-slope farming, using gradient terraces, and field strip-cropping also reduce erosion. Legume and grass crops are also suited to this soil and help control erosion. Nitrogen, sulfur, and sometimes phosphorus are necessary. Weed control is important.

This soil is well suited to pasture and hay. Under a high level of management, including a well balanced fertilization program, production is good. Grazing should be rotated during the growing season, and a minimum height of stubble should be maintained. Latar orchard-grass, smooth brome, Regar brome, intermediate wheat-grass, and alfalfa are suitable for planting.

The potential native vegetation is mainly Idaho fescue, black hawthorn, and common snowberry. If range condition declines, the proportion of Idaho fescue and bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and shrubs become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition. Mechanical seeding is possible.

The main restrictions on use of this soil for homesites are the high shrink-swell potential in the subsoil and slope. Use for sanitary facilities is restricted by the slow permeability and slope. The design of roads should compensate for the shrink-swell potential, low strength, and slope. Excavation can be hindered by the high clay content and slope.

Slope is the main restriction on use for recreation. This soil can be used for paths and trails.

This soil is in capability subclass IIIe.

**50—Jacket silt loam, 25 to 40 percent slopes.** This steep soil is on canyonsides. It is very deep and well drained. Elevation is 1,200 to 3,000 feet. This soil formed in loess and colluvium and residuum from Columbia

River Basalt. The average annual precipitation is about 24 inches, the average annual air temperature is about 45 degrees F, and the frost-free period is about 120 days.

Typically, the surface layer is very dark grayish brown silt loam about 17 inches thick. The upper part of the subsoil is brown silty clay loam about 13 inches thick, and the lower part, to a depth of 63 inches, is brown silty clay with a few basalt pebbles and cobbles.

Included with this soil in mapping are small areas of Ferdinand silt loam, Bluesprings silt loam, Klickson silt loam, and Keuterville gravelly loam.

In this Jacket soil, permeability is slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is neutral in the surface layer and slightly acid and medium acid in the subsoil. Runoff is very rapid, and the hazard of erosion is very severe.

This soil is used mainly for hay, pasture, barley, and winter wheat. It is also used for range. This soil has a sparse stand of ponderosa pine in some areas.

If this soil is properly managed, production of all locally grown crops is good. The hazard of erosion is very severe if the soil is tilled intensively, as in summer-fallow practice. A restrictive layer in the subsoil retards the movement of water and the growth of roots. Soil can be conserved by keeping a permanent cover crop on the soil at least half of the time, annual cropping, cross-slope farming, keeping tillage to a minimum, and returning crop residue to the soil. Grassed waterways prevent formation of gullies in the natural drainageways. Contour farming, divided-slope farming, using gradient terraces, field strip cropping, and building structures for water and sediment control also reduce erosion. Chiseling in the stubble in fall helps to slow runoff and reduce soil loss in years when the snow melts rapidly while the surface is frozen. Crops of legumes and grasses can also be grown and help to control erosion. Nitrogen, sulfur, and sometimes phosphorus are necessary. Weed control is important.

This soil is well suited to pasture and hay. Under a high level of management, including a well balanced fertilization program, production is good. Grazing should be rotated during the growing season and a minimum height of stubble should be maintained. Latar orchardgrass, smooth brome, Regar brome, intermediate wheatgrass, and alfalfa are suitable for planting.

The potential native vegetation is mainly Idaho fescue, hawthorn, and snowberry. If range condition declines, the proportion of Idaho fescue and bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and shrubs become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition. Mechanical seeding is possible.

Slope is the main restriction on use of this soil for all construction. Homesites are also limited by the high shrink-swell potential. Use for sanitary facilities is restricted by the slow permeability of the subsoil. The design of

roads should compensate for the shrink-swell potential, the low strength of the soil, and slope. Excavation can be hindered by the high clay content in the subsoil and by slope.

The steep slopes restrict use of this soil for recreation.

This soil is in capability subclass IVe.

**51—Jacket Variant silt loam, 7 to 12 percent slopes.** This sloping soil is on high river terraces. It is very deep and well drained. Elevation is about 1,300 feet. This soil formed in loess and some granitic residuum. The average annual precipitation is about 24 inches, the average annual air temperature is about 51 degrees F, and the frost-free period is about 160 days.

Typically, the surface layer is dark grayish brown and brown silt loam about 30 inches thick. The upper part of the subsoil is light yellowish brown silt loam about 22 inches thick, and the lower part is reddish yellow silty clay loam to a depth of 60 inches.

Included with this soil in mapping are small areas where slopes are less than 7 percent or more than 12 percent and small areas of a soil that is similar to Jacket Variant soils but that has more than 15 percent sand coarser than very fine sand in the subsoil.

In this Jacket Variant soil, permeability is moderate. Effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is neutral throughout. Runoff is rapid, and the hazard of erosion is severe.

This soil is used mainly for hay, pasture, barley, and winter wheat. It is also used for range. This soil has a sparse stand of ponderosa pine in many areas.

If this soil is properly managed, production of all locally grown crops is good. The hazard of erosion is severe if the soil is tilled intensively, as in summer-fallow practice. Soil is conserved by growing annual crops of small grains and peas, keeping tillage to a minimum, and returning crop residue to the soil. Grassed waterways prevent formation of gullies in the natural drainageways. Crops of legumes and grasses are also suited to this soil and help control erosion. Nitrogen, sulfur, and sometimes phosphorus are necessary. Weed control is important.

This soil is well suited to hay and pasture. Under a high level of management, production is good. A well balanced fertilization program is needed. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Latar orchardgrass, smooth brome, Regar brome, intermediate wheatgrass, and alfalfa are suitable for planting.

The potential native vegetation is mainly Idaho fescue, hawthorn, and snowberry. If range condition declines, the proportion of Idaho fescue and bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and shrubs become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition. Mechanical seeding is possible.



Slope is the main restriction on the use of this soil for all construction. Use for roads is restricted by potential frost action.

Slope is the main restriction on use for recreation. The tendency of this soil to be dusty when dry also limits recreation. Use for playgrounds is severely restricted by slope.

This soil is in capability subclass IIIe.

**52—Jacket Variant silt loam, 12 to 25 percent slopes.** This moderately steep soil is on high river terraces. It is very deep and well drained. Elevation is about 1,300 feet. This soil formed in loess and some granitic residuum. The average annual precipitation is about 24 inches, the average annual air temperature is about 51 degrees F, and the frost-free period is about 160 days.

Typically, the surface layer is dark grayish brown and brown silt loam about 30 inches thick. The upper part of the subsoil is light yellowish brown silt loam about 22 inches thick, and the lower part is reddish yellow silty clay loam to a depth of 60 inches.

Included with this soil in mapping are small areas where slopes are less than 12 percent or more than 25 percent and small areas of a soil that is similar to Jacket Variant soils but that has more than 15 percent sand coarser than very fine sand in the subsoil.

In this Jacket Variant soil, permeability is moderate. Effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is neutral throughout. Runoff is rapid, and the hazard of erosion is severe.

This soil is used mainly for hay, pasture, barley, and winter wheat. It is also used for range. This soil has a sparse stand of ponderosa pine in many areas.

If this soil is properly managed, production of all locally grown crops is good. The hazard of erosion is severe if the soil is tilled intensively, as in summer-fallow practice. Soil can be conserved by growing annual crops of small grains or peas, keeping tillage to a minimum, and returning crop residue to the soil. Grassed waterways prevent formation of gullies in the natural drainageways. Crops of legumes and grasses are also suited to this soil and help control erosion. Nitrogen, sulfur, and sometimes phosphorus are necessary. Weed control is important.

This soil is well suited to hay and pasture. Under a high level of management, production is good. A well balanced fertilization program is needed. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Latac orchardgrass, smooth brome, Regar brome, intermediate wheatgrass, and alfalfa are suitable for planting.

The potential native vegetation is mainly Idaho fescue, hawthorn, and snowberry. If range condition declines, the proportion of Idaho fescue and bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and shrubs become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition. Mechanical seeding is possible.

Slope is the main restriction on use of this soil for all construction. Use for roads and dwellings is restricted by slope and potential frost action.

Slope is the main restriction on use for recreation. The tendency of this soil to be dusty when dry also limits use for paths and trails.

This soil is in capability subclass IIIe.

**53—Jacket Variant silt loam, 25 to 40 percent slopes.** This steep soil is on high terraces. It is very deep and well drained. Elevation is about 1,300 feet. This soil formed in loess and some granitic residuum. The average annual precipitation is about 24 inches, the average annual air temperature is about 51 degrees F, and the frost-free period is about 160 days.

Typically, the surface layer is dark grayish brown and brown silt loam about 30 inches thick. The upper part of the subsoil is light yellowish brown silt loam about 22 inches thick, and the lower part is reddish yellow silty clay loam to a depth of 60 inches.

Included with this soil in mapping are small areas where slopes are less than 25 percent and small areas of soil that is similar to Jacket Variant soils but that has more than 15 percent sand coarser than very fine sand in the subsoil.

In this Jacket Variant soil, permeability is moderate. Effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is neutral throughout. Runoff is very rapid, and the hazard of erosion is very severe.

This soil is used for hay, pasture, and range. This soil has a sparse stand of ponderosa pine in many areas.

This soil is well suited to hay and pasture. Under a high level of management, production is good. A well balanced fertilization program is needed. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Latac orchardgrass, smooth brome, Regar brome, intermediate wheatgrass, and alfalfa are suitable for planting.

The potential native vegetation is mainly Idaho fescue, hawthorn, and snowberry. If range condition declines, the proportion of Idaho fescue and bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and shrubs become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition. Mechanical seeding is possible.

Slope is the main restriction on use of this soil for all construction and recreation.

This soil is in capability subclass VIe.

**54—Johnson loam, 7 to 25 percent slopes.** This sloping and moderately steep soil is on plateaus and mountainsides in timbered areas bordering grasslands. It is very deep and well drained. Elevation is 2,800 to 4,500 feet. This soil formed in loess and residuum from granitic rocks. The average annual precipitation is about 24 inches, the average annual air temperature is about

45 degrees F, and the frost-free period is about 100 days.

Typically, the surface layer is very dark grayish brown and dark brown loam about 19 inches thick. The upper part of the subsoil is brown loam about 20 inches thick, and the lower part is brown clay loam and loam to a depth of 60 inches.

Included with this soil in mapping are small areas of Brownlee loam, Naz silt loam, and a soil that is similar to Johnson loam but that is not as deep.

In this Johnson soil, permeability is moderate. Effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is medium acid in the surface layer and neutral and slightly acid in the subsoil. Runoff is rapid, and the hazard of erosion is severe.

This soil is used mainly for hay and pasture. It is also used for woodland and woodland grazing.

After timber is harvested from this soil, the area can be converted to pasture and hay. Under a high level of management, production is good. A well balanced fertilization program is needed. Nitrogen and sulfur is essential. If legumes are included in the stand, phosphorus is also needed. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Intermediate wheatgrass, Regar brome, Latar orchardgrass, and alfalfa are suitable for planting.

This soil is suited to ponderosa pine. It can produce about 3,400 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 40 years, or it can produce 38,000 board feet (Scribner rule) of merchantable timber 11.6 inches or more in diameter in 130 years in an unmanaged stand based on the culmination of the mean annual increment. Conventional methods can be used for tree harvest, but roads, skid trails, and landings must be carefully planned to minimize soil loss.

This soil has excellent potential for producing forage. The overstory is normally quite open, allowing ample light to reach the understory. The potential native understory is mainly Idaho fescue, bluebunch wheatgrass, snowberry, and various forbs. If grazing is excessive, the proportion of Idaho fescue and bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and annual plants become more abundant if grazing condition further declines. The vegetation should be managed to permit timber regeneration and to maintain enough litter for soil protection. A planned grazing system is essential. This soil will produce forage for livestock almost continually if managed as a woodlot. Depending on the level of management, annual production varies from 1,400 pounds of air-dry herbage per acre to less than 500 pounds.

Slope is the main restriction on use of this soil for homesites, roads, and sanitary facilities. This soil is suitable as a potential source of topsoil.

This soil can be used for paths and trails. Slope restricts use for other kinds of recreation.

This soil is in capability subclass IVe.

**55—Johnson loam, 25 to 40 percent slopes.** This steep soil is on plateaus and mountainsides in timbered areas bordering grasslands. It is very deep and well drained. Elevation is 2,800 to 4,500 feet. This soil formed in loess and residuum from granitic rocks. The average annual precipitation is about 24 inches, the average annual air temperature is about 45 degrees F, and the frost-free period is about 100 days.

Typically, the surface layer is very dark grayish brown and dark brown loam about 19 inches thick. The upper part of the subsoil is brown loam about 20 inches thick, and the lower part is brown clay loam and loam to a depth of 60 inches.

Included with this soil in mapping are small areas of Brownlee loam, Naz silt loam, Spokel very gravelly loam, and a soil that is similar to Johnson loam but that is not as deep.

In this Johnson soil, permeability is moderate. Effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is medium acid in the surface layer and neutral and slightly acid in the subsoil. Runoff is very rapid, and the hazard of erosion is very severe.

This soil is used for hay, pasture, woodland, and woodland grazing.

After timber is harvested from this soil, the area can be converted to pasture and hay. Under a high level of management, production is good. A well balanced fertilization program is needed. Nitrogen and sulfur are essential. If legumes are included in the stand, phosphorus is also needed. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Intermediate wheatgrass, Regar brome, Latar orchardgrass, and alfalfa are suitable for planting.

This soil is suited to ponderosa pine. It can produce about 3,400 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 40 years, or it can produce 38,000 board feet (Scribner rule) of merchantable timber 11.6 inches or more in diameter in 130 years in an unmanaged stand based on the culmination of the mean annual increment. The main problem in managing timber is the erosion hazard. Conventional methods can be used for harvest, but roads, skid trails, and landings should be carefully planned to minimize soil loss.

This soil has excellent potential for producing forage suitable for grazing. The overstory is normally quite open, allowing ample light to reach the understory. The potential native understory is mainly Idaho fescue, bluebunch wheatgrass, snowberry, and various forbs. If grazing is excessive, the proportion of Idaho fescue and bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and annual plants become more abundant if grazing condition declines further. The vegetation should be managed to permit timber regeneration and maintain enough litter for soil protection. A planned grazing system is essential. This soil will produce forage for livestock almost continually if managed as a woodlot. Depending on the level of management, annual production varies from 1,400 pounds of air-dry herbage per acre to less than 500 pounds.



Slope is the main restriction on the use of this soil for all construction and recreation.

This soil is in capability subclass VIe.

**56—Jughandle loam, cool, 7 to 40 percent slopes.**

This sloping to steep soil is on mountainsides. It is deep and somewhat excessively drained. Elevation is 4,000 to 5,600 feet. This soil formed in volcanic ash and residuum from granitic rocks. The average annual precipitation is about 34 inches, the average annual air temperature is about 38 degrees F, and the frost-free period is about 50 days.

Typically, the surface layer is brown loam about 11 inches thick. The underlying material is pale brown and light brown loam and sandy loam about 30 inches thick. Decomposing granitic gneiss is at a depth of 41 inches.

Included with this soil in mapping are small areas where slopes are more than 40 percent, small areas of Ericson loam, and occasional areas of Rock outcrop.

In this Jughandle soil, permeability is moderately rapid. Effective rooting depth is 40 to 60 inches. Available water capacity is moderate. Reaction is medium acid throughout. Runoff is rapid and very rapid, and the hazard of erosion is severe and highly severe.

This soil is used for woodland and woodland grazing.

This soil is suited to subalpine fir, grand fir, Douglas-fir, lodgepole pine, western larch, and spruce. It can produce about 10,100 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 100 years, or it can produce 41,000 board feet (Scribner rule) of merchantable timber 12.6 inches or more in diameter in 140 years in an unmanaged mixed conifer stand based on the culmination of the mean annual increment. The main problem in managing timber is the erosion hazard. Conventional methods can be used for tree harvest, but logging roads, skids trails, and landings should be carefully planned to minimize soil loss.

This soil has potential for producing forage if the canopy is opened by logging, fire, or other disturbance. When the canopy is open or sparse, the native forage plants include elk sedge, Columbia brome, willow, and snowberry. Forage production can be increased and soil protected by seeding disturbed areas to suitable plants such as timothy, orchardgrass, tall fescue, and White Dutch clover. The vegetation should be managed to permit timber regeneration and to maintain enough litter for soil protection. This soil will produce forage for 5 to 10 years following opening of the canopy. During this period, annual production will vary from about 1,200 pounds of air-dry herbage per acre under an open canopy to less than 100 pounds as the canopy closes.

Slope is the main restriction on use of this soil for all construction and recreation.

This soil is in capability subclass VIe.

**57—Jughandle loam, cool, 40 to 90 percent slopes.**

This very steep soil is on mountainsides. It is deep and somewhat excessively drained. Elevation is 4,000 to

5,600 feet. This soil formed in volcanic ash and residuum from granitic rocks. The average annual precipitation is about 34 inches, the average annual air temperature is about 38 degrees F, and the frost-free period is about 50 days.

Typically, the surface layer is brown loam about 11 inches thick. The underlying material is pale brown and light brown loam and sandy loam about 30 inches thick. Decomposing granitic gneiss is at a depth of 41 inches.

Included with this soil in mapping are small areas where slopes are less than 40 percent, small areas of Ericson loam, and occasional areas of Rock outcrop.

In this Jughandle soil, permeability is moderately rapid. Effective rooting depth is 40 to 60 inches. Available water capacity is moderate. Reaction is medium acid throughout. Runoff is very rapid, and the hazard of erosion is very severe.

This soil is used for woodland and woodland grazing.

This soil is suited to subalpine fir, grand fir, Douglas-fir, lodgepole pine, western larch, and spruce. It can produce about 10,100 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 100 years, or it can produce about 41,000 board feet (Scribner rule) of merchantable timber 12.6 inches or more in diameter in 140 years in an unmanaged mixed conifer stand based upon the culmination of the mean annual increment. The main problems in managing timber are the very steep slopes and the very severe erosion hazard. This soil is too steep for conventional methods of tree harvest. Specialized logging methods that cause the least soil disturbance should be used to prevent excessive soil loss. Road construction is also restricted by the very steep slopes.

This soil has potential for producing forage if the canopy is opened by fire or logging. When the canopy is opened or sparse, the main native forage plants include elk sedge, Columbia brome, and willow. Forage production can be increased by seeding disturbed areas to suitable plants such as tall fescue, orchardgrass, timothy, and White Dutch clover. The vegetation should be managed to permit timber regeneration and to maintain enough litter for soil protection. The very steep slopes limit movement of livestock and accessibility of forage. Once the canopy is opened this soil will produce forage for 5 to 10 years. During this period, annual production will vary from about 1,200 pounds of air-dry herbage per acre under an open canopy to less than 100 pounds per acre as the canopy closes.

The very steep slopes restrict use of this soil for all construction and recreation.

This soil is in capability subclass VIIe.

**58—Jughandle-Ericson association.** This association consists of very steep soils on mountainsides. Slopes are 40 to 90 percent. Elevation is 4,000 to 4,800 feet. This association is about 55 percent Jughandle loam, cool, and 30 percent Ericson loam. The Jughandle soil is north facing, and the Ericson soil is south facing.

Included with these soils in mapping are small areas where slopes are less than 40 percent and areas of Rock outcrop.

The Jughandle soil is deep to decomposing granitic rock and is somewhat excessively drained. It formed in volcanic ash and residuum weathered from granitic rock. The average annual precipitation is about 34 inches, the average annual air temperature is about 38 degrees F, and the frost-free period is about 50 days.

Typically the surface layer is brown loam about 11 inches thick. The underlying material is pale brown and light brown loam and sandy loam. Decomposing granitic gneiss is at a depth of 41 inches.

Permeability is moderately rapid. The effective rooting depth is 40 to 60 inches. Available water capacity is moderate. Reaction is medium acid throughout. Runoff is very rapid, and the hazard of erosion is very severe.

The Ericson soil is very deep and well drained. It formed in granitic residuum and alluvium. The average annual precipitation is about 30 inches, the average annual air temperature is about 40 degrees F, and the frost-free period is about 60 days.

Typically, the surface layer is brown loam about 2 inches thick. The subsurface layer is pale brown loam about 10 inches thick. The subsoil is yellowish brown and light yellowish brown loam and fine gravelly loam to a depth of 60 inches or more.

Permeability is moderately slow. The effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is strongly acid throughout. Runoff is very rapid, and the hazard of erosion is very severe.

This association is used for woodland and woodland grazing.

These soils are suited to subalpine fir, grand fir, Douglas-fir, lodgepole pine, western larch, and spruce. They can produce about 10,100 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 100 years, or they can produce 41,000 board feet (Scribner rule) of merchantable timber 12.6 inches or more in diameter in 140 years in an unmanaged mixed conifer stand based upon the culmination of the mean annual increment. The main problems in managing timber are the very steep slopes and very severe erosion hazard. These soils are too steep for conventional methods of tree harvest. Specialized logging methods that cause the least soil disturbance should be used to prevent excessive soil loss. Road construction is also restricted by the very steep slopes.

These soils have potential for producing forage if the canopy is opened by logging, fire, or other disturbance. When the canopy is open and sparse, the main native forage plants include elk sedge, Columbia brome, and willow on the Jughandle soil and pine reedgrass, sedges, snowberry, and willow on the Ericson soil. Forage production can be increased and soil protected by seeding disturbed areas to suitable plants, including tall fescue, orchardgrass, timothy, and White Dutch clover on the Jughandle soil and timothy, tall fescue, and orchardgrass

on the Ericson soil. The vegetation should be managed to permit timber regeneration and to maintain enough litter for soil protection. The very steep slopes limit movement of livestock and accessibility of forage. Once the canopy is opened, the Jughandle soil will produce forage for 5 to 10 years; during this period, annual production will vary from about 1,200 pounds of air-dry herbage per acre under an open canopy to less than 100 pounds as the canopy closes. The Ericson soil will produce forage for 10 to 15 years following opening of the canopy; during this period, annual production will vary from about 1,500 pounds of air-dry herbage per acre under an open canopy to less than 150 pounds as the canopy closes.

The very steep slopes restrict use of these soils for all construction and recreation.

This association is in capability subclass VIIe.

**59—Jughandle-Suttler association.** This association consists of very steep soils on mountainsides. Slopes are 40 to 90 percent. Elevation is 3,800 to 5,600 feet. This association is about 50 percent Jughandle loam, cool, and 30 percent Suttler loam. The Jughandle soil is higher than the Suttler soil.

Included with these soils in mapping are small areas where slopes are less than 40 percent and areas of Rock outcrop.

The Jughandle soil is deep and somewhat excessively drained. It formed in volcanic ash and residuum from granitic rock. The average annual precipitation is about 34 inches, the average annual air temperature is about 38 degrees F, and the frost-free period is about 50 days.

Typically, the surface layer is brown loam about 11 inches thick. The underlying material is pale brown and light brown loam and sandy loam. Decomposing granitic gneiss is at a depth of 41 inches.

Permeability is moderately rapid. Effective rooting depth is 40 to 60 inches. Available water capacity is moderate. Reaction is medium acid throughout. Runoff is very rapid, and the hazard of erosion is very severe.

The Suttler soil is very deep and well drained. It formed in residuum and colluvium from granitic rock. The average annual precipitation is about 28 inches, the average annual air temperature is about 42 degrees F, and the frost-free period is about 80 days.

Typically, the surface layer is brown loam about 10 inches thick. The upper part of the subsoil is light yellowish brown gravelly loam and gravelly sandy loam about 29 inches thick, and the lower part is light yellowish brown very gravelly sandy loam to a depth of 60 inches.

Permeability is moderate. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Between depths of 4 and 10 inches reaction is neutral, and above and below this layer reaction is medium acid. Runoff is very rapid, and the hazard of erosion is very severe.

This association is used for woodland and woodland grazing.



The Jughandle soil is suited to subalpine fir, grand fir, Douglas-fir, lodgepole pine, western larch, and spruce. It can produce about 10,100 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 100 years, or it can produce 41,000 board feet (Scribner rule) of merchantable timber 12.6 inches or more in diameter in 140 years in an unmanaged mixed conifer stand.

The Suttler soil is suited to grand fir, Douglas-fir, western larch, lodgepole pine, and ponderosa pine. It can produce about 11,850 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 100 years, or it can produce 70,500 board feet (Scribner rule) of merchantable timber 12.6 inches or more in diameter in 140 years in an unmanaged mixed conifer stand based upon the culmination of the mean annual increment.

The main problems in managing these soils for timber are the very steep slopes and very severe erosion hazard. These soils are too steep for conventional methods of tree harvest. Specialized logging methods that cause the least soil disturbance should be used to prevent excessive soil loss. Road construction is also restricted by the very steep slopes.

These soils have potential for producing forage if the canopy is opened by fire or logging. When the canopy is open or sparse, the main native forage plants include elk sedge, Columbia brome, and willow on the Jughandle soil and Columbia brome, sedge, and wild rose on the Suttler soil. Forage production can be increased by seeding disturbed areas to suitable plants such as tall fescue, orchardgrass, timothy, and White Dutch clover. The vegetation should be managed to permit timber regeneration and to maintain enough litter for soil protection. The very steep slopes limit movement of livestock and accessibility of forage. Once the canopy is opened, the Jughandle soil will produce forage for 5 to 10 years; during this period, annual production will vary from about 1,200 pounds of air-dry herbage per acre under an open canopy to less than 100 pounds as the canopy closes. The Suttler soil will produce forage for 10 to 15 years following opening of the canopy; during this period, annual production will vary from about 950 pounds of air-dry herbage per acre under an open canopy to less than 100 pounds as the canopy closes.

The very steep slopes restrict use of these soils for all construction and recreation.

This association is in capability subclass VIIe.

**60—Jughandle Variant silt loam.** This nearly level soil is on bottom lands and low terraces. It is very deep and somewhat poorly drained. Elevation is about 4,000 feet. This soil formed in alluvium from granitic material. The average annual precipitation is about 30 inches, the average annual air temperature is about 38 degrees F, and the frost-free period is about 65 days.

Typically, the surface layer is brown and dark grayish brown, mottled silt loam about 15 inches thick. The upper part of the underlying material is very pale brown and light gray, mottled sandy loam 28 inches thick, and

the lower part is light gray, stream-deposited sand to a depth of 60 inches.

Included with this soil in mapping are areas of soils that are similar to Jughandle Variant soils but that have a sandy loam surface layer and a sandy substratum below a depth of 20 inches or that have stratified silt loam and silty clay loam layers above a depth of 40 inches.

In this Jughandle Variant soil, permeability is moderately rapid. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Reaction is medium acid in the surface layer and medium acid and strongly acid in the underlying material. Runoff is slow, and the hazard of erosion is none to slight. This soil is frequently flooded for very brief periods in winter. The water table is at a depth of 1/2 foot to 1 1/2 feet in winter and spring.

This soil is used for hay, pasture, and range.

This soil is well suited to long-term hay and pasture. Under a high level of management, production is excellent. A well balanced fertilization program is needed, including nitrogen, sulfur, and possibly phosphorus. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Timothy, creeping and meadow foxtail, reed canarygrass, and alsike clover are suitable for planting.

The potential native vegetation is mainly sedges, tufted hairgrass, and rushes. If range condition declines, the proportion of tufted hairgrass decreases and the proportion of forbs and shrubs increases. Weeds and sedges become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition. Mechanical seeding is possible.

The main restrictions on use of this soil for all construction and recreation are the seasonal high water table, the potential for flooding, and frost action. This soil is a potential source of topsoil, but the material should be removed when the water table is low.

This soil is in capability subclass IVw.

**61—Keuterville gravelly loam, 7 to 25 percent slopes.** This sloping and moderately steep soil is on plateaus. It is very deep and well drained. This soil formed in basalt residuum and colluvium that have some loess mixed into the upper part. Elevation is 3,000 to 4,000 feet. The average annual precipitation is about 24 inches, the average annual air temperature is about 47 degrees F, and the frost-free period is about 125 days.

Typically, the surface layer is dark brown gravelly loam about 10 inches thick. The upper part of the subsoil is brown gravelly loam about 8 inches thick, and the lower part is brown very gravelly silty clay loam and strong brown very gravelly loam to a depth of 60 inches.

Included with this soil in mapping are small areas of a soil that is similar to Keuterville soils but that is more shallow to bedrock. Also included are small areas of De Masters silt loam, Klickson silt loam, Sulof silt loam, Jacket silt loam, and Riggins very gravelly silt loam.

In this Keuterville soil, permeability is moderately slow. Effective rooting depth is 60 inches or more. Available water capacity is low. Reaction is slightly acid and neutral throughout. Runoff is rapid, and the hazard of erosion is severe.

This soil is used for hay, pasture, woodland, and woodland grazing.

After timber is harvested from this soil, the area can be converted to hay or pasture. Under a high level of management, production is good. A well balanced fertilization program is needed. Nitrogen and sulfur are essential. If legumes are included in the stand, phosphorus is also needed. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Manchar smooth brome, Regar brome, Latar orchardgrass, alfalfa, and clover are suitable for planting.

This soil is suited to ponderosa pine. It can produce about 3,400 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 40 years, or it can produce 38,000 board feet (Scribner rule) of merchantable timber 11.6 inches or more in diameter in 130 years in an unmanaged stand based on the culmination of the mean annual increment. Conventional methods can be used for tree harvest, but logging roads, skid trails, and landings should be carefully planned to minimize soil loss.

This soil has excellent potential for producing forage. The tree overstory is normally quite open, allowing light to reach the understory. The potential native understory is mainly snowberry, bluebunch wheatgrass, Idaho fescue, and wild rose. If grazing is excessive, the proportion of Idaho fescue and bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and annual plants become more abundant if grazing condition declines further. The vegetation should be managed to permit timber regeneration and to maintain enough litter for soil protection. A planned grazing system is essential. The soil will produce forage for livestock almost continually if managed as a woodlot. Depending on the level of management, annual production varies from 1,500 pounds of air-dry herbage per acre to less than 400 pounds.

Slope restricts use of this soil for all construction, homesites, and sanitary facilities and for recreation. Small stones may also limit use for recreation.

This soil is in capability subclass VIe.

**62—Keuterville gravelly loam, 25 to 40 percent slopes.** This steep soil is on plateaus. It is very deep and well drained. This soil formed in basalt residuum and colluvium that have some loess mixed into the upper part. Elevation is 3,000 to 4,000 feet. The average annual precipitation is about 24 inches, the average annual air temperature is about 47 degrees F, and the frost-free period is about 125 days.

Typically, the surface layer is dark brown gravelly loam about 10 inches thick. The upper part of the subsoil is brown gravelly loam about 8 inches thick, and the lower part is brown gravelly silty clay loam and strong brown very gravelly loam to a depth of 60 inches.

Included with this soil in mapping are small areas of a soil that is similar to Keuterville soils but that is more shallow to bedrock. Also included are small areas of De Masters silt loam, Keuterville cobbly loam, Klickson silt loam, Suloaf silt loam, Jacket silt loam, and Bluesprin silt loam.

In this Keuterville soil, permeability is moderately slow. Effective rooting depth is 60 inches or more. Available water capacity is low. Reaction is slightly acid and neutral throughout. Runoff is very rapid, and the hazard of erosion is very severe.

This soil is used mainly for woodland and woodland grazing. It is also used for hay and pasture.

After timber is harvested from this soil, the area can be converted to hay or pasture. Under a high level of management, production is good. A well balanced fertilization program is needed. Nitrogen and sulfur are essential. If legumes are included in the stand, phosphorus is also needed. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Manchar smooth brome, Regar brome, Latar orchardgrass, alfalfa, and clover are suitable for planting.

This soil is suited to ponderosa pine. It can produce about 3,400 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 40 years, or it can produce 38,000 board feet (Scribner rule) of merchantable timber 11.6 inches or more in diameter in 130 years in an unmanaged stand based on the culmination of the mean annual increment. The main problem in managing timber is the erosion hazard. Conventional methods can be used for tree harvest, but roads, skid trails, and landings must be carefully planned to minimize soil loss.

This soil has excellent potential for producing forage. The tree overstory is normally quite open, allowing light to reach the understory. The potential native understory is mainly snowberry, bluebunch wheatgrass, Idaho fescue, and wild rose. If grazing is excessive, the proportion of Idaho fescue and bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and annual plants become more abundant as grazing condition declines further. The vegetation should be managed to permit timber regeneration and to maintain enough litter for soil protection. A planned grazing system is essential. This soil will produce forage for livestock almost continually if managed as a woodlot. Depending on the level of management, annual production varies from 1,500 pounds of air-dry herbage per acre to less than 400 pounds.

The steep slopes restrict use of this soil for all construction and recreation.

This soil is in capability subclass VIe.

**63—Keuterville-Bluesprin complex.** This complex consists of moderately sloping to steep soils south-facing on concave and convex slide slopes. Slopes are 7 to 40 percent. Elevation is 2,200 to 3,500 feet. This complex is about 40 percent Keuterville gravelly loam and 25 percent Bluesprin silt loam.



Included with these soils in mapping are small areas of Keuterville very cobbly loam and Bluesprin cobbly loam that have slopes of more than 40 percent. Also included are small areas of a soil that is similar to Keuterville soils but that has less than 35 percent rock fragments in the subsoil and small areas of Suloaf cobbly silt loam and Riggins very gravelly silt loam.

The Keuterville soil is very deep and well drained. It formed in basalt residuum and colluvium that have some loess mixed into the upper part. The average annual precipitation is about 24 inches, the average annual air temperature is about 47 degrees F, and the frost-free period is about 125 days.

Typically, the surface layer is dark brown gravelly loam about 10 inches thick. The upper part of the subsoil is brown gravelly loam about 8 inches thick, and the lower part is brown very gravelly silty clay loam and strong brown very gravelly loam to a depth of 60 inches.

Permeability is moderately slow. Effective rooting depth is 60 inches or more. Available water capacity is low. Reaction is slightly acid and neutral throughout. Runoff is rapid and very rapid, and the hazard of erosion is severe and very severe.

The Bluesprin soil is moderately deep and well drained. It formed in loess and in colluvium and residuum from basic igneous rock, mainly basalt and andesite. The average annual precipitation is about 18 inches, the average annual air temperature is about 48 degrees F, and the frost-free period is about 140 days.

Typically, the surface layer is dark grayish brown silt loam about 12 inches thick. The subsoil is dark yellowish brown very cobbly clay loam about 19 inches thick. Bedrock is at a depth of 31 inches.

Permeability is moderately slow. The effective rooting depth is 20 to 40 inches. Available water capacity is low. Reaction is slightly acid and neutral throughout. Runoff is rapid and very rapid, and the hazard of erosion is severe and very severe.

This complex is used for hay and pasture, woodland and woodland grazing, and range.

After timber is harvested from the Keuterville soil, the area can be converted to hay or pasture. Under a high level of management, production is good. A well balanced fertilization program is needed. Nitrogen and sulfur are essential. If legumes are included in the stand, phosphorus is also needed. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Manchar smooth brome, Regar brome, Latar orchardgrass, alfalfa, and clover are suitable for planting.

The Keuterville soil is suited to ponderosa pine. It can produce about 3,400 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 40 years, or it can produce 38,000 board feet (Scribner rule) of merchantable timber 11.6 inches or more in diameter in 130 years in an unmanaged stand based on the culmination of the mean annual increment. The main problem in managing timber is the erosion hazard. Conventional methods can be used for tree harvest, but roads, skid trails, and landings must be carefully planned to minimize soil loss.

The Keuterville soil has excellent potential for producing forage. The tree overstory is normally quite open, allowing light to reach the understory. The potential native understory is mainly snowberry, bluebunch wheatgrass, Idaho fescue, and wild rose. If grazing is excessive, the proportion of Idaho fescue and bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and annual plants become more abundant if grazing condition declines further. The vegetation should be managed to permit timber regeneration and to maintain enough litter for soil protection. A planned grazing system is essential. This soil will produce forage for livestock almost continually if managed as a woodlot. Depending on the level of management, annual production varies from 1,500 pounds of air-dry herbage per acre to less than 400 pounds.

The potential native vegetation on the Bluesprin soil is mainly bluebunch wheatgrass and Idaho fescue. If range condition declines, the proportion of bluebunch wheatgrass and Idaho fescue decreases and the proportion of forbs and shrubs increases. Weeds and annual plants become more abundant if range condition declines further. A planned grazing system is necessary in maintaining or improving range condition. Potential forage production is good. Providing adequate stock water is often difficult, especially during the hot, dry summer.

In the steeper areas, use of these soils for construction and for recreation is restricted by slope. Homesites, sanitary facilities, and roads and dwellings are also restricted by the depth to rock in the Bluesprin soil.

This complex is in capability subclass VIe.

**64—Keuterville-Bluesprin association.** This association consists of very steep soils on canyon sides. Slopes are 40 to 90 percent. Elevation is 2,200 to 3,500 feet. This association is about 40 percent Keuterville very cobbly loam and 25 percent Bluesprin very cobbly loam. The Keuterville soil is north facing, and the Bluesprin soil is south facing.

Included with these soils in mapping are small areas of Keuterville gravelly loam and Bluesprin silt loam that have slopes of less than 40 percent. Also included are small areas of Klickson cobbly loam, Suloaf cobbly silt loam, and Rock outcrop.

The Keuterville soil is very deep and well drained. It formed in basalt residuum and colluvium that have some loess mixed into the upper part. The average annual precipitation is about 24 inches, the average annual air temperature is about 47 degrees F, and the frost-free period is about 125 days.

Typically, the surface layer is dark brown very cobbly loam about 10 inches thick. The upper part of the subsoil is brown gravelly loam about 8 inches thick, and the lower part is brown very gravelly silty clay loam and strong brown very gravelly loam to a depth of 60 inches.

Permeability is moderately slow. Effective rooting depth is 60 inches or more. Available water capacity is



low. Reaction is slightly acid and neutral throughout. Runoff is very rapid, and the hazard of erosion is very severe.

The Bluesprin soil is moderately deep and well drained. It formed in loess and in residuum and colluvium from basic igneous rock, mainly basalt and andesite. The average annual precipitation is about 18 inches, the average annual air temperature is about 48 degrees F, and the frost-free period is about 140 days.

Typically, the surface layer is dark grayish brown very cobbly loam about 12 inches thick. The subsoil is dark yellowish brown very cobbly clay loam about 19 inches thick. Bedrock is at a depth of 31 inches.

Permeability is moderately slow. The effective rooting depth is 20 to 40 inches. Available water capacity is low. Reaction is slightly acid and neutral throughout. Runoff is very rapid, and the hazard of erosion is very severe.

The Keuterville soil is used for woodland and woodland grazing. The Bluesprin soil is used for range.

The Keuterville soil is suited to ponderosa pine. It can produce about 3,400 cubic feet of wood per acre in trees 0.6 inch or more in diameter in 40 years, or it can produce 38,000 board feet (Scribner rule) of merchantable timber 11.6 inches or more in diameter in 130 years in an unmanaged stand based on the culmination of the mean annual increment. The main problems in managing timber are the very steep slopes and very severe erosion hazard. This soil is too steep for conventional methods of tree harvest. Specialized logging methods that cause the least soil disturbance should be used to prevent excessive soil loss. Road construction is also restricted by the very steep slopes.

The Keuterville soil has excellent potential for producing forage. The tree overstory is normally quite open, allowing light to reach the understory. The potential native understory is mainly snowberry, bluebunch wheatgrass, Idaho fescue, and wild rose. If grazing is excessive, the proportion of Idaho fescue and bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and annual plants become more abundant if grazing condition declines further. The vegetation should be managed to permit timber regeneration and to maintain enough litter for soil protection. A planned grazing system is essential. The very steep slopes limit movement of livestock and accessibility of forage. This soil will produce forage for livestock almost continually if managed as a woodlot. Depending on the level of management, annual production varies from 1,500 pounds of air-dry herbage per acre to less than 400 pounds.

The potential native vegetation on the Bluesprin soil is mainly bluebunch wheatgrass and Idaho fescue. If range condition declines, the proportion of bluebunch wheatgrass and Idaho fescue decreases and the proportion of forbs and shrubs increases. Weeds and annual plants become more abundant if range condition declines further. A planned grazing system is necessary in maintaining or improving range condition. Potential forage pro-

duction is good, but the very steep slopes limit movement of livestock and accessibility of forage. Providing adequate stock water is often difficult, especially during the hot, dry summer.

The very steep slopes restrict use of these soils for all construction and recreation.

This association is in capability subclass VIIe.

**65—Keuterville-Klickson association.** This association consists of very steep soils on canyonsides. Slopes are 40 to 90 percent. Elevation is 3,000 to 4,500 feet. This association is about 35 percent Keuterville very cobbly loam and 30 percent Klickson cobbly loam. The Keuterville soil is west facing, and the Klickson soil is north facing.

Included with these soils in mapping are small areas where slope is less than 40 percent and small areas of Suloaf cobbly silt loam and Rock outcrop. Also included are small areas of a soil that is similar to Klickson soils but that has bedrock at a depth of 40 to 60 inches.

The Keuterville soil is very deep and well drained. It formed in basalt residuum and colluvium that have some loess mixed into the upper part. The average annual precipitation is about 24 inches, the average annual air temperature is about 47 degrees F, and the frost-free period is about 125 days.

Typically, the surface layer is dark brown very cobbly loam about 10 inches thick. The upper part of the subsoil is brown gravelly loam about 8 inches thick, and the lower part is brown very gravelly silty clay loam and strong brown very gravelly loam to a depth of 60 inches.

Permeability is moderately slow. Effective rooting depth is 60 inches or more. Available water capacity is low. Reaction is slightly acid and neutral throughout. Runoff is very rapid, and the hazard of erosion is very severe.

The Klickson soil is very deep and well drained. It formed in loess and in colluvium and residuum from basic igneous rock. The average annual precipitation is about 26 inches, the average annual air temperature is about 42 degrees F, and the frost-free period is about 80 days.

Typically, the surface layer is dark grayish brown and brown cobbly loam about 15 inches thick. The upper part of the subsoil is brown cobbly silt loam and very cobbly loam about 36 inches thick, and the lower part is brown very cobbly clay to a depth of 60 inches or more.

Permeability is moderate in the upper part and moderately slow in the very cobbly clay. The effective rooting depth is 60 inches or more. Available water capacity is moderate. Reaction is slightly acid throughout. Runoff is very rapid, and the hazard of erosion is very severe.

This association is used for woodland and woodland grazing.

The Keuterville soil is suited to ponderosa pine. It can produce about 3,400 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 40 years, or it can produce 38,000 board feet (Scribner rule) of merchanta-



ble timber 11.6 inches or more in diameter in 130 years in an unmanaged stand based on the culmination of the mean annual increment.

The Klickson soil is suited to Douglas-fir and ponderosa pine. It can produce about 4,100 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 40 years, or it can produce 44,600 board feet (Scribner rule) of merchantable timber 11.6 inches or more in diameter in 120 years in an unmanaged stand based on the culmination of the mean annual increment.

The main problems in managing timber are the very steep slopes and the very severe erosion hazard. These soils are too steep for conventional methods of tree harvest. Specialized logging methods that cause the least soil disturbance should be used to prevent excessive soil loss. Road construction is also restricted by the very steep slopes.

The Keuterville soil has excellent potential for producing forage. The tree overstory is normally quite open, allowing ample light to reach the understory. The potential native understory is mainly snowberry, bluebunch wheatgrass, Idaho fescue, and wild rose. If grazing is excessive, the proportion of Idaho fescue and bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and annual plants become more abundant if grazing condition declines further. The vegetation should be managed to permit timber regeneration and to maintain enough litter for soil protection. A planned grazing system is essential. The very steep slopes limit movement of livestock and accessibility of forage. This soil will produce forage for livestock almost continually if managed as a woodlot. Annual production varies from 1,500 pounds of air-dry herbage per acre to less than 400 pounds.

The Klickson soil has potential for producing forage if the canopy is opened by fire or logging. When the canopy is open and sparse, the main native forage plants include elk sedge, wild rose, and pine reedgrass. Forage production can be increased by seeding disturbed areas to suitable plants such as orchardgrass, timothy, tall fescue, and White Dutch clover. The vegetation should be managed to permit timber regeneration and to maintain enough litter for soil protection. The very steep slopes limit movement of livestock and accessibility of forage. Once the canopy is opened this soil will produce forage for 15 to 20 years. During this period, annual production will vary from about 1,600 pounds of air-dry herbage per acre under an open canopy to less than 300 pounds as the canopy closes.

The very steep slopes restrict use of these soils for all construction and recreation.

This association is in capability subclass VIIe.

**66—Klickson-Rock outcrop complex.** This complex consists of very steep, north-facing soils and Rock outcrop on canyonsides (fig. 6). Slopes are 40 to 90 percent. Elevation is 1,500 to 5,000 feet. This complex is about 45 percent Klickson cobbly loam and 30 percent Rock outcrop.

Included in mapping are small areas of Suloaf cobbly silt loam, Zaza gravelly loam, and soils that are similar to Klickson soils but that have bedrock at a depth of 40 to 60 inches or that have an average annual soil temperature warmer than 47 degrees F.

The Klickson soil is very deep and well drained. It formed in loess and colluvium and residuum from basic igneous rock. The average annual precipitation is about 26 inches, the average annual air temperature is about 42 degrees F, and the frost-free period is about 80 days.

Typically, the surface layer is dark grayish brown and brown cobbly loam about 15 inches thick. The upper part of the subsoil is brown cobbly silt loam and very cobbly loam about 36 inches thick, and the lower part is brown very cobbly clay to a depth of 60 inches or more. In some areas the very cobbly clay subsoil layer is absent.

Permeability is generally moderate. Where present, the very cobbly clay subsoil layer is moderately slowly permeable. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Reaction is slightly acid throughout. Runoff is very rapid, and the hazard of erosion is very severe.

Rock outcrop consists of Columbia River Basalt or Seven Devils Volcanics.

This complex is used for woodland and woodland grazing.

The Klickson soil is suited for Douglas-fir and ponderosa pine. It can produce about 4,100 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 40 years, or it can produce 44,600 board feet (Scribner rule) of merchantable timber 11.6 inches or more in diameter in 120 years in an unmanaged stand based on the culmination of the mean annual increment. The main problems in managing timber are the very steep slopes, Rock outcrop, and very severe erosion hazard. This complex is too steep for conventional methods of tree harvest. Specialized logging methods that cause the least soil disturbance should be used to prevent excessive soil loss. Road construction is also restricted by the very steep slopes and Rock outcrop. The outcrops interfere with tree felling.

The Klickson soil has limited potential for producing forage after the canopy is opened by fire or logging. When the canopy is open or sparse, the main native forage plants include elk sedge, wild rose, and pine reedgrass. Forage production can be increased by seeding disturbed areas to suitable plants such as orchardgrass, timothy, tall fescue, and White Dutch clover. The vegetation should be managed to permit timber regeneration and to maintain enough litter for soil protection. The very steep slopes and Rock outcrop limit movement of livestock and accessibility of forage. Once the canopy is opened, this soil will produce forage for 15 to 20 years. During this period, annual production will vary from about 1,600 pounds of air-dry herbage per acre under an open canopy to less than 300 pounds as the canopy closes.





Figure 6.—Area of north-facing Klickson-Rock outcrop complex on left. South-facing area on right is Bluesprin-Rock outcrop complex.

The very steep slopes and Rock outcrop restrict use of this complex for all construction and recreation.

This complex is in capability subclass VIIe.

**67—Klickson-Suloaf complex.** This complex consists of very steep, north-facing soils on canyonsides. Slopes are 40 to 90 percent. Elevation is 1,500 to 5,000 feet. This complex is about 45 percent Klickson silt loam and 25 percent Suloaf cobbly silt loam.

Included with these soils in mapping are small areas of Keuterville gravelly loam, Wapshilla loam, Rock outcrop, a soil that is similar to Klickson soils but that has bed-rock at a depth of 40 to 60 inches, and soils that are similar to Klickson and Suloaf soils that have an average annual soil temperature warmer than 47 degrees F.

The Klickson soil is very deep and well drained. It

formed in loess and colluvium and residuum from basic igneous rock. The average annual precipitation is about 26 inches, the average annual air temperature is about 42 degrees F, and the frost-free period is about 80 days.

Typically, the upper part of the surface layer is dark grayish brown silt loam about 6 inches thick, and the lower part is brown cobbly silt loam about 9 inches thick. The upper part of the subsoil is brown cobbly silt loam and very cobbly loam about 36 inches thick, and the lower part is brown very cobbly clay to a depth of 60 inches or more. In some areas the very cobbly clay layer is absent.

Permeability is generally moderate. Where present, the very cobbly clay subsoil layer is moderately slowly permeable. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Reaction is slightly



acid throughout. Runoff is very rapid, and the hazard of erosion is very severe.

The Suloaf soil is deep and well drained. It formed in loess and residuum from Columbia River Basalt or Seven Devils Volcanics. The average annual precipitation is about 26 inches, the average annual air temperature is about 42 degrees F, and the frost-free period is about 90 days.

Typically, the surface layer is brown cobbly silt loam about 17 inches thick. The subsoil is light yellowish brown and light brown gravelly silt loam about 24 inches thick. The substratum is reddish yellow gravelly sandy loam about 13 inches thick. Partially decomposed basalt bedrock is at a depth of 54 inches.

Permeability is moderate. Effective rooting depth is 40 to 60 inches. Available water capacity is moderate. Reaction is neutral above a depth of 17 inches and slightly acid below that depth. Runoff is very rapid, and the hazard of erosion is very severe.

This complex is used for woodland and woodland grazing.

These soils are suited to Douglas-fir and ponderosa pine. The Klickson soil can produce about 4,100 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 40 years, or it can produce 44,600 board feet (Scribner rule) of merchantable timber 11.6 inches or more in diameter in 120 years in an unmanaged stand based on the culmination of the mean annual increment. The Suloaf soil can produce 3,400 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 40 years, or it can produce 38,000 board feet (Scribner rule) of merchantable timber 11.6 inches or more in diameter in 130 years in an unmanaged stand based on the culmination of the mean annual increment.

The main problems in managing these soils for timber are the very steep slopes and very severe erosion hazard. These soils are too steep for conventional methods of tree harvest. Specialized logging methods that cause the least soil disturbance should be used to prevent excessive soil loss. Road construction is also restricted by the very steep slopes.

These soils have limited potential for producing forage after the canopy is opened by fire or logging. When the canopy is open or sparse, the main native forage plants include elk sedge, wild rose, and pine reedgrass. Forage production can be increased by seeding disturbed areas to suitable plants such as orchardgrass, timothy, tall fescue, and White Dutch clover. The vegetation should be managed to permit timber regeneration and to maintain enough litter for soil protection. The very steep slopes limit movement of livestock and accessibility of forage. Once the canopy is opened, these soils will produce forage for 15 to 20 years. During this period, annual production will vary from about 1,600 pounds of air-dry herbage per acre under an open canopy to less than 300 pounds as the canopy closes.

The very steep slopes restrict the use of these soils for all construction and recreation.

This complex is in capability subclass VIIe.

**68—Klickson-Bluesprln association.** This association consists of very steep, convex soils on canyonsides. Slopes are 40 to 90 percent. Elevation is 2,200 to 5,000 feet. This association is about 45 percent Klickson silt loam and 20 percent Bluesprln very cobbly loam. The Klickson soil is north facing, and the Bluesprln soil is south facing.

Included with these soils in mapping are small areas of a soil that is similar to Bluesprln soils but that is deeper to bedrock; small areas of Lawyer silt loam, Rock outcrop, and Suloaf silt loam; and small areas of a soil that is similar to Klickson soils but that has bedrock at a depth of 40 to 60 inches.

The Klickson soil is very deep and well drained. It formed in loess and colluvium and residuum from basic igneous rock. The average annual precipitation is about 26 inches, the average annual air temperature is about 42 degrees F, and the frost-free period is about 80 days.

Typically, the upper part of the surface layer is dark grayish brown silt loam about 6 inches thick, and the lower part is brown cobbly silt loam about 9 inches thick. The upper part of the subsoil is brown cobbly silt loam and very cobbly loam about 36 inches thick, and the lower part is brown very cobbly clay to a depth of 60 inches or more. In some areas the very cobbly clay subsoil layer is absent.

Permeability is generally moderate. Where present, the very cobbly clay subsoil layer has moderately slow permeability. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Reaction is slightly acid throughout. Runoff is very rapid, and the hazard of erosion is very severe.

The Bluesprln soil is moderately deep and well drained. It formed in loess and colluvium and residuum from basic volcanic rock, mainly basalt and andesite. The average annual precipitation is about 18 inches, the average annual air temperature is about 48 degrees F, and the frost-free period is about 140 days.

Typically, the surface layer is dark grayish brown very cobbly loam about 12 inches thick. The subsoil is dark yellowish brown very cobbly clay loam about 19 inches thick. Bedrock is at a depth of 31 inches.

Permeability is moderately slow. Effective rooting depth is 20 to 40 inches. Available water capacity is low. Reaction is slightly acid and neutral throughout. Runoff is very rapid, and the hazard of erosion is very severe.

The Klickson soil is used for woodland and woodland grazing. The Bluesprln soil is used for range.

The Klickson soil is suited to Douglas-fir and ponderosa pine. It can produce about 4,100 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 40 years, or it can produce 44,600 board feet (Scribner rule) of merchantable timber 11.6 inches or more in diameter in 120 years in an unmanaged stand based on the culmination of the mean annual increment. The main problems in managing timber are the very steep slopes and

very severe erosion hazard. This soil is too steep for conventional methods of tree harvest. Specialized logging methods that cause the least soil disturbance should be used to prevent excessive soil loss. Road construction is also restricted by the very steep slopes.

The Klickson soil has limited potential for producing forage even after the canopy is opened by fire or logging. When the canopy is open and sparse, the main native forage plants include elk sedge, wild rose, and pine reedgrass. Forage production can be increased by seeding disturbed areas to suitable plants such as orchardgrass, timothy, tall fescue, and White Dutch clover. The vegetation should be managed to permit timber regeneration and to maintain enough litter for soil protection. The very steep slopes limit movement of livestock and accessibility of forage. Once the canopy is opened, this soil will produce forage for 15 to 20 years. During this period, annual production will vary from about 1,600 pounds of air-dry herbage per acre under an open canopy to less than 300 pounds as the canopy closes.

The potential native vegetation on the Bluesprin soil is mainly bluebunch wheatgrass and Idaho fescue. If range condition declines, the proportion of bluebunch wheatgrass and Idaho fescue decreases and the proportion of forbs and shrubs increases. Weeds and annual plants become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition. Potential forage production is good. The very steep slopes often limit movement of livestock and accessibility of forage. Providing adequate stock water is often a problem, especially during the hot, dry summer.

The very steep slopes restrict the use of these soils for all construction and recreation.

This association is in capability subclass VIIe.

**69—Klickson-Wapshilla association.** This association consists of very steep soils on sides of mountains and canyons. Slopes are 40 to 90 percent. Elevation is 3,500 to 5,000 feet. This association is about 40 percent Klickson silt loam and 40 percent Wapshilla cobbly loam. The Klickson soil is lower than the Wapshilla soil.

Included with these soils in mapping are small areas of Suloaf cobbly silt loam, Telcher silt loam, Rock outcrop, and a soil that is similar to Klickson soils but that has bedrock at a depth of 40 to 60 inches. The Suloaf soils are mainly in areas of Klickson soils. The Telcher soils are mainly in areas of Wapshilla soils.

The Klickson soil is very deep and well drained. It formed in loess and colluvium and residuum from basic igneous rock. The average annual precipitation is about 26 inches, the average annual air temperature is about 42 degrees F, and the frost-free period is about 80 days.

Typically, the upper part of the surface layer is dark grayish brown silt loam, and the lower part is brown cobbly silt loam about 9 inches thick. The upper part of the subsoil is brown cobbly silt loam and very cobbly loam about 36 inches thick, and the lower part is brown

cobbly clay to a depth of 60 inches or more. The cobbly clay subsoil layer is absent in some areas.

Permeability is generally moderate. Where present, the cobbly clay subsoil layer has moderately slow permeability. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Reaction is slightly acid throughout. Runoff is very rapid, and the hazard of erosion is very severe.

The Wapshilla soil is very deep and well drained. It formed in loess mixed with basalt colluvium. The average annual precipitation is about 28 inches, the average annual air temperature is about 42 degrees F, and the frost-free period is about 90 days.

Typically, the surface layer is brown cobbly loam about 14 inches thick. The subsoil is light brown gravelly loam and light yellowish brown very gravelly loam to a depth of 60 inches.

Permeability is moderate. Effective rooting depth is 60 inches or more. Available water capacity is low. Reaction is medium acid in the upper part of the surface layer and slightly acid and neutral below. Runoff is very rapid, and the hazard of erosion is very severe.

This association is used for woodland and woodland grazing.

The Klickson soil is suited to Douglas-fir and ponderosa pine. It can produce about 4,100 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 40 years, or it can produce 44,600 board feet (Scribner rule) of merchantable timber 11.6 inches or more in diameter in 120 years in an unmanaged stand based on the culmination of the mean annual increment.

The Wapshilla soil is suited to grand fir, Douglas-fir, western larch, lodgepole pine, and ponderosa pine. It can produce about 11,850 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 100 years, or it can produce 70,500 board feet (Scribner rule) of merchantable timber 12.6 inches or more in diameter in 140 years in an unmanaged stand based upon the culmination of the mean annual increment.

The main problems in managing these soils for timber are the very steep slopes and very severe erosion hazard. These soils are too steep for conventional methods of tree harvest. Specialized logging methods that cause the least soil disturbance should be used to minimize soil loss. Road construction is also restricted by the very steep slopes.

These soils have potential for producing forage if the canopy is opened by fire or logging. When the canopy is open or sparse, the main native forage plants include elk sedge, wild rose, and pine reedgrass on the Klickson soil and sedge, Columbia brome, elk sedge, snowberry, and redstem ceanothus on the Wapshilla soil. Forage production can be increased by seeding disturbed areas to suitable plants such as orchardgrass, timothy, tall fescue, and White Dutch clover. The vegetation should be managed to permit timber regeneration and to maintain enough litter for soil protection. The very steep slopes limit movement of livestock and accessibility of forage.



Once the canopy is opened, the Klickson soil will produce forage for 15 to 20 years; during this period, annual production will vary from about 1,600 pounds of air-dry herbage per acre under an open canopy to less than 300 pounds as the canopy closes. The Wapshilla soil will produce forage for 5 to 15 years after the canopy is opened; during this period, annual production will vary from about 1,100 pounds of air-dry herbage per acre under an open canopy to less than 200 pounds per acre as the canopy closes.

The very steep slopes restrict use of these soils for all construction and recreation.

This association is in capability subclass VIIe.

**70—Kooskia silt loam, low rainfall, 3 to 7 percent slopes.** This gently sloping soil is on plateaus. It is very deep and moderately well drained. Elevation is 2,500 to 3,000 feet. This soil formed in loess. The average annual precipitation is about 23 inches, the average annual air temperature is about 45 degrees F, and the frost-free period is about 110 days.

Typically, the surface layer is dark grayish brown silt loam about 9 inches thick. The subsoil is brown silt soil about 5 inches thick. The buried subsurface layer is light gray silt loam about 7 inches thick. The buried subsoil is yellowish brown and brown silty clay to a depth of 60 inches or more.

Included with this soil in mapping are small areas where slopes are more than 7 percent, and small areas of Wilkins silt loam.

In this Kooskia soil, permeability is slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is slightly acid and neutral in the surface layer and subsoil and neutral and mildly alkaline in the buried subsurface layer and the buried subsoil. Runoff is medium, and the hazard of erosion is moderate. A perched water table is at a depth of 2 to 3 feet in winter.

This soil is used mainly for hay, pasture, barley, winter wheat, and peas. It is also used for woodland and woodland grazing.

Use of this soil for crops is limited mainly by the hazard of erosion. Production of all locally grown crops is good. Soil can be conserved by continuously growing as small grains or forage crops if minimum tillage is practiced and crop residue is returned to the soil. Grassed waterways prevent formation of gullies in the natural drainageways. Nitrogen, sulfur, and sometimes phosphorus are necessary. Weed control is important. Grasses and legumes are beneficial and are good alternative crops.

After timber is harvested from this soil, the area can be converted to pasture or hay. Under a high level of management, production is good. A well balanced fertilization program is needed. Nitrogen and sulfur are essential. If legumes are included in the stand, phosphorus is also needed. Grazing should be rotated during the growing season to maintain a minimum height of stubble.

Latar orchardgrass, Manchac smooth brome, Regar brome, and clover and alfalfa are suitable for planting.

This soil is suited to ponderosa pine. It can produce about 2,750 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 40 years, or it can produce 31,500 board feet (Scribner rule) of merchantable timber 11.6 inches or more in diameter in 140 years in an unmanaged stand based on the culmination of the mean annual increment. Conventional methods of tree harvest can be used.

This soil has good potential for grazing if the tree canopy is opened by fire or logging. When the canopy is open or sparse, the main native forage plants include elk sedge, bluebunch wheatgrass, and wild rose. Forage production can be increased by seeding disturbed areas to suitable plants such as timothy, orchardgrass, tall fescue, and White Dutch clover. The vegetation should be managed to permit timber regeneration and maintain enough litter for soil protection. Once the canopy is opened this soil will produce forage for 15 to 20 years. During this period, annual production will vary from about 2,000 pounds of air-dry herbage per acre under an open canopy to less than 500 pounds as the canopy closes.

The main restrictions on use of this soil for homesites are the shrink-swell potential of the soil and its low strength. Installation of sanitary facilities is restricted by wetness and the clay content of the subsoil. Septic tank absorption fields are severely restricted by the slow permeability and wetness. The shrink-swell potential, low strength, and wetness limit use for roads. Excavation can be hindered by the high clay content of the subsoil.

The main restriction on use of this soil for recreation is the tendency of the surface to be dusty when dry. Playgrounds are also limited by slope.

This soil is in capability subclass IIe.

**71—Kooskia silt loam, low rainfall, 7 to 12 percent slopes.** This sloping soil is on plateaus. It is very deep and moderately well drained. Elevation is 2,500 to 3,000 feet. This soil formed in loess. The average annual precipitation is about 23 inches, the average annual air temperature is about 45 degrees F, and the frost-free period is about 110 days.

Typically, the surface layer is dark grayish brown silt loam about 9 inches thick. The subsoil is brown silt loam about 5 inches thick. The buried subsurface layer is light gray silt loam about 7 inches thick. The buried subsoil is yellowish brown and brown silty clay to a depth of 60 inches or more.

Included with this soil in mapping are small areas where slopes are more than 12 percent or less than 7 percent.

In this Kooskia soil, permeability is slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is slightly acid and neutral in the surface layer and subsoil and neutral and mildly alkaline in the buried subsurface layer and the buried subsoil. Runoff is rapid, and the hazard of erosion is severe. A



perched water table is at a depth of 2 to 3 feet during winter.

This soil is used mainly for hay, pasture, barley, winter wheat, and peas. It is also used for woodland and woodland grazing.

Use of this soil for crops is limited mainly by the hazard of erosion. Production of all locally grown crops is good. Soil can be conserved by continuously growing small grains or forage crops if minimum tillage is practiced and crop residue is returned to the soil. Grassed waterways prevent formation of gullies in the natural drainageways. Contour farming, divided-slope farming, and field stripcropping also reduce erosion. Nitrogen, sulfur, and sometimes phosphorus are necessary. Weed control is important. Grasses and legumes are beneficial and are good alternative crops.

After timber is harvested from this soil, the area can be converted to pasture or hay. Under a high level of management, production is good. A well balanced fertilization program is needed. Nitrogen and sulfur are essential. If legumes are included in the stand, phosphorus is also needed. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Latar orchardgrass, Manchar smooth brome, Regar brome, and clover or alfalfa are suitable for planting.

This soil is suited to ponderosa pine. It can produce about 2,750 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 40 years, or it can produce 31,500 board feet (Scribner rule) of merchantable timber 11.6 inches or more in diameter in 140 years in an unmanaged stand based on the culmination of the mean annual increment. Conventional methods can be used for tree harvest, but logging roads, skid trails, and landings should be carefully planned to minimize soil loss.

This soil has good potential for grazing if the canopy is opened by fire or logging. When the canopy is open or sparse, the main native forage plants include elk sedge, bluebunch wheatgrass, and rose. Forage production can be increased by seeding disturbed areas to suitable grasses such as timothy, orchardgrass, tall fescue and White Dutch clover. The vegetation should be managed to permit timber regeneration and maintain enough litter for soil protection. Once the canopy is opened this soil will produce forage for 15 to 20 years. During this period, annual production will vary from about 2,000 pounds of air-dry herbage per acre under an open canopy to less than 500 pounds as the canopy closes.

The main restrictions on use of this soil for homesites are the shrink-swell potential of the soil and its low strength. Installation of sanitary facilities is restricted by wetness and the high clay content of the subsoil. Septic tank absorption fields are severely restricted by slow permeability and wetness. Sewage lagoons are severely restricted by slope and wetness. The shrink-swell potential, low strength, and wetness limit use for roads. Excavation can be hindered by the high clay content of the subsoil.

The main restriction on use of this soil for recreation is slope. The tendency of the surface to be dusty when dry is also a limitation.

This soil is in capability subclass IIIe.

**72—Kooskia silt loam, low rainfall, 12 to 25 percent slopes.** This moderately steep soil is on plateaus. It is very deep and moderately well drained. Elevation is 2,500 to 3,000 feet. This soil formed in loess. The average annual precipitation is about 23 inches, the average annual air temperature is about 45 degrees F, and the frost-free period is about 110 days.

Typically, the surface layer is dark grayish brown silt loam about 9 inches thick. The subsoil is brown silt loam about 5 inches thick. The buried subsurface layer is light gray silt loam about 7 inches thick. The buried subsoil is yellowish brown and brown silty clay to a depth of 60 inches or more.

Included with this soil in mapping are small areas where slopes are less than 12 percent.

In this Kooskia soil, permeability is slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is slightly acid and neutral in the surface layer and subsoil and neutral and mildly alkaline in the buried subsurface layer and the buried subsoil. Runoff is rapid, and the hazard of erosion is severe. A perched water table is at a depth of 2 to 3 feet during winter.

This soil is used mainly for hay, pasture, barley, winter wheat, and peas. It is also used for woodland and woodland grazing.

Use of this soil for crops is limited mainly by the hazard of erosion. Production of all locally grown crops is good. Soil can be conserved by continuously growing small grains or forage crops if minimum tillage is practiced and crop residue is returned to the soil. Because of slope, using field strips or divided-slope farming is also necessary. Nitrogen, sulfur, and sometimes phosphorus are needed. Grasses and legumes are beneficial and are good alternative crops.

After timber is harvested from this soil, the area can be converted to pasture or hay. Under a high level of management, production is good. A well balanced fertilization program is needed. Nitrogen and sulfur are essential. If legumes are included in the stand, phosphorus is also needed. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Latar orchardgrass, Manchar smooth brome, Regar brome, and clover and alfalfa are suitable for grazing.

This soil is suited to ponderosa pine. It can produce about 2,750 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 40 years, or it can produce 31,500 board feet (Scribner rule) of merchantable timber 11.6 inches or more in diameter in 140 years in an unmanaged stand based on the culmination of the mean annual increment. Conventional methods can be used for tree harvest, but logging roads, skid trails, and landings should be carefully planned to minimize soil loss.



Good site preparation and harvest methods are needed to establish an adequate stand and to overcome competition from undesirable plants.

This soil has good potential for grazing if the canopy is opened by fire or logging. When the canopy is open or sparse, the main native forage plants include elk sedge, bluebunch wheatgrass, and wild rose. Forage production can be increased by seeding disturbed areas to suitable plants such as timothy, orchardgrass, tall fescue, and White Dutch clover. The vegetation should be managed to permit timber regeneration and to maintain enough litter for soil protection. Once the canopy is opened, this soil will produce forage for 15 to 20 years. During this period, annual production will vary from about 2,000 pounds of air-dry herbage per acre under an open canopy to less than 500 pounds as the canopy closes.

The main restrictions on use of this soil for homesites are slope, the low strength of this soil, and its shrink-swell potential. Installation of sanitary facilities is restricted by slope, wetness, and the high clay content of the subsoil. Septic tank absorption fields are severely restricted by slow permeability, wetness, and slope. Sewage lagoons are severely restricted by slope and wetness. The shrink-swell potential, slope, low strength, and wetness limit use for roads. Excavation can be hindered by the high clay content of the subsoil and by slope.

The moderately steep slopes are the main restriction on use of this soil for recreation. The tendency of the surface to be dusty when dry is also a restriction.

This soil is in capability subclass IIIe.

**73—Lawyer-Rock outcrop complex.** This complex consists of very steep, north-facing soils on canyonsides. Slopes are 40 to 90 percent. Elevation is 1,200 to 4,000 feet. This complex is about 30 percent Lawyer silt loam, and 30 percent Rock outcrop.

Included in mapping are small areas of Bluesprink cobbly loam and Riggins very gravelly loam.

The Lawyer soil is very deep and well drained. It formed in loess mixed with colluvium and residuum from basic igneous rocks. The average annual precipitation is about 20 inches, the average annual air temperature is about 47 degrees F, and the frost-free period is about 130 days.

Typically, the upper part of the surface layer is very dark grayish brown silt loam about 6 inches thick, and the lower part is very dark grayish brown loam and gravelly loam to a depth of about 23 inches. The subsoil is dark grayish brown and brown very gravelly clay loam to a depth of 72 inches.

Permeability is slow. The effective rooting depth is 60 inches or more. Available water capacity is moderate. Reaction is neutral throughout. Runoff is very rapid, and the hazard of erosion is very severe.

Rock outcrop consists of Columbia River Basalt or Seven Devils Volcanics.

This complex is used for range.

The potential native vegetation on the Lawyer soil is mainly Idaho fescue, bluebunch wheatgrass, and many forbs. If range condition declines, the proportion of Idaho fescue and bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and sod-forming bluegrass become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition. This soil should be avoided during wet, freezing weather to reduce the hazard of livestock injury caused by slipping and falling. Production of forage is excellent, but the very steep slopes and Rock outcrop limit movement of livestock and accessibility of forage.

Rock outcrop has no value for grazing. It often interferes with livestock movement, thereby limiting accessibility of forage.

The very steep slopes and Rock outcrop restrict the use of this complex for all construction and recreation.

This complex is in capability subclass VIIe.

**74—Lawyer-Bluesprink association.** This association consists of very steep, convex soils on canyonsides. Slopes are 40 to 90 percent. Elevation is 2,200 to 4,000 feet. This association is about 50 percent Lawyer silt loam and 20 percent Bluesprink very cobbly loam. The Lawyer soil is north facing, and the Bluesprink soil is south facing.

Included with these soils in mapping are small areas of Keuterville very cobbly loam, Riggins very gravelly silt loam, Rock outcrop, and Tannahill cobbly loam.

The Lawyer soil is very deep and well drained. It formed in loess mixed with colluvium and residuum from basic igneous rock. The average annual precipitation is about 20 inches, the average annual air temperature is about 47 degrees F, and the frost-free period is about 130 days.

Typically, the upper part of the surface layer is very dark grayish brown silt loam about 6 inches thick, and the lower part is very dark grayish brown loam and gravelly loam to a depth of about 23 inches. The subsoil is dark grayish brown and brown very gravelly clay loam to a depth of 72 inches.

Permeability is slow. The effective rooting depth is 60 inches or more. Available water capacity is moderate. Reaction is neutral throughout. Runoff is very rapid, and the hazard of erosion is very severe.

The Bluesprink soil is moderately deep and well drained. It formed in loess and colluvium and residuum from basic igneous rock, mainly basalt and andesite. The average annual precipitation is about 18 inches, the average annual air temperature is about 48 degrees F, and the frost-free period is about 140 days.

Typically, the surface layer is dark grayish brown very cobbly loam about 12 inches thick. The subsoil is dark yellowish brown very cobbly clay loam about 19 inches thick. Bedrock is at a depth of 31 inches.

Permeability is moderately slow. The effective rooting depth is 20 to 40 inches. Available water capacity is low.

Reaction is slightly acid and neutral throughout. Runoff is very rapid, and the hazard of erosion is very severe.

This association is used for range.

The potential native vegetation is mainly Idaho fescue, bluebunch wheatgrass, and many forbs on the Lawyer soil and bluebunch wheatgrass and Idaho fescue on the Bluesprin soil. If range condition declines, the proportion of bluebunch wheatgrass and Idaho fescue decreases and the proportion of forbs and shrubs increases. Weeds and annual plants become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition. Forage production is excellent on the Lawyer soil and good on the Bluesprin soil. The very steep slopes limit movement of livestock and accessibility of forage. The Lawyer soil should be avoided during wet, freezing weather to reduce the hazard of livestock injury caused by slipping and falling. Providing adequate stock water is often a problem in areas of the Bluesprin soil, especially during the hot, dry summer.

The very steep slopes restrict use of these soils for all construction and recreation.

This association is in capability subclass VIIe.

**75—Lawyer-Tannahill association.** This association consists of very steep soils on lower parts of mountainsides and canyonsides. Slopes are 40 to 90 percent. Elevation is 1,000 to 2,800 feet. This association is about 40 percent Lawyer silt loam and 30 percent Tannahill cobbly loam. The Lawyer soil is north facing, and the Tannahill soil is south facing.

Included with these soils in mapping are small areas of Licksillet gravelly clay loam, Bluesprin cobbly loam, and Rock outcrop.

The Lawyer soil is very deep and well drained. It formed in loess mixed with colluvium and residuum weathered from basic igneous rock. The average annual precipitation is about 20 inches, the average annual air temperature is about 47 degrees F, and the frost-free period is about 130 days.

Typically, the upper part of the surface layer is very dark grayish brown silt loam about 6 inches thick, and the lower part is very dark grayish brown loam and gravelly loam about 17 inches thick. The subsoil is dark grayish brown and brown very gravelly clay loam to a depth of 72 inches.

Permeability is slow. The effective rooting depth is 60 inches or more. Available water capacity is moderate. Reaction is neutral throughout. Runoff is very rapid, and the hazard of erosion is very severe.

The Tannahill soil is deep and well drained. It formed in colluvium and residuum weathered from Columbia River Basalt and Seven Devils Volcanics with some loess mixed in the upper part. The average annual precipitation is about 14 inches, the average annual air temperature is about 52 degrees F, and the frost-free period is about 170 days.

Typically, the surface layer is dark brown cobbly loam and gravelly silty clay loam about 10 inches thick. The

subsoil is brown very gravelly silty clay loam about 9 inches thick. The substratum is pale brown and very pale brown, strongly calcareous very gravelly loam about 33 inches thick. Fractured, weathered basalt bedrock is at a depth of 52 inches.

Permeability is moderately slow. Effective rooting depth is 40 to 60 inches. Available water capacity is low. Reaction is mildly alkaline in the surface layer and subsoil and moderately alkaline and strongly alkaline in the substratum. Runoff is very rapid, and the hazard of erosion is very severe.

This association is used for range.

The potential native vegetation on the Lawyer soil is mainly Idaho fescue, bluebunch wheatgrass, and many forbs. If range condition declines, the proportion of Idaho fescue and bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and sod-forming bluegrass become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition. This soil should be avoided during wet, freezing weather to reduce the hazard of livestock injury caused by slipping and falling.

The potential native vegetation on the Tannahill soil is mainly bluebunch wheatgrass and Sandberg bluegrass. If range condition declines, the proportion of bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and annual plants become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition. Potential forage production is good, but the very steep slopes limit movement of livestock and accessibility of forage. Providing adequate stock water is often a problem, especially during the hot, dry summer.

The very steep slopes restrict use of these soils for all construction and recreation.

This association is in capability subclass VIIe.

**76—Licksillet-Tannahill complex.** This complex consists of gently sloping to steep, south-facing soils on side slopes. Slopes are 7 to 40 percent. Elevation is 1,000 to 2,800 feet. This complex is about 45 percent Licksillet gravelly clay loam and 25 percent Tannahill loam.

Included with these soils in mapping are small areas of cobbly and very cobbly soils and small areas of a soil that is similar to Tannahill soils but that has less than 35 percent rock fragments in the subsoil.

The Licksillet soil is shallow and well drained. It formed in loess mixed with material weathered from Columbia River Basalt or Seven Devils Volcanics. The average annual precipitation is about 14 inches, the average annual air temperature is about 52 degrees F, and the frost-free period is about 170 days.

Typically the surface layer is brown and dark brown gravelly loam and gravelly clay loam about 10 inches thick. The subsoil is brown very gravelly clay loam about



7 inches thick. Fractured basalt bedrock having lime in some fractures is at a depth of 17 inches.

Permeability is moderate. The effective rooting depth is 10 to 20 inches. Available water capacity is very low. Reaction is mildly alkaline throughout. Runoff is rapid and very rapid, and the hazard of erosion is severe and very severe.

The Tannahill soil is deep and well drained. It formed in colluvium and residuum weathered from Columbia River Basalt or Seven Devils Volcanics with some loess mixed in the upper part. The average annual precipitation is about 14 inches, the average annual air temperature is about 52 degrees F, and the frost-free period is about 170 days.

Typically the surface layer is dark brown loam about 10 inches thick. The subsoil is brown very gravelly silty clay loam about 9 inches thick. The substratum is pale brown and very pale brown, strongly calcareous very gravelly loam about 33 inches thick. Fractured, weathered basalt bedrock is at a depth of 52 inches.

Permeability is moderately slow. Effective rooting depth is 40 to 60 inches. Available water capacity is low. Reaction is mildly alkaline in the surface layer and subsoil and moderately alkaline and strongly alkaline in the substratum. Runoff is rapid and very rapid, and the hazard of erosion is severe and very severe.

This complex is used for range.

The potential native vegetation on these soils is bluebunch wheatgrass and Sandberg bluegrass. If range condition declines, the proportion of bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and annual plants become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition. Potential forage production is fair.

Providing adequate stock water is often a problem, especially during the hot, dry summer.

The depth to rock and the content of rock fragments in these soils restrict construction and recreation. Slope is a restriction in the steeper areas.

This complex is in capability subclass VIIe.

**77—Meland silt loam, 3 to 7 percent slopes.** This gently sloping, south-facing soil is on plateaus. It is moderately deep and well drained. Elevation is 2,500 to 4,200 feet. This soil formed in basalt residuum mixed with loess. The average annual precipitation is about 22 inches, the average annual air temperature is about 46 degrees F, and the frost-free period is about 120 days.

Typically, the surface layer is dark grayish brown and grayish brown silt loam about 16 inches thick. The upper part of the subsoil is brown silt loam about 5 inches thick, and the lower part is brown and light yellowish brown clay loam about 11 inches thick. Decomposing basalt bedrock is at a depth of 32 inches.

Included with this soil in mapping are small areas of a soil that is similar to Meland soils but that has a thick surface layer. Also included are small areas of Ferdinand

and Nez Perce silt loams and Riggins very gravelly silt loam.

In this Meland soil, permeability is moderately slow. Effective rooting depth is 20 to 40 inches. Available water capacity is moderate. Reaction is slightly acid and medium acid throughout. Runoff is medium, and the hazard of erosion is moderate.

This soil is used for winter wheat, barley, peas, and some hay and pasture. No significant areas remain in native vegetation.

If this soil is properly managed, production of all commonly grown crops is good. Soil can be conserved by growing annual crops of small grains and peas, keeping tillage to a minimum, and returning crop residue to the soil. Grassed waterways prevent formation of gullies in the natural drainageways. Crops of legumes and grasses can also be grown and help control erosion. Nitrogen sulfur, and sometimes phosphorus are necessary. Weed control is important.

This soil is well suited to pasture and hay. Under a high level of management, production is good. A well balanced fertilization program is needed. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Latar orchardgrass, smooth and Regar brome, intermediate wheatgrass, and alfalfa are suitable for planting.

The main restriction on use of this soil for homesites and most sanitary facilities is the depth to rock. Septic tank absorption fields are also restricted by the moderately slow permeability of the subsoil.

This soil is suited to most kinds of recreation, but the surface tends to be dusty when dry.

This soil is in capability subclass IIe.

**78—Meland silt loam, 7 to 25 percent slopes.** This sloping and moderately steep, south-facing soil is on plateaus. It is moderately deep and well drained. Elevation is 2,500 to 4,200 feet. This soil formed in basalt residuum mixed with loess. The average annual precipitation is about 22 inches, the average air temperature is about 46 degrees F, and the frost-free period is about 120 days.

Typically, the surface layer is dark grayish brown and grayish brown silt loam about 16 inches thick. The upper part of the subsoil is brown silt loam about 5 inches thick, and the lower part is brown and light yellowish brown clay loam about 11 inches thick. Decomposing basalt bedrock is at a depth of 32 inches.

Included with this soil in mapping are small areas of a soil that is similar to Meland soils but that has a thicker surface layer. Also included are small areas of Ferdinand and Nez Perce silt loams and Riggins very gravelly silt loam.

In this Meland soil, permeability is moderately slow. Effective rooting depth is 20 to 40 inches. Available water capacity is moderate. Reaction is slightly acid and medium acid throughout. Runoff is rapid, and the hazard of erosion is severe.

This soil is used for winter wheat, barley, peas, and some hay and pasture. No significant areas remain in native vegetation.

If this soil is properly managed, production of all commonly grown crops is good. The hazard of erosion is severe if the soil is tilled intensively, as in summer-fallow practice. Soil can be conserved by growing annual crops of small grains and peas, keeping tillage to a minimum, and returning crop residue to the soil. Grassed waterways prevent formation of gullies in the natural drainageways. Crops of legumes and grasses can also be grown and help control erosion. Nitrogen, sulfur, and sometimes phosphorus are necessary. Weed control is important.

This soil is well suited to pasture and hay. Under a high level of management, production is good. A well balanced fertilization program is needed. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Latar orchardgrass, smooth brome, Regar brome, intermediate wheatgrass, and alfalfa are suitable for planting.

The main restrictions on use of this soil for homesites, roads, and sanitary facilities are slope and the depth to rock. Septic tank absorption fields are also restricted by the moderately slow permeability of the subsoil.

This soil can be used for paths and trails. Slope restricts use for playgrounds and camp areas.

This soil is in capability subclass IIIe.

**79—Meland silt loam, 25 to 40 percent slopes.** This steep, south-facing soil is on plateaus. It is moderately deep and well drained. Elevation is 2,500 to 4,200 feet. This soil formed in basalt residuum mixed with loess. The average annual precipitation is about 22 inches, the average annual air temperature is about 46 degrees F, and the frost-free period is about 120 days.

Typically, the surface layer is dark grayish brown and grayish brown silt loam about 16 inches thick. The upper part of the subsoil is brown silt loam about 5 inches thick, and the lower part is brown and light yellowish brown clay loam about 11 inches thick. Decomposing basalt bedrock is at a depth of 32 inches.

Included with this soil in mapping are small areas of a soil that is similar to Meland soils but that has a thicker surface layer. Also included are small areas of Ferdinand and Nez Perce silt loams and Riggins very gravelly silt loam.

In this Meland soil permeability is moderately slow. Effective rooting depth is 20 to 40 inches. Available water capacity is moderate. Reaction is slightly acid and medium acid throughout. Runoff is very rapid, and the hazard of erosion is very severe.

This soil is used for hay, pasture, barley, and winter wheat. No significant areas remain in native vegetation.

If this soil is properly managed, production of all commonly grown crops is good. The hazard of erosion is very severe if the soil is tilled intensively, as in summer-fallow practice. Soil is conserved by keeping a perma-

nent cover crop on the soil at least half of the time, annual cropping, cross-slope farming, keeping tillage to a minimum, and returning crop residue to the soil. Grassed waterways prevent formation of gullies in the natural drainageways. Contour farming, divided-slope farming, using gradient terraces, field stripcropping, and building structures for water and sediment control also reduce erosion. Chiseling in the stubble in fall helps slow runoff and reduce soil loss in years when the snow melts rapidly while the surface is frozen. Crops of legumes and grasses can also be grown and help control erosion. Nitrogen, sulfur, and sometimes phosphorus are necessary. Weed control is important.

This soil is well suited to pasture and hay. Under a high level of management, production is good. A well balanced fertilization program is needed. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Latar orchardgrass, smooth brome, Regar brome, intermediate wheatgrass, and alfalfa are suitable for planting.

Slope is the main restriction on use of this soil for all construction and recreation. Homesites are also limited by the depth to rock. Sanitary facilities are limited by the depth to rock and the moderately slow permeability in the subsoil.

This soil is in capability subclass IVe.

**80—Naz sandy loam, 25 to 40 percent slopes.** This steep soil is in north-facing areas. It is very deep and well drained. Elevation is 2,400 to 5,000 feet. This soil formed in loess and residuum weathered from granitic rock. The average annual precipitation is about 26 inches, the average annual air temperature is about 43 degrees F, and the frost-free period is about 80 days.

Typically, the surface layer is dark grayish brown and grayish brown sandy loam about 24 inches thick. The underlying material is grayish brown and pale brown sandy loam to a depth of 60 inches.

Included with this soil in mapping are small areas where slopes are more than 40 percent or less than 25 percent. Also included are small areas of Johnson loam and a soil that is similar to Naz soils but that is more shallow to bedrock and has more than 35 percent rock fragments in the subsoil.

In this Naz soil, permeability is moderately rapid. The effective rooting depth is 60 inches or more. Available water capacity is moderate. Reaction is neutral in the surface layer and neutral and medium acid in the underlying material. Runoff is very rapid, and the hazard of erosion is very severe.

This soil is used mainly for woodland and woodland grazing. It is also used for hay and pasture.

After timber is harvested from this soil, the area can be converted to hay or pasture. Under a high level of management, production is good. A well balanced fertilization program is needed. Nitrogen and sulfur are essential. If legumes are included in the stand, phosphorus is also needed. Grazing should be rotated during the



growing season to maintain a minimum height of stubble. Latah orchardgrass, smooth brome, and alfalfa are suitable for planting.

This soil is suited to Douglas fir and ponderosa pine. It can produce about 4,100 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 40 years, or it can produce 44,600 board feet (Scribner rule) of merchantable timber 11.6 inches or more in diameter in 120 years in an unmanaged mixed conifer stand based upon the culmination of the mean annual increment. The main problem in managing timber is the erosion hazard. Conventional methods can be used for tree harvest, but logging roads, skid trails, and landings must be carefully planned to minimize soil loss.

This soil has potential for producing forage if the canopy is opened by logging, fire or other disturbance. The main native forage plants on this soil include red-stem ceanothus, Columbia brome, and elk sedge. Forage production can be increased and soil protected by seeding disturbed areas to suitable plants such as tall fescue, timothy, orchardgrass, and White Dutch clover. The vegetation should be managed to permit timber regeneration and to maintain enough litter for soil protection. This soil will produce forage for 10 to 20 years following opening of the canopy. During this period, annual production will vary from about 1,400 pounds of air-dry herbage per acre under an open canopy to less than 300 pounds as the canopy closes.

Slope is the main restriction on use of this soil for all construction and recreation.

This soil is in capability subclass IVe.

**81—Nazaton-Naz complex.** This complex consists of very steep, north-facing soils on side slopes. Slopes are 40 to 90 percent. Elevation is 2,400 to 4,000 feet. This complex is about 45 percent Nazaton gravelly loam and 25 percent Naz sandy loam.

Included with these soils in mapping are small areas of Spokel very gravelly loam and Suttler loam.

The Nazaton soil is very deep and well drained. It formed in loess and residuum from granitic rocks. The average annual precipitation is about 26 inches, the average annual temperature is about 43 degrees F, and the frost-free period is about 80 days.

Typically, the surface layer is dark grayish brown and dark brown gravelly loam about 20 inches thick. The upper part of the subsoil is brown and light yellowish brown very gravelly loam about 26 inches thick, and the lower part of the subsoil and the substratum are light brown and light yellowish brown very gravelly sandy loam to a depth of 60 inches.

Permeability is moderately rapid. The effective rooting depth is 60 inches or more. Available water capacity is moderate. Reaction is slightly acid in the surface layer and neutral in the subsoil and substratum. Runoff is very rapid, and the hazard of erosion is very severe.

The Naz soil is very deep and well drained. It formed in loess and residuum from granitic rocks. The average

annual precipitation is about 26 inches, the average annual air temperature is about 43 degrees F, and the frost-free period is about 80 days.

Typically, the surface layer is dark grayish brown and grayish brown sandy loam about 24 inches thick. The underlying material is grayish brown and pale brown sandy loam to a depth of 60 inches.

Permeability is moderately rapid. The effective rooting depth is 60 inches or more. Available water capacity is moderate. Reaction is neutral and medium acid. Runoff is very rapid, and the hazard of erosion is very severe.

This complex is used for woodland and woodland grazing.

These soils are suited to Douglas-fir and ponderosa pine. They can produce about 4,100 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 40 years, or they can produce 44,600 board feet (Scribner rule) of merchantable timber 11.6 inches or more in diameter in 120 years in an unmanaged mixed conifer stand based upon the culmination of the mean annual increment. The main problems in managing timber are the very steep slopes and very severe erosion hazard. These soils are too steep for conventional equipment. Specialized equipment that causes the least soil disturbance should be used for tree harvest. Road construction is also restricted by the very steep slopes.

These soils have potential for producing forage if the canopy is opened by fire or logging. The main native forage plants include elk sedge, redstem ceanothus, and Columbia brome. Forage production can be increased by seeding disturbed areas to suitable plants such as tall fescue, orchardgrass, timothy, and White Dutch clover. The vegetation should be managed to permit timber regeneration and to maintain enough litter for soil protection. The very steep slopes limit movement of livestock and accessibility of forage. Once the canopy is opened these soils will produce forage for 10 to 20 years. During this period, annual production will vary from about 1,400 pounds of air-dry herbage per acre under an open canopy to less than 300 pounds as the canopy closes.

The very steep slopes restrict use of these soils for all construction and recreation.

This complex is in capability subclass VIIe.

**82—Nazaton-Suttler association.** This association consists of very steep soils on sides of canyons and mountains. Slopes are 40 to 90 percent. Elevation is 2,800 to 4,500 feet. This association is about 45 percent Nazaton gravelly loam and 35 percent Suttler loam. The Nazaton soil is lower than the Suttler soil.

Included with these soils in mapping are small areas of Jughandle loam and Spokel very gravelly loam and areas where slopes are less than 40 percent. Jughandle soils have a light-colored surface.

Nazaton soil is very deep and well drained. It formed in loess and residuum from granitic rocks. The average annual precipitation is about 26 inches, the average annual air temperature is about 43 degrees F, and the frost-free period is about 80 days.



Typically, the surface layer is dark grayish brown and dark brown gravelly loam about 20 inches thick. The upper part of the subsoil is brown and light yellowish brown very gravelly loam about 26 inches thick, and the lower part of the subsoil and the substratum are light brown and light yellowish brown very gravelly sandy loam to a depth of 60 inches.

Permeability is moderately rapid. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Reaction is slightly acid in the surface layer and neutral in the subsoil and substratum. Runoff is very rapid, and the hazard of erosion is very severe.

The Suttler soil is very deep and well drained. It formed in residuum and colluvium from granitic rock. The average annual precipitation is about 28 inches, the average annual air temperature is about 42 degrees F, and the frost-free period is about 80 days.

Typically, the surface layer is brown loam about 10 inches thick. The upper part of the subsoil is light yellowish brown gravelly loam and gravelly sandy loam about 29 inches thick, and the lower part is light yellowish brown very gravelly sandy loam to a depth of 60 inches.

Permeability is moderate. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Reaction is neutral between depths of 4 and 10 inches and medium acid above and below this layer. Runoff is very rapid and the hazard of erosion is very high.

Included with these soils in mapping are small areas of Jughandle loam and Spokel very gravelly loam and areas where slopes are less than 40 percent. Jughandle soils have a light-colored surface.

This association is used for woodland and woodland grazing.

The Nazaton soil is suited to Douglas-fir and ponderosa pine. It can produce about 4,100 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 40 years, or it can produce 44,600 board feet (Scribner rule) of merchantable timber 11.6 inches or more in diameter in 120 years in an unmanaged stand based on the culmination of the mean annual increment.

The Suttler soil is suited to grand fir, Douglas-fir, western larch, lodgepole pine, and ponderosa pine. It can produce 11,850 cubic feet of wood per acre in trees 0.6 inch or more in diameter in 100 years, or it can produce 70,500 board feet (Scribner rule) of merchantable timber 11.6 inches or more in diameter in 140 years in an unmanaged stand based on the culmination of the mean annual increment.

The main problems in managing these soils for timber are the very steep slopes and the very severe erosion hazard. These soils are too steep for conventional methods of tree harvest. Specialized logging methods that cause the least soil disturbance should be used to prevent excessive soil loss. Road construction is also restricted by the very steep slopes.

These soils have potential for producing forage if the canopy is opened by fire or logging. The main native forage plants include elk sedge, redstem ceanothus, and

Columbia brome on the Nazaton soil and Columbia brome, sedge, and wild rose on the Suttler soil. Forage production can be increased by seeding disturbed areas to suitable plants such as tall fescue, orchardgrass, timothy, and White Dutch clover. The vegetation should be managed to permit timber regeneration and to maintain enough litter for soil protection. The very steep slopes limit movement of livestock and accessibility of forage. Once the canopy is opened, the Nazaton soil will produce forage for 10 to 20 years; during this period, annual production will vary from about 1,400 pounds of air-dry herbage per acre under an open canopy to less than 300 pounds as the canopy closes. The Suttler soil will produce forage for 10 to 15 years following opening of the canopy; during this period, annual production will vary from about 950 pounds of air-dry herbage per acre under an open canopy to less than 100 pounds per acre as the canopy closes.

The very steep slopes restrict use of these soils for all construction and recreation.

This association is in capability subclass VIIe.

**83—Nez Perce silt loam, 2 to 7 percent slopes.** This gently sloping, south-facing soil is on prairies. It is very deep and moderately well drained. Elevation is 2,800 to 4,000 feet. This soil formed in loess mixed with some residuum from basalt in the lower part. The average annual precipitation is about 22 inches, the average annual air temperature is about 46 degrees F, and the frost-free period is about 120 days.

Typically, the surface layer is dark gray and grayish brown silt loam about 17 inches thick. The buried subsurface layer is light brownish gray silt loam about 3 inches thick. The upper part of the buried subsoil is pale brown and brown silty clay about 22 inches thick, and the lower part is light brownish gray light silty clay to a depth of 69 inches.

Included with this soil in mapping are small areas where slopes are more than 7 percent and small areas of Fenn silty clay, Wilkins silt loam, Shebang silt loam, and Chicane silt loam. Also included are small areas of a soil that is similar to Nez Perce soils but that has 10 to 35 percent rock fragments in the subsoil.

In this Nez Perce soil, permeability is slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is slightly acid and neutral in the surface layer and buried subsurface layer, neutral and mildly alkaline in the upper part of the buried subsoil, and moderately alkaline in the lower part of the buried subsoil. Runoff is medium, and the hazard of erosion is moderate. A restrictive layer in the subsoil slows the movement of water and the growth of roots. A perched water table is at a depth of 1 1/2 to 2 1/2 feet late in winter.

This soil is used for winter wheat (fig. 7), barley, peas, clover seed, and some hay and pasture. No significant areas remain in native vegetation.





Figure 7.—Area of Nez Perce soils in winter wheat. North-facing area in background is Uhlorn soils.

If this soil is properly managed, production of all commonly grown crops is good. A restrictive layer in the subsoil slows the movement of water and the growth of roots. Soil can be conserved by growing annual crops of small grains and peas, keeping tillage to a minimum, and returning crop residue to the soil. Grassed waterways prevent formation of gullies in the natural drainageways. Crops of legumes and grasses can also be grown and help control erosion. Nitrogen, sulfur, and sometimes phosphorus are necessary. Weed control is important.

This soil is well suited to pasture and hay. Under a high level of management, including fertilization, production is good. Grazing should be rotated during the growing season, and a minimum stubble height should be maintained. Latar orchardgrass, smooth brome, Regar brome, intermediate wheatgrass, and alfalfa are suitable for planting.

Use of this soil for sanitary facilities is limited by the slow permeability of the subsoil and a seasonal perched water table. The design of dwellings, roads, and embankments should compensate for inherent low strength

of the soil and its shrink-swell potential. Excavation can be hindered by the high clay content of the subsoil. This soil is a suitable source of topsoil.

This soil is suited to most kinds of recreation, but the surface tends to be dusty when dry.

This soil is in capability subclass IIe.

#### **84—Nez Perce silt loam, 7 to 12 percent slopes.**

This sloping, south-facing soil is on prairies. It is very deep and well drained. Elevation is 2,800 to 4,000 feet. This soil formed in loess mixed with some residuum from basalt in the lower part. The average annual precipitation is about 22 inches, the average annual air temperature is about 46 degrees F, and the frost-free period is about 120 days.

Typically, the surface layer is dark gray and grayish brown silt loam about 17 inches thick. The buried subsurface layer is light brownish gray silt loam about 3 inches thick. The upper part of the buried subsoil is pale brown and brown silty clay about 22 inches thick, and the lower part is light brownish gray light silty clay to a depth of 69 inches.



Included with this soil in mapping are small areas where slopes are less than 7 percent and small areas of Fenn silty clay and Shebang and Chicane silt loams. Also included are small areas of a soil that is similar to Nez Perce soils but that has 10 to 35 percent rock fragments in the subsoil.

In this Nez Perce soil, permeability is slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is slightly acid and neutral in the surface layer and buried subsurface layer, neutral and mildly alkaline in the upper part of the buried subsoil, and moderately alkaline in the lower part of the buried subsoil. Runoff is rapid and the hazard of erosion is severe. A perched water table is at a depth of 1 1/2 to 2 1/2 feet late in winter.

This soil is used for winter wheat, barley, peas, clover seed, and some hay and pasture. No significant areas remain in native vegetation.

If this soil is properly managed, production of all commonly grown crops is good. The hazard of erosion is severe if the soil is tilled intensively, as in summer-fallow practice. A restrictive layer in the subsoil slows the movement of water and the growth of roots. Soil is conserved by growing annual crops of small grains and peas, tilling across the slope, keeping tillage to a minimum, and returning crop residue to the soil. Grassed waterways prevent formation of gullies in the natural drainageways. Crops of legumes and grasses are suited to this soil and help control erosion. Nitrogen, sulfur, and sometimes phosphorus are necessary. Weed control is important.

This soil is well suited to pasture and hay. Under a high level of management, including fertilization, production is good. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Latar orchardgrass, smooth brome, Regar brome, intermediate wheatgrass, and alfalfa are suitable for planting.

Use of this soil for sanitary facilities is limited by the slow permeability and seasonal perched water table. Slope restricts use for sewage lagoons. The design of dwellings, roads, and embankments should compensate for inherent low strength of the soil and its shrink-swell potential. Excavation can be hindered by the high clay content of the subsoil. This soil is suitable as a source of topsoil.

This soil can be used for picnic areas, camp areas, and paths and trails; however, the soil surface tends to be dusty when dry. Slope restricts use for playgrounds.

This soil is in capability subclass IIIe.

#### **85—Nez Perce silt loam, 12 to 25 percent slopes.**

This moderately steep, south-facing soil is on prairies. It is very deep and moderately well drained. Elevation is 2,800 to 4,000 feet. This soil formed in loess mixed with some residuum from basalt in the lower part. The average annual precipitation is about 22 inches, the average annual air temperature is about 46 degrees F, and the frost-free period is about 120 days.

Typically, the surface layer is dark gray and grayish brown silt loam about 17 inches thick. The buried subsurface layer is light brownish gray silt loam about 3 inches thick. The upper part of the buried subsoil is pale brown and brown silty clay about 22 inches thick, and the lower part is light brownish and gray light silty clay to a depth of 69 inches or more.

Included with this soil in mapping are small areas where slopes are less than 12 percent and small areas of Fenn silty clay and Shebang and Chicane silt loams. Also included are small areas of a soil that is similar to Nez Perce soils but that has 10 to 35 percent rock fragments in the subsoil.

In this Nez Perce soil, permeability is slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is slightly acid and neutral in the surface layer and buried subsurface layer, neutral and mildly alkaline in the upper part of the buried subsoil, and moderately alkaline in the lower part of the buried subsoil. Runoff is rapid, and the hazard of erosion is severe. A perched water table is at a depth of 1 1/2 to 2 1/2 feet late in winter.

This soil is used for winter wheat, barley, peas, clover seed, and some hay and pasture. No significant areas remain in native vegetation.

If this soil is properly managed, production of all commonly grown crops is good. The hazard of erosion is severe if the soil is tilled intensively, as in summer-fallow practice. A restrictive layer in the subsoil slows the movement of water and the growth of roots. Soil is conserved by continuously growing small grains and peas, keeping tillage to a minimum, and returning crop residue to the soil. Grassed waterways prevent gullies in the natural drainageways. Contour farming, divided-slope farming, using gradient terraces, and field stripcropping also reduce erosion. Crops of legumes and grasses are also suited to this soil and help control erosion. Nitrogen, sulfur, and sometimes phosphorus are necessary. Weed control is important.

This soil is well suited to pasture and hay. Under a high level of management, including fertilization, production is good. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Latar orchardgrass, smooth brome, Regar brome, intermediate wheatgrass, and alfalfa are suitable for planting.

Use of this soil for sanitary facilities is limited by slope the slow permeability, and the seasonal perched water table. The design of dwellings, roads, and embankments should compensate for the inherent low strength of the soil, its shrink-swell potential and slope. Excavation can be hindered by the high clay content of the subsoil and by slope.

Recreation use is restricted by slope.

This soil is in capability subclass IIIe.

**86—Nicodemus loam.** This nearly level soil is on bottom lands, low terraces, and alluvial fans. It is moderately deep to stratified sand, gravel, and cobbles and is



moderately well drained. Elevation is 1,150 to 1,500 feet. This soil formed in alluvium. The average annual precipitation is about 25 inches, the average annual air temperature is about 51 degrees F, and the frost-free period is about 150 days.

Typically, the upper part of the surface layer is dark grayish brown loam about 9 inches thick, and the lower part is dark grayish brown very cobbly loam about 16 inches thick. The underlying material is stratified layers of sand, gravel, and cobbles to a depth of 60 inches.

Included with this soil in mapping are small areas of Typic Xerofluvents, Nicodemus Variant loam, and Nicodemus Variant cobbly loam.

In this Nicodemus soil, permeability is rapid. Effective rooting depth is 60 inches or more. Available water capacity is low. Reaction is medium acid and slightly acid in the surface layer. Runoff is slow, and the hazard of erosion is none to slight. This soil is flooded for brief periods in some years. The water table is at a depth of 2 to 4 feet in spring.

This soil is used mainly for nonirrigated hay and pasture. It is also used for irrigated hay and pasture. No significant areas remain in native vegetation.

This soil is well suited to irrigated and nonirrigated pasture and hay. Under a high level of management, production is excellent in irrigated areas and good in nonirrigated areas. A well balanced fertilization program is needed. Good water management in irrigated areas is essential. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Latar orchardgrass, smooth brome, and alfalfa are suitable for planting in both irrigated and nonirrigated areas.

Use of this soil for roads, homesites, and sanitary facilities is restricted by the seasonal high water table and the potential flooding. The rapid permeability also limits use for sewage lagoons and sanitary landfills.

This soil is suited to recreation.

This soil is in capability subclass IVs.

**87—Nicodemus Variant loam.** This nearly level soil is on bottom lands and alluvial terraces. It is very deep and moderately well drained. Elevation is 1,150 to 1,500 feet. This soil formed in alluvium. The average annual precipitation is about 25 inches, the average annual air temperature is about 51 degrees F, and the frost-free period is about 150 days.

Typically, the surface layer is dark gray and dark grayish brown loam about 30 inches thick. The underlying material is dark grayish brown loam and brown gravelly loam to a depth of 60 inches.

Included with this soil in mapping are small areas of Nicodemus loam and Nicodemus Variant cobbly loam.

In this Nicodemus Variant soil, permeability is moderate. Effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is slightly acid in the upper part of the surface layer and neutral in the lower part of the surface layer and the underlying material. Runoff is slow, and the hazard of erosion is none to

slight. The soil is flooded briefly in some years. A perched water table is at a depth of 3 to 5 feet in spring.

This soil is used for hay and pasture. No significant areas remain in native vegetation.

This soil is well suited to irrigated and nonirrigated pasture and hay. Under a high level of management, production is excellent in irrigated areas and good in nonirrigated areas. A well balanced fertilization program is needed. Good water management in irrigated areas is essential. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Latar orchardgrass, smooth brome, and alfalfa are suitable for planting in both irrigated and nonirrigated areas.

Use of this soil for roads, homesites, and sanitary facilities is restricted by the seasonal perched water table and the potential flooding. The moderate permeability of the soil also limits use for sewage lagoons.

This soil is suited to recreation.

This soil is in capability subclass IIc.

**88—Nicodemus Variant cobbly loam.** This nearly level soil is on bottom lands and alluvial terraces. It is very deep and moderately well drained. Elevation is 1,150 to 1,500 feet. This soil formed in alluvium. The average annual precipitation is about 25 inches, the average annual air temperature is about 51 degrees F, and the frost-free period is about 150 days.

Typically, the upper part of the surface layer is dark gray cobbly loam about 6 inches thick, and the lower part is dark gray and dark grayish brown loam and gravelly loam about 24 inches thick. The underlying material is dark grayish brown and brown loam and gravelly loam to a depth of 60 inches.

Included with this soil in mapping are small areas of Nicodemus Variant loam and Nicodemus loam.

In this Nicodemus Variant soil, permeability is moderate. Effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is slightly acid and neutral in the surface layer and neutral in the underlying material. Runoff is slow, and the hazard of erosion is none to slight. This soil is flooded briefly in some years. A perched water table is at a depth of 3 to 5 feet in spring.

This soil is used for pasture. No significant areas remain in native vegetation.

This soil is suited to pasture. Under a high level of management, production is excellent. A well balanced fertilization program is needed, including nitrogen, sulfur, and possibly phosphorus. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Orchardgrass, smooth brome, tall fescue, and alfalfa are suitable for planting. The cobbles make seedbed preparation and seeding difficult.

Use of this soil for roads, homesites, and sanitary facilities is restricted by the seasonal perched water table and the potential flooding. The moderate permeability of the soil also limits use for sewage lagoons.

This soil is suited to most kinds of recreation. Use for playgrounds is limited by cobbles on the surface.



This soil is in capability subclass IVs.

**89—Oland silt loam, 10 to 40 percent slopes.** This moderately steep and steep soil is on high terraces. It is very deep and well drained. Elevation is 2,400 to 3,600 feet. This soil formed in loess and colluvium and residuum from granitic rock. The average annual precipitation is about 18 inches, the average annual air temperature is about 46 degrees F, and the frost-free period is about 120 days.

Typically, the upper part of the surface layer is very dark grayish brown silt loam about 4 inches, and the lower part is very dark grayish brown loam about 7 inches thick. The upper part of the subsoil is dark brown gravelly loam about 15 inches thick, and the lower part is brown very gravelly loam about 14 inches thick. The substratum is very dark grayish brown very gravelly sandy loam to a depth of 70 inches.

Included with this soil in mapping are areas where slopes are more than 40 percent and areas of Oland Variant loam and Brownlee loam.

In this Oland soil, permeability is moderate. The effective rooting depth is 60 inches or more. Available water capacity is moderate. Reaction is neutral and slightly acid in the surface layer and slightly acid in the subsoil and substratum. Runoff is rapid, and the hazard of erosion is severe.

This soil is used mostly for range. It is also used for hay and pasture.

This soil is well suited to pasture and hay. Under a high level of management, production is good. A well balanced fertilization program is needed. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Intermediate wheatgrass, Lata orchardgrass, smooth brome, Regar brome, and alfalfa are suitable for planting.

The potential native vegetation is mainly Idaho fescue, bluebunch wheatgrass, various forbs, and hawthorn. If range condition declines, the proportion of Idaho fescue and bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and annuals become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition.

Slope is the main restriction on use of this soil for all construction and recreation.

This soil is in capability subclass VIe.

**90—Oland silt loam, 40 to 90 percent slopes.** This very steep, north-facing soil is on side slopes (fig. 8). It is very deep and well drained. Elevation is 2,400 to 3,600 feet. This soil formed in loess and colluvium and residuum from granitic rock. The average annual precipitation is about 18 inches, the average annual air temperature is about 46 degrees F, and the frost-free period is about 120 days.

Typically, the upper part of the surface layer is very dark grayish brown silt loam about 4 inches thick, and the lower part is very dark grayish brown loam about 7

inches thick. The upper part of the subsoil is dark brown gravelly loam about 15 inches thick, and the lower part is brown very gravelly loam about 14 inches thick. The substratum is very dark grayish brown very gravelly sandy loam to a depth of 70 inches.

Included with this soil in mapping are areas where slopes are less than 40 percent and areas of Brower very gravelly loam.

In this Oland soil, permeability is moderate. The effective rooting depth is 60 inches or more. Available water capacity is moderate. Reaction is neutral and slightly acid in the surface layer and slightly acid in the subsoil and substratum. Runoff is very rapid, and the hazard of erosion is very severe.

This soil is used for range.

The potential native vegetation is mainly Idaho fescue, bluebunch wheatgrass, various forbs, and hawthorn. If range condition declines, the proportion of Idaho fescue and bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and annuals become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition. The very steep slopes limit movement of livestock and accessibility of forage.

The very steep slopes restrict use of this soil for all construction and recreation.

This soil is in capability subclass VIIe.

**91—Oland Variant loam, 10 to 30 percent slopes.**

This moderately steep soil is on high terraces. It is very deep and well drained. Elevation is 2,800 to 3,600 feet. This soil formed in residuum from granitic rock. The average annual precipitation is about 18 inches, the average annual air temperature is about 47 degrees F, and the frost-free period is about 130 days.

Typically, the surface layer is very dark grayish brown and dark grayish brown loam about 27 inches thick. The subsoil is brown and dark brown loam about 23 inches thick. The substratum is yellowish brown loam to a depth of 62 inches.

Included with this soil in mapping are areas where slopes are less than 10 percent or more than 30 percent and areas of Oland silt loam and Brower gravelly loam.

In this Oland Variant soil, permeability is moderate. Effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is neutral throughout. Runoff is rapid, and the hazard of erosion is severe.

This soil is used mainly for hay and pasture. It is also used for range.

This soil is well suited to pasture and hay. Under a high level of management, production is good. A well balanced fertilization program is needed. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Intermediate wheatgrass, Lata orchardgrass, smooth brome, Regar brome, and alfalfa are suitable for planting.

The potential native vegetation is mainly Idaho fescue, bluebunch wheatgrass, and various forbs. If range condition declines, the proportion of Idaho fescue and blue-





Figure 8.—Area of north-facing Oland soils on right. South-facing area on left is Brower-Rock outcrop complex.

bunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and annuals become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition.

Slope is the main restriction on use of this soil for all construction and recreation.

This soil is in capability subclass IVe.

**92—Riggins-Meland complex.** This complex consists of moderately sloping to steep soils on edges of plateaus. Slopes are 7 to 40 percent. Elevation is 2,500 to 4,200 feet. This complex is about 45 percent Riggins very gravelly silt loam and 35 percent Meland silt loam.

Included with these soils in mapping are small areas of Flybow very cobbly loam and Ferdinand silt loam.

The Riggins soil is shallow and well drained. It formed in loess and colluvium and residuum from Columbia River Basalt or Seven Devils Volcanics. The average annual precipitation is about 18 inches, the average annual air temperature is about 48 degrees F, and the frost-free period is about 140 days.

Typically, the surface layer is dark grayish brown very gravelly silt loam about 8 inches thick. The subsoil is brown very gravelly clay loam about 5 inches thick. Basalt bedrock is at a depth of 13 inches.

Permeability is moderately slow. The effective rooting depth is 10 to 20 inches. Available water capacity is very

low. Reaction is neutral throughout. Runoff is rapid and very rapid, and the hazard of erosion is severe and very severe.

The Meland soil is moderately deep and well drained. It formed in basalt residuum mixed with loess. The average annual precipitation is about 22 inches, the average annual air temperature is about 46 degrees F, and the frost-free period is about 120 days.

Typically, the surface layer is dark grayish brown and grayish brown silt loam about 16 inches thick. The upper part of the subsoil is brown silt loam about 5 inches thick, and the lower part is brown and light yellowish brown clay loam about 11 inches thick. Decomposing basalt bedrock is at a depth of 32 inches.

Permeability is moderately slow. The effective rooting depth is 20 to 40 inches. Available water capacity is moderate. Reaction is slightly acid and medium acid throughout. Runoff is rapid and very rapid, and the hazard of erosion is severe and very severe.

This complex is used mainly for range. It is also used for hay and pasture.

These soils are suited to pasture and hay. Under a high level of management, production is good. A well balanced fertilization program is needed. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Latah orchardgrass, smooth brome, Regar brome, intermediate wheatgrass, and alfalfa are suitable for planting.

The potential native vegetation is mainly bluebunch wheatgrass, Idaho fescue, and Sandberg bluegrass on the Riggins soil and Idaho fescue, bluebunch wheatgrass, and balsamroot on the Meland soil. If range condition declines, the proportion of Idaho fescue and bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds, shrubs, and annual grasses become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition.

Slope is the main restriction on use of these soils for all construction and recreation. Depth to rock is also a limitation.

This complex is in capability subclass VIe.

**93—Rock outcrop.** Rock outcrop is on steep and very steep sides of canyons and mountains (fig. 9). This map unit is about 90 percent outcroppings of various kinds of rock, mainly Columbia River Basalt, Seven Devils Volcanics (greenstone), andesite, and granitic rock. Crevices in the rock contain some soil material.

Tannahill, Bluesprink, and Klickson soils are included in areas of basalt, Seven Devils Volcanics, and andesite. Brower, Nazaton, and Suttler soils are included in areas of granitic rock.

Rock outcrop is used for wildlife habitat. It has no value for grazing and often interferes with livestock movement, thereby limiting accessibility of forage.



Figure 9.—Area of Rock outcrop along the Salmon River.

All construction and recreation uses are severely limited.

Rock outcrop is in capability subclass VIIIs.

**94—Rock outcrop-Bluesprink complex.** This complex consists of Rock outcrop and very steep soils on south-facing canyonsides. Slopes are 40 to 90 percent. Elevation is 2,200 to 5,000 feet. This complex is about 60 percent Rock outcrop and 25 percent Bluesprink very cobbly loam.

Included in mapping are small areas of Licksillet gravelly clay loam, Tannahill cobbly loam, and Riggins very gravelly silt loam.

Rock outcrop consists of Columbia River Basalt or Seven Devils Volcanics.

The Bluesprink soil is moderately deep and well drained. It formed in loess and colluvium and residuum from basic igneous rock, mainly basalt and andesite. The average annual precipitation is about 18 inches, the average annual air temperature is about 48 degrees F, and the frost-free period is about 140 days.

Typically, the surface layer is dark grayish brown very cobbly loam about 12 inches thick. The subsoil is dark yellowish brown very cobbly clay loam about 19 inches thick. Bedrock is at a depth of 31 inches.

Permeability is moderately slow. The effective rooting depth is 20 to 40 inches. Available water capacity is low. Reaction is slightly acid and neutral throughout. Runoff is very rapid, and the hazard of erosion is very severe.

This complex is used for range.



Rock outcrop has no value for grazing. It often interferes with livestock movement, thereby limiting accessibility of forage.

The potential native vegetation on the Bluesprin soil is mainly bluebunch wheatgrass and Idaho fescue. If range condition declines, the proportion of bluebunch wheatgrass and Idaho fescue decreases and the proportion of forbs and shrubs increases. Weeds and annual plants become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition. Potential forage production is good, but the very steep slopes and Rock outcrop limit movement of livestock and accessibility of forage. Providing adequate stock water is often a problem, especially during the hot, dry summer.

The very steep slopes and Rock outcrop restrict the use of this complex for all construction and recreation.

This complex is in capability subclass VIIe.

**95—Rock outcrop-Brower complex.** This complex consists of Rock outcrop and very steep soils on south-facing canyonsides. Slopes are 40 to 90 percent. Elevation is 2,000 to 3,700 feet. This complex is about 60 percent Rock outcrop and 25 percent Brower very gravelly loam.

Included in mapping are small areas of Brownlee loam and Spokel very gravelly loam.

Rock outcrop consists of schist, gneiss, quartz diorite, and similar granitic rock.

The Brower soil is very deep and well drained. It formed in colluvium and residuum weathered from granitic rock and some loess. The average annual precipitation is about 20 inches, the average annual air temperature is about 49 degrees F, and the frost-free period is about 140 days.

Typically, the upper part of the surface layer is brown very gravelly loam about 9 inches thick, and the lower part is grayish brown very gravelly loam about 16 inches thick. The underlying material is brown very gravelly loam to a depth of 60 inches.

Permeability is moderate. Effective rooting depth is 60 inches or more. Available water capacity is low. Reaction is neutral throughout. Runoff is very rapid, and the hazard of erosion is very severe.

This complex is used for range.

Rock outcrop has no value for grazing. It often interferes with livestock movement.

The potential native vegetation on the Brower soil is mainly bluebunch wheatgrass, Idaho fescue, arrowleaf balsamroot, and lupine. If range condition declines, the proportion of bluebunch wheatgrass and Idaho fescue decreases and the proportion of forbs and shrubs increases. Weeds, shrubs, and annuals become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition.

The very steep slopes and Rock outcrop limit movement of livestock and accessibility of forage. The very

steep slopes and Rock outcrop restrict the use of this complex for all construction and recreation.

This complex is in capability subclass VIIe.

**96—Rock outcrop-Klickson complex.** This complex consists of Rock outcrop and very steep soils on north-facing canyonsides. Slopes are 40 to 90 percent. Elevation is 2,500 to 7,000 feet. This complex is about 60 percent Rock outcrop and 25 percent Klickson cobbly loam.

Included in mapping are small areas of Suloaf and Telcher silt loams.

Rock outcrop consists of Columbia River Basalt.

The Klickson soil is very deep and well drained. It formed in loess and colluvium and residuum from basic igneous rock. The average annual precipitation is about 26 inches, the average annual air temperature is about 42 degrees F, and the frost-free period is about 80 days.

Typically, the upper part of the surface layer is dark grayish brown cobbly loam about 6 inches thick, and the lower part is brown cobbly silt loam about 9 inches thick. The upper layer of the subsoil is brown cobbly silt loam and very cobbly loam about 36 inches thick, and the lower layer is brown cobbly clay to a depth of 60 inches or more. The cobbly clay subsoil layer is absent in some areas.

Permeability is generally moderate. Where present, the cobbly clay subsoil layer has moderately slow permeability. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Reaction is slightly acid throughout. Runoff is very rapid, and the hazard of erosion is very severe.

This complex is used for woodland and woodland grazing.

Rock outcrop has no value for grazing or timber production. It often interferes with livestock movement, thereby limiting accessibility of forage.

The Klickson soil is suited to Douglas-fir and ponderosa pine. It can produce about 4,100 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 40 years, or it can produce 44,600 board feet (Scribner rule) of merchantable timber 11.6 inches or more in diameter in 120 years in an unmanaged stand based on the culmination of the mean annual increment. The main problems in managing timber are the very steep slopes, Rock outcrop, and very severe erosion hazard. This unit is too steep for conventional methods of tree harvest. Specialized logging methods that cause the least soil disturbance should be used to prevent excessive soil loss. Road construction is also restricted by the very steep slopes and Rock outcrop. The outcrops interfere with tree felling.

This unit has potential for producing forage if the canopy is opened by fire or logging. The main native forage plants on the Klickson soil include elk sedge, pine reedgrass, and rose. Forage production can be increased by seeding disturbed areas to suitable plants such as orchardgrass, timothy, tall fescue, and White

Dutch clover. The vegetation should be managed to permit timber regeneration and to maintain enough litter for soil protection. Rock outcrop and very steep slopes limit movement of livestock and accessibility of forage. Once the canopy is opened, this soil will produce forage for 15 to 20 years. During this period, annual production will vary from about 1,600 pounds of air-dry herbage per acre under an open canopy to less than 300 pounds as the canopy closes.

The very steep slopes and Rock outcrop restrict use of this complex for all construction and recreation.

This complex is in capability subclass VIIe.

**97—Rock outcrop-Nazaton complex.** This complex consists of Rock outcrop and very steep soils on north-facing canyonsides. Slopes are 40 to 90 percent. Elevation is 2,400 to 4,500 feet. This complex is about 60 percent Rock outcrop and 25 percent Nazaton gravelly loam.

Included with this complex in mapping are small areas of a soil that is similar to Nazaton gravelly loam but that is shallow to bedrock and small areas of Naz sandy loam and Spokel very gravelly loam.

Rock outcrop consists of schist, gneiss, or similar granitic rock. Around Lucile, there are some areas of limestone.

The Nazaton soil is very deep and well drained. It formed in loess and residuum from granitic rocks. The average annual precipitation is about 26 inches, the average annual air temperature is 43 degrees F, and the frost-free period is about 80 days.

Typically, the surface layer is dark grayish brown and dark brown gravelly loam about 20 inches thick. The upper part of the subsoil is brown and light yellowish brown very gravelly silt loam about 26 inches thick. The lower part of the subsoil and the substratum are light brown and light yellowish brown very gravelly sandy loam to a depth of 60 inches.

Permeability is moderately rapid. The effective rooting depth is 60 inches or more. Available water capacity is moderate. Reaction is slightly acid in the surface layer and neutral in the subsoil and substratum. Runoff is very rapid, and the hazard of erosion is very severe.

This complex is used for woodland and woodland grazing.

Rock outcrop has very little value for grazing. It often interferes with livestock movement.

The Nazaton soil is suited to Douglas-fir and ponderosa pine. It can produce about 4,100 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 40 years, or it can produce 44,600 board feet (Scribner rule) of merchantable timber 11.6 inches or more in diameter in 120 years in an unmanaged mixed conifer stand based upon the culmination of the mean annual increment. The main problems in managing timber are the very steep slopes, Rock outcrop, and very severe erosion hazard. This unit is too steep for conventional methods of tree harvest. Specialized logging methods that

cause the least soil disturbance should be used to prevent excessive soil loss. Road construction is also restricted by the very steep slopes and Rock outcrop. The outcrops interfere with tree felling.

The Nazaton soil has potential for producing forage if the canopy is opened by fire or logging. The main native forage plants include elk sedge, redstem ceanothus, and Columbia brome. Forage production can be increased by seeding disturbed areas to suitable plants such as tall fescue, orchardgrass, timothy, and White Dutch clover. The vegetation should be managed to permit timber regeneration and to maintain enough litter for soil protection. Rock outcrop and the very steep slopes limit movement of livestock and accessibility of forage. Once the canopy is opened, this soil will produce forage for 10 to 20 years. During this period, annual production will vary from about 1,400 pounds of air-dry herbage per acre under an open canopy to less than 300 pounds as the canopy closes.

The very steep slopes and Rock outcrop restrict the use of this complex for all construction and recreation.

This complex is in capability subclass VIIe.

**98—Rock outcrop-Suttler complex.** This complex consists of Rock outcrop and very steep soils on mountainsides. Slopes are 40 to 90 percent. Elevation is 3,500 to 4,800 feet. This complex is about 60 percent Rock outcrop and 20 percent Suttler loam.

Included with this complex in mapping are small areas of Jughandle loam and a soil that is similar to Suttler soils but that is more shallow to bedrock.

Rock outcrop consists of schist, gneiss, or similar granitic rock.

The Suttler soil is very deep and well drained. It formed in residuum and colluvium from granitic rock. The average annual precipitation is about 28 inches, the average annual air temperature is about 42 degrees F, and the frost-free period is about 80 days.

Typically, the surface layer is brown loam about 10 inches thick. The upper part of the subsoil is light yellowish brown gravelly loam and gravelly sandy loam about 29 inches thick, and the lower part is light yellowish brown very gravelly loam to a depth of 60 inches.

Permeability is moderate. The effective rooting depth is 60 inches or more. Available water capacity is moderate. Reaction is medium acid throughout. Runoff is very rapid, and the hazard of erosion is very severe.

This complex is used for woodland and woodland grazing.

Rock outcrop has no value for grazing. It often interferes with livestock movement, thereby limiting accessibility of forage.

The Suttler soil is suited to grand fir, Douglas-fir, western larch, lodgepole pine, and ponderosa pine. It can produce about 11,850 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 100 years, or it can produce 70,500 board feet (Scribner rule) of merchantable timber 12.6 inches or more in diameter in 140 years.



in an unmanaged mixed conifer stand based on the culmination of the mean annual increment. The main problems in managing timber are the very steep slopes, Rock outcrop, and hazard of erosion. This soil is too steep for conventional methods of tree harvest. Special logging methods that cause the least soil disturbance should be used to prevent excessive soil loss. Road construction is also restricted by the very steep slopes and Rock outcrop. The outcrops interfere with tree felling.

The Suttler soil has potential for producing forage if the canopy is opened by fire or logging. The main native forage plants include Columbia brome, sedge, and wild rose. Forage production can be increased by seeding disturbed areas to suitable plants such as timothy, tall fescue, orchardgrass, and White Dutch clover. The vegetation should be managed to permit timber regeneration and to maintain enough litter for soil protection. The Rock outcrop and very steep slopes limit movement of livestock and accessibility of forage. Once the canopy is opened, this soil will produce forage for 10 to 15 years. During this period, annual production will vary from about 950 pounds of air-dry herbage per acre under an open canopy to less than 100 pounds as the canopy closes.

The very steep slopes and Rock outcrop restrict use of this complex for all construction and recreation.

This complex is in capability subclass VIIe.

**99—Rock outcrop-Tannahill complex.** This complex consists of Rock outcrop and very steep soils on south-facing canyonsides. Slopes are 40 to 90 percent. Elevation is 1,200 to 2,800 feet. This complex is about 55 percent Rock outcrop and 30 percent Tannahill cobbly loam.

Included in mapping are small areas of Lawyer silt loam and Licksillet gravelly clay loam.

Rock outcrop consists of Columbia River Basalt or Seven Devils Volcanics.

The Tannahill soil is deep and well drained. It formed in colluvium and residuum weathered from Columbia River Basalt or Seven Devils Volcanics with some loess in the upper part. The average annual precipitation is about 14 inches, the average annual air temperature is about 52 degrees F, and the frost-free period is about 170 days.

Typically, the upper part of the surface layer is dark brown cobbly loam about 3 inches thick, and the lower part is dark brown gravelly silty clay loam about 7 inches thick. The subsoil is brown very gravelly silty clay loam about 9 inches thick. The substratum is pale brown and very pale brown, strongly calcareous very gravelly loam about 33 inches thick. Fractured, weathered basalt rock is at a depth of 52 inches.

Permeability is moderately slow. The effective rooting depth is 40 to 60 inches. Available water capacity is low. Reaction is mildly alkaline in the surface layer and subsoil and moderately alkaline and strongly alkaline in the substratum. Runoff is very rapid, and the hazard of erosion is very severe.

This complex is used for range.

Rock outcrop has no value for grazing. It often interferes with livestock movement, thereby limiting accessibility of forage.

The potential native vegetation on the Tannahill soil is mainly bluebunch wheatgrass and Sandberg bluegrass. If range condition declines, the proportion of bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and annual plants become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition.

Potential forage production is good, but the very steep slopes and Rock outcrop limit accessibility of forage and movement of livestock. Providing adequate stock water is often a problem, especially during the hot, dry summer.

The very steep slopes and Rock outcrop restrict the use of this complex for all construction and recreation.

This complex is in capability subclass VIIe.

**100—Shebang silt loam, 2 to 7 percent slopes.** This gently sloping, south-facing soil is on prairies. It is very deep and moderately well drained. Elevation is 2,800 to 4,000 feet. This soil formed in loess and some residuum from basalt. The average annual precipitation is about 22 inches, the average annual air temperature is about 46 degrees F, and the frost-free period is about 120 days.

Typically, the surface layer is dark gray silt loam about 9 inches thick. The subsurface layer is gray silt loam about 1 inch thick. The buried subsoil is very dark gray, dark grayish brown and brown clay to a depth of 65 inches. Segregated lime occurs below a depth of 23 inches.

Included with this soil in mapping are small areas of Nez Perce silt loam and Fenn silty clay.

In this Shebang soil, permeability is slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is slightly acid and medium acid in the surface layer, neutral in the subsurface layer, and mildly alkaline to strongly alkaline in the buried subsoil. Runoff is medium, and the hazard of erosion is moderate. This soil has a perched water table at a depth of 1 to 2 feet in spring.

This soil is used for winter wheat, barley, peas, clover seed, and some hay and pasture. No significant areas remain in native vegetation.

If this soil is properly managed, production of all commonly grown crops is good. A restrictive layer in the subsoil slows the movement of water and retards the growth of roots. Soil is conserved by continuously growing small grains and peas if minimum tillage is used and crop residue is returned to the soil. Grassed waterways prevent formation of gullies in the natural drainageways. Crops of legumes and grasses are also suited to this soil and help control erosion. Nitrogen, sulfur, and sometimes phosphorus are necessary. Weed control is important.

This soil is well suited to pasture and hay. Under a high level of management, including fertilization, production is fair. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Latah orchardgrass, Regar brome, smooth brome, intermediate wheatgrass, and alfalfa are suitable for planting.

Use of this soil for septic tank absorption fields is limited by the slow permeability of the subsoil and the seasonal perched water table. Construction of sewage lagoons is restricted by slope. Construction of sanitary landfills is restricted by the seasonal perched water table and the high clay content of the subsoil. The design of roads and dwellings should compensate for the shrink-swell potential of the soil, its inherent low strength, and the perched water table. Excavation can be hindered by the high clay content of the subsoil and the perched water table. Embankment construction is restricted by the inherent low strength of the soil and the difficulty of compacting this soil. Slope and the slow permeability of the subsoil should be considered in designing grassed waterways.

This soil is suited to most kinds of recreation, but the surface tends to be dusty when dry. The perched water table restricts use for playgrounds.

This soil is in capability subclass IIe.

#### **101—Shebang silt loam, 7 to 12 percent slopes.**

This sloping, south-facing soil is on prairies. It is very deep and moderately well drained. Elevation is 2,800 to 4,000 feet. This soil formed in loess and some residuum from basalt. The average annual precipitation is about 22 inches, the average annual air temperature is about 46 degrees F, and the frost-free period is about 120 days.

Typically, the surface layer is dark gray silt loam about 9 inches thick. The subsurface layer is gray silt loam about 1 inch thick. The buried subsoil is very dark gray, dark grayish brown and brown clay to a depth of 65 inches. Segregated lime occurs below a depth of 23 inches.

Included with this soil in mapping are small areas of Ferdinand and Nez Perce silt loams and Fenn silty clay.

In this Shebang soil, permeability is slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is slightly acid and medium acid in the surface layer, neutral in the subsurface layer, and mildly alkaline to strongly alkaline in the buried subsoil. Runoff is rapid, and the hazard of erosion is severe. A perched water table is at a depth of 1 to 2 feet in spring.

This soil is used for winter wheat, barley, peas, clover seed, and some hay and pasture. No significant areas remain in native vegetation.

If this soil is properly managed, production of all commonly grown crops is good. A restrictive layer in the subsoil slows the movement of water and the growth of roots. Soil can be conserved by continuously growing small grains and peas if minimum tillage is used and crop residue is returned to the soil. Grassed waterways prevent formation of gullies in the natural drainageways.

Crops of legumes and grasses are also suited to this soil and help control erosion. Nitrogen, sulfur, and sometimes phosphorus are necessary. Weed control is important.

This soil is well suited to pasture and hay. Under a high level of management, including fertilization, production is fair. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Latah orchardgrass, Regar brome, smooth brome, intermediate wheatgrass, and alfalfa are suitable for planting.

The use of this soil for septic tank absorption fields is restricted by the slow permeability of the subsoil and the seasonal perched water table. Sewage lagoon construction is restricted by slope. Sanitary landfill construction is restricted by the perched water table and high clay content of the subsoil. The design of roads and dwellings should compensate for the shrink-swell potential of the soil, its inherent low strength, and the perched water table. Excavation can be hindered by the high clay content of the subsoil and the perched water table. Embankment construction is restricted by the inherent low strength of the soil, the difficulty in compacting this soil, and slope. Slope and the slow permeability of the subsoil should be considered in designing grassed waterways.

This soil is suited to most kinds of recreation, but the soil tends to be dusty when dry. Slope restricts use for playgrounds.

This soil is in capability subclass IIIe.

#### **102—Shebang silt loam, 12 to 25 percent slopes.**

This moderately steep, south-facing soil is on prairies. It is very deep and moderately well drained. Elevation is 2,800 to 4,000 feet. This soil formed in loess and some residuum from basalt. The average annual precipitation is about 22 inches, the average annual air temperature is about 46 degrees F, and the frost-free period is about 120 days.

Typically, the surface layer is dark gray silt loam about 9 inches thick. The subsurface layer is gray silt loam about 1 inch thick. The buried subsoil is very dark gray, dark grayish brown, and brown clay to a depth of 65 inches. Segregated lime occurs below a depth of 23 inches.

Included with this soil in mapping are small areas of Ferdinand and Nez Perce silt loams and Fenn silty clay.

In this Shebang soil, permeability is slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is slightly acid and medium acid in the surface layer, neutral in the subsurface layer, and mildly alkaline to strongly alkaline in the buried subsoil. Runoff is rapid and the hazard of erosion is severe. A perched water table is at a depth of 1 to 2 feet in spring.

This soil is used for winter wheat, barley, peas, clover seed, and some hay pasture. No significant areas remain in native vegetation.

If this soil is properly managed, production of all commonly grown crops is good. The hazard of erosion is severe if the soil is tilled intensively, as in summer-fallow



practice. A restrictive layer in the subsoil slows the movement of water and the growth of roots. Soil is conserved by continuously growing small grains and peas if minimum tillage is used and crop residue is returned to the soil. Grassed waterways prevent the formation of gullies in the natural drainageways. Contour farming, divided-slope farming, using gradient terraces, and field stripcropping also reduce erosion. Crops of legumes and grasses are also suited to this soil and help control erosion. Nitrogen, sulfur, and sometimes phosphorus are necessary. Weed control is important.

This soil is well suited to pasture and hay. Under a high level of management, including a balanced fertilization program, production is fair. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Latah orchardgrass, Regar brome, smooth brome, intermediate wheatgrass, and alfalfa are suitable for planting.

Slope is the main restriction on use of this soil for all kinds of construction. Use for septic tank filter fields is also restricted by the seasonal perched water table and the slow permeability. Sanitary landfills are restricted by the high clay content of the subsoil and the perched water table. The design of roads and dwellings should compensate for the slope, the shrink-swell potential of the soil, its inherent low strength, and the perched water table. Excavation can be hindered by the high clay content of the subsoil and by slope.

The moderately steep slopes restrict use of this soil for recreation.

This soil is in capability subclass IIIe.

**103—Spokel very stony loam, 40 to 90 percent slopes.** This very steep soil is on sides of mountains and canyons. It is very deep and well drained. Elevation is 2,800 to 4,500 feet. This soil formed in residuum and colluvium from granitic rock. The average annual precipitation is about 24 inches, the average annual air temperature is about 46 degrees F, and the frost-free period is about 120 days.

Typically, the surface layer is grayish brown very stony loam about 10 inches thick. The subsoil is pale brown and light yellowish brown very gravelly sandy loam about 28 inches thick. The substratum is light yellowish brown very gravelly loam to a depth of 64 inches.

Included with this soil in mapping are small areas of Brower very gravelly loam, Nazaton gravelly loam, Johnson loam, and Rock outcrop.

In this Spokel soil, permeability is moderately rapid. Effective rooting depth is more than 60 inches. Available water capacity is low. Reaction is slightly acid and neutral in the surface layer and neutral in the subsoil and substratum. Runoff is very rapid, and the hazard of erosion is very severe.

This soil is used for woodland and woodland grazing.

This soil is suited to ponderosa pine. It can produce about 3,400 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 40 years, or it can produce

40,900 board feet (Scribner rule) of merchantable timber 11.6 inches or more in diameter in 140 years in an unmanaged stand based upon the culmination of the mean annual increment. The main problems in managing timber are the very steep slopes, stones on the surface, and the very severe erosion hazard. This soil is too steep for conventional methods of tree harvest. Specialized logging methods that cause the least soil disturbance should be used to prevent excessive soil losses. Road construction is also restricted by the very steep slopes. Stones on the surface interfere with tree felling.

This soil has potential for producing forage. The overstory is normally quite open, allowing ample light to reach the understory. The potential native vegetation is mainly bluebunch wheatgrass, Idaho fescue, snowberry, and various forbs. If grazing is excessive, the proportion of Idaho fescue and bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and annual plants become more abundant if range condition further declines. The vegetation should be managed to permit timber regeneration and to maintain enough litter for soil protection. A planned grazing system is essential. The very steep slopes limit movement of livestock and accessibility of forage. This soil will produce forage almost continually if managed as a woodlot. Depending on the level of management, annual production varies from 1,200 pounds of air-dry herbage per acre to less than 500 pounds.

The very steep slopes restrict the use of this soil for all construction and recreation.

This soil is in capability subclass VIIe.

**104—Spokel-Brower association.** This association consists of very steep soils on canyon sides. Slopes are 40 to 90 percent. Elevation is 2,800 to 4,500 feet. This association is about 35 percent Spokel very gravelly loam and 35 percent Brower very gravelly loam. The Spokel soil is north facing and the Brower soil is south facing.

Included with these soils in mapping are small areas of Brownlee loam, Nazaton gravelly loam, and Rock outcrop.

The Spokel soil is very deep and well drained. It formed in residuum and colluvium from granitic rocks. The average annual precipitation is about 24 inches, the average annual air temperature is about 46 degrees F, and the frost-free period is about 120 days.

Typically, the surface layer is grayish brown very gravelly loam about 10 inches thick. The subsoil is pale brown and light yellowish brown very gravelly sandy loam about 28 inches thick. The substratum is light yellowish brown very gravelly loam to a depth of 64 inches.

Permeability is moderately rapid. The effective rooting depth is more than 60 inches. Available water capacity is low. Reaction is slightly acid and neutral in the surface layer and upper part of the subsoil and neutral in the lower part of the subsoil and substratum. Runoff is very rapid, and the hazard of erosion is very severe.



The Brower soil is very deep and well drained. It formed in colluvium and residuum weathered from granitic rocks and some loess. The average annual precipitation is about 20 inches, the average annual air temperature is about 49 degrees F, and the frost-free period is about 140 days.

Typically, the upper part of the surface layer is brown very gravelly loam about 9 inches thick and the lower part is grayish brown very gravelly loam about 16 inches thick. The underlying material is brown very gravelly loam to a depth of 60 inches.

Permeability is moderate. Effective rooting depth is 60 inches or more. Available water capacity is low. Reaction is neutral throughout. Runoff is very rapid, and the hazard of erosion is very severe.

The Spokel soil is used for woodland and woodland grazing. The Brower soil is used for range.

The Spokel soil is suited to ponderosa pine. It can produce about 3,400 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 40 years, or it can produce 31,500 board feet (Scribner rule) of merchantable timber 11.6 inches or more in diameter in 140 years in an unmanaged stand based upon the culmination of the mean annual increment. The main problems in managing timber are the very steep slopes and very severe erosion hazard. This soil is too steep for conventional methods of tree harvest. Specialized logging methods that cause the least soil disturbance should be used to prevent excessive soil loss. Road construction is also restricted by the very steep slopes.

The Spokel soil has potential for producing forage. The overstory is normally quite open, allowing ample light to reach the understory. The potential native understory is mainly Idaho fescue, bluebunch wheatgrass, snowberry, and various forbs. If grazing is excessive, the proportion of Idaho fescue and bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and annual plants become more abundant if grazing condition declines further. The vegetation should be managed to permit timber regeneration and to maintain enough litter for soil protection. A planned grazing system is essential. The very steep slopes limit movement of livestock and accessibility of forage. This soil will produce forage almost continually if managed as a woodlot. Depending on the level of management, annual production varies from 1,200 pounds of air-dry herbage per acre to less than 500 pounds.

The potential native vegetation on the Brower soil is mainly bluebunch wheatgrass and Idaho fescue. If range condition declines, the proportion of Idaho fescue and bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and annual plants become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition. Potential forage production is good, but the very steep slopes limit accessibility of forage and movement of livestock. Providing adequate stock water is often a problem, especially during the hot, dry summer.

The very steep slopes restrict the use of these soils for all construction and recreation.

This association is in capability subclass VIIe.

**105—Spokel-Nazaton association.** This association consists of very steep soils on sides of mountains and canyons. Slopes are 40 to 90 percent. Elevation is 2,800 to 4,500 feet. This association is about 35 percent Spokel very gravelly loam and 35 percent Nazaton gravelly loam. The Spokel soil is south facing, and the Nazaton soil is north facing.

Included with these soils in mapping are small areas of Brower very gravelly loam, Oland silt loam, Wapshilla cobbly loam, and Rock outcrop.

The Spokel soil is very deep and well drained. It formed in residuum and colluvium from granitic rocks. The average annual precipitation is about 24 inches, the average annual air temperature is about 46 degrees F, and the frost-free period is about 120 days.

Typically, the surface layer is grayish brown very gravelly loam about 10 inches thick. The subsoil is pale brown and light yellowish brown very gravelly sandy loam about 28 inches thick. The substratum is light yellowish brown very gravelly loam to a depth of 64 inches.

Permeability is moderately rapid. The effective rooting depth is more than 60 inches. Available water capacity is low. Reaction is slightly acid and neutral in the upper part of the soil and neutral in the lower part. Runoff is very rapid, and the hazard of erosion is very severe.

The Nazaton soil is very deep and well drained. It formed in loess and residuum and colluvium from granitic rocks. The average annual precipitation is about 26 inches, the average annual air temperature is about 43 degrees F, and the frost-free period is about 80 days.

Typically, the surface layer is dark grayish brown and dark brown gravelly loam about 20 inches thick. The upper part of the subsoil is brown and light yellowish brown very gravelly loam about 26 inches thick. The lower part of the subsoil and the substratum are light brown and light yellowish brown very gravelly sandy loam to a depth of 68 inches.

Permeability is moderately rapid. The effective rooting depth is 60 inches or more. Available water capacity is moderate. Reaction is slightly acid in the surface layer and neutral in the subsoil and substratum. Runoff is very rapid, and the hazard of erosion is very severe.

This association is used for woodland and woodland grazing.

The Spokel soil is suited to ponderosa pine. It can produce about 3,400 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 40 years, or it can produce 31,500 board feet (Scribner rule) of merchantable timber 11.6 inches or more in diameter in 140 years in an unmanaged mixed conifer stand based upon the culmination of the mean annual increment.

The Nazaton soil is suited to Douglas-fir and ponderosa pine. It can produce about 4,100 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 40



years, or it can produce 44,600 board feet (Scribner rule) of merchantable timber 11.6 inches or more in diameter in 120 years in an unmanaged stand based upon the culmination of the mean annual increment.

The main problems in managing these soils for timber are the very steep slopes and very severe erosion hazard. These soils are too steep for conventional methods of tree harvest. Specialized logging methods that cause the least soil disturbance should be used to prevent excessive soil loss. Road construction is also restricted by the very steep slopes.

The Spokel soil has potential for producing forage. The overstory is normally quite open, allowing light to reach the understory. The potential native understory is mainly Idaho fescue, bluebunch wheatgrass, snowberry, and various forbs. If grazing is excessive, the proportion of Idaho fescue and bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and annual plants become more abundant if forage condition further declines. The vegetation should be managed to permit timber regeneration and to maintain enough litter for soil protection. A planned grazing system is essential. This soil will produce forage almost continually if managed as a woodlot. Depending on the level of management, annual production varies from 1,200 pounds of air-dry herbage per acre to less than 500 pounds.

The Nazaton soil has potential for producing forage if the canopy is opened by logging, fire, or other disturbance. The main native forage plants include redstem ceanothus, Columbia brome, and elk sedge. Forage production can be increased and soil protected by seeding disturbed areas to suitable plants such as tall fescue, timothy, orchardgrass, and White Dutch clover. The vegetation should be managed to permit timber regeneration and to maintain enough litter for soil protection. The very steep slopes limit movement of livestock and accessibility of forage. This soil will produce forage for 10 to 20 years following opening of the canopy. During this period, annual production will vary from about 1,400 pounds of air-dry herbage per acre under an open canopy to less than 300 pounds as the canopy closes.

The very steep slopes restrict use of these soils for all construction and recreation.

This association is in capability subclass VIIe.

**106—Spokel-Suttler association.** This association consists of very steep soils on canyonsides. Slopes are 40 to 90 percent. Elevation is 2,800 to 4,800 feet. This association is about 50 percent Spokel very gravelly loam and 30 percent Suttler loam. The Spokel soil is south facing, and the Suttler soil is north facing.

Included with these soils in mapping are small areas of Nazaton gravelly loam and Rock outcrop.

The Spokel soil is very deep and well drained. It formed in residuum and colluvium from granitic rocks. The average annual precipitation is about 24 inches, the average annual air temperature is about 46 degrees F, and the frost-free period is about 120 days.

Typically, the surface layer is grayish brown very gravelly loam about 10 inches thick. The subsoil is pale brown and light yellowish brown very gravelly sandy loam about 28 inches thick. The substratum is light yellowish brown very gravelly loam to a depth of 64 inches.

Permeability is moderately rapid. Effective rooting depth is more than 60 inches. Available water capacity is low. Reaction is slightly acid in the upper part of the surface layer and neutral below. Runoff is very rapid, and the hazard of erosion is very severe.

The Suttler soil is very deep and well drained. It formed in residuum and colluvium from granitic rocks. The average annual precipitation is about 28 inches, the average annual air temperature is about 42 degrees F, and the frost-free period is about 80 days.

Typically, the surface layer is brown loam about 10 inches thick. The upper part of the subsoil is light yellowish brown gravelly loam and gravelly sandy loam 29 inches thick, and the lower part is light yellowish brown very gravelly sandy loam to a depth of 60 inches.

Permeability is moderate. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Reaction is medium acid throughout. Runoff is very rapid, and the hazard of erosion is very severe.

This association is used for woodland and woodland grazing.

The Spokel soil is suited to ponderosa pine. It can produce about 3,400 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 40 years, or it can produce 31,500 board feet (Scribner rule) of merchantable timber 11.6 inches or more in diameter in 140 years in an unmanaged stand based on the culmination of the mean annual increment.

The Suttler soil is suited to grand fir, Douglas-fir, western larch, lodgepole pine, and ponderosa pine. It can produce about 11,850 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 100 years, or it can produce 70,500 board feet (Scribner rule) of merchantable timber 12.6 inches or more in diameter in 140 years in an unmanaged mixed conifer stand based on the culmination of the mean annual increment.

The main problems in managing these soils for timber are the very steep slopes and very severe erosion hazard. These soils are too steep for conventional methods of tree harvest. Specialized logging methods that cause the least soil disturbance should be used to prevent excessive soil loss. Road construction is also restricted by the very steep slopes.

The Spokel soil has potential for producing forage. The overstory is normally quite open, allowing ample light to reach the understory. The potential native understory is mainly Idaho fescue, bluebunch wheatgrass, snowberry, and various forbs. If grazing is excessive, the proportion of Idaho fescue and bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and annual plants become more abundant if forage condition declines further. The vegetation should be managed to permit timber regeneration and to



maintain enough litter for soil protection. A planned grazing system is essential. The very steep slopes limit movement of livestock and accessibility of forage. This soil will produce forage almost continually if managed as a woodlot. Depending on the level of management, annual production varies from 1,200 pounds of air-dry herbage per acre to less than 500 pounds.

The Suttler soil has potential for producing forage if the canopy is opened by fire or logging. The main forage plants include Columbia brome, sedge, and wild rose. Forage production can be increased by seeding disturbed areas to suitable plants such as timothy, tall fescue, orchardgrass, and White Dutch clover. The vegetation should be managed to permit timber regeneration and to maintain enough litter for soil protection. The very steep slopes limit movement of livestock and accessibility of forage. Once the canopy is opened, this soil will produce forage for 10 to 15 years. During this period, annual production will vary from about 950 pounds of air-dry herbage per acre under an open canopy to less than 100 pounds as the canopy closes.

The very steep slopes restrict use of these soils for all construction and recreation.

This association is in capability subclass VIIe.

**107—Suloaf silt loam, 3 to 7 percent slopes.** This gently sloping soil is on timbered plateaus, mountain footslopes, and benches. It is deep and well drained. Elevation is 2,500 to 4,500 feet. This soil formed in loess and material weathered from Columbia River Basalt, andesite, or greenstone of the Seven Devils Volcanics. The average annual precipitation is about 26 inches, the average annual temperature is about 42 degrees F, and the frost-free period is about 90 days.

Typically, the surface layer is brown silt loam about 17 inches thick. The subsoil is light yellowish brown and light brown gravelly silt loam about 24 inches thick. The substratum is reddish yellow gravelly sandy loam. Partially decomposed basalt bedrock is at a depth of 54 inches.

Included with this soil in mapping are small areas of De Masters silt loam, Telcher silt loam, and Uptmor silt loam and areas where slopes are more than 7 percent.

In this Suloaf soil, permeability is moderate. Effective rooting depth is 40 to 60 inches. Available water capacity is moderate. Reaction is neutral in the surface layer and slightly acid in the subsoil and substratum. Runoff is medium, and the hazard of erosion is moderate.

This soil is used for hay, pasture, woodland, and woodland grazing.

After timber is harvested from this soil, the area can be converted to pasture and hay. Under a high level of management, production is good. A well balanced fertilization program is needed. Nitrogen and sulfur are essential. If legumes are included in the stand, phosphorus is also needed. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Latar orchardgrass, smooth brome, Regar brome, and alfalfa are suitable for planting.

This soil is suited to Douglas-fir and ponderosa pine. It can produce about 3,400 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 40 years, or it can produce 38,000 board feet (Scribner rule) of merchantable timber 11.6 inches or more in diameter in 130 years in an unmanaged stand based upon the culmination of the mean annual increment. Conventional methods can be used for tree harvest.

This soil has potential for producing forage if the canopy is opened by fire, logging, or other disturbance. The main native forage plants include elk sedge and pine reedgrass. Forage production can be increased and soil protected by seeding disturbed areas to suitable plants such as timothy, orchardgrass, tall fescue, and White Dutch clover. The vegetation should be managed to permit timber regeneration and to maintain enough litter for soil protection. This soil will produce forage for 15 to 20 years following opening of the canopy. During this period, annual production will vary from about 1,500 pounds of air-dry herbage per acre under an open canopy to less than 400 pounds as the canopy closes.

The main restrictions on use of this soil for sanitary facilities are the depth to rock and the moderate permeability in the subsoil. The design of roads and dwellings should compensate for the depth to rock, the shrink-swell potential of the soil, and its inherent low strength.

This soil is suited to most kinds of recreation, but the surface tends to be dusty when dry. Slope also restricts use for playgrounds.

This soil is in capability subclass IVe.

**108—Suloaf silt loam, 7 to 25 percent slopes.** This sloping and moderately steep soil is on timbered plateaus, mountain footslopes, and benches. It is deep and well drained. Elevation is 2,500 to 4,500 feet. This soil formed in loess and material weathered from Columbia River Basalt, andesite, or greenstone of the Seven Devils Volcanics. The average annual precipitation is about 26 inches, the average air temperature is about 42 degrees F, and the frost-free period is about 90 days.

Typically, the surface layer is brown silt loam about 17 inches thick. The subsoil is light yellowish brown and light brown gravelly silt loam about 24 inches thick. The substratum is reddish yellow gravelly sandy loam. Partially decomposed basalt bedrock is at a depth of 54 inches.

Included with this soil in mapping are small areas of De Masters silt loam, Telcher silt loam, and Uptmor silt loam and areas where slopes are more than 25 percent.

In this Suloaf soil, permeability is moderate. Effective rooting depth is 40 to 60 inches. Available water capacity is high. Reaction is neutral in the surface layer and slightly acid in the subsoil and substratum. Runoff is rapid, and the hazard of erosion is severe.

This soil is used mainly for woodland and woodland grazing. It is also used for hay and pasture.

After timber is harvested from this soil, the area can be converted to pasture and hay. Under a high level of



management, production is good. A well balanced fertilization program is needed. Nitrogen and sulfur are essential. If legumes are included in the stand, phosphorus is also needed. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Latar orchardgrass, smooth brome, Regar brome, and alfalfa are suitable for grazing.

This soil is suited to Douglas-fir and ponderosa pine. It can produce about 3,400 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 40 years, or it can produce 38,000 board feet (Scribner rule) of merchantable timber 11.6 inches or more in diameter in 130 years in an unmanaged stand based upon the culmination of the mean annual increment.

Conventional methods can be used for tree harvest, but roads, skid trails, and landings must be carefully planned to minimize soil loss. Reforestation after harvest must be carefully managed to reduce competition from undesirable understory plants.

This soil has potential for producing forage if the canopy is opened by logging, fire, or other disturbance. The main native forage plants on this soil include elk sedge and pine reedgrass. Forage production can be increased and soil protected by seeding disturbed areas to suitable plants such as timothy, orchardgrass, tall fescue, and White Dutch clover. The vegetation should be managed to permit timber regeneration and to maintain enough litter for soil protection. This soil will produce forage for 15 to 20 years following opening of the canopy. During this period, annual production will vary from about 1,500 pounds of air-dry herbage per acre under an open canopy to less than 400 pounds as the canopy closes.

The main restrictions on use of this soil for sanitary facilities are the depth to rock, moderate permeability in the subsoil, and slope. The design of roads and dwellings should compensate for the depth to rock, slope, the shrink-swell potential of the soil, and its inherent low strength.

This soil is suited to most kinds of recreation, but the surface tends to be dusty when dry. Slope is a restriction in the steeper areas.

This soil is in capability subclass IVe.

**109—Suloaf silt loam, 25 to 40 percent slopes.** This steep soil is on timbered plateaus, mountain footslopes, and benches. It is deep and well drained. Elevation is 2,500 to 4,500 feet. This soil formed in loess and material weathered from Columbia River Basalt, andesite, or greenstone of the Seven Devils Volcanics. The average annual precipitation is about 26 inches, the average annual air temperature is about 42 degrees F, and the frost-free period is about 90 days.

Typically, the surface layer is brown silt loam about 17 inches thick. The subsoil is light yellowish brown and light brown gravelly silt loam about 24 inches thick. The substratum is reddish yellow gravelly sandy loam. Partially decomposed basalt bedrock is at a depth of 54 inches.

Included with this soil in mapping are small areas of De Masters silt loam, Suloaf cobbly silt loam, and Telcher silt loam.

In this Suloaf soil, permeability is moderate. Effective rooting depth is 40 to 60 inches. Available water capacity is moderate. Reaction is neutral in the surface layer and slightly acid in the subsoil and substratum. Runoff is very rapid, and the hazard of erosion is very severe.

This soil is used mainly for woodland and woodland grazing. It is also used for hay and pasture.

After timber is harvested from this soil, the area can be converted to hay and pasture. Under a high level of management, production is good. A well balanced fertilization program is needed. Nitrogen and sulfur are essential. If legumes are included in the stand, phosphorus is also needed. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Latar orchardgrass, smooth brome, Regar brome, and alfalfa are suitable for planting.

This soil is suited to Douglas-fir and ponderosa pine. It can produce about 3,400 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 40 years, or it can produce 38,000 board feet (Scribner rule) of merchantable timber 11.6 inches or more in diameter in 130 years in an unmanaged stand based upon the culmination of the mean annual increment. The main problem in managing timber is the erosion hazard. If conventional methods are used for tree harvest, then roads, skid trails, and landings must be carefully planned to minimize soil loss.

This soil has potential for producing forage if the canopy is opened by logging, fire, or other disturbance. The main native forage plants on this soil include elk sedge and pine reedgrass. Forage production can be increased and soil protected by seeding disturbed areas to suitable plants such as timothy, orchardgrass, tall fescue, and White Dutch clover. The vegetation should be managed to permit timber regeneration and to maintain enough litter for soil protection. This soil will produce forage for 15 to 20 years following opening of the canopy. During this period, annual production will vary from about 1,500 pounds of air-dry herbage per acre under open canopy to less than 400 pounds as the canopy closes.

Slope is the main restriction on use of this soil for construction and recreation.

This soil is in capability subclass VIe.

**110—Suloaf cobbly silt loam, 7 to 40 percent slopes.** This sloping to steep soil is on timbered plateaus, mountain footslopes, and benches. It is deep and well drained. Elevation is 2,500 to 4,500 feet. This soil formed in loess and material weathered from Columbia River Basalt, andesite, or greenstone of Seven Devils Volcanics. The average annual precipitation is about 26 inches, the average annual air temperature is about 42 degrees F, and the frost-free period is about 90 days.

Typically, the surface layer is brown cobbly silt loam about 17 inches thick. The subsoil is light yellowish



brown and light brown gravelly silt loam about 24 inches thick. The substratum is reddish yellow gravelly sandy loam. Partially decomposed basalt bedrock is at a depth of 54 inches.

Included with this soil in mapping are small areas of Suloaf silt loam, Klickson silt loam, De Masters silt loam, Telcher silt loam, and Uptmor silt loam and small very cobbly areas.

In this Suloaf soil, permeability is moderate. Effective rooting depth is 40 to 60 inches. Available water capacity is moderate. Reaction is neutral in the surface layer and slightly acid in the subsoil and substratum. Runoff is very rapid, and the hazard of erosion is very severe.

This soil is used mainly for woodland and woodland grazing.

This soil is suited to Douglas-fir and ponderosa pine. It can produce about 3,400 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 40 years, or it can produce 38,000 board feet (Scribner rule) of merchantable timber 11.6 inches or more in diameter in 130 years in an unmanaged stand, based on the culmination of the mean annual increment. The main problem in managing timber is the erosion hazard. Conventional methods can be used for tree harvest, but roads, skid trails, and landings must be carefully planned to minimize soil loss.

This soil has potential for producing forage if the canopy is opened by logging, fire, or other disturbance. The main native forage plants include bluebunch wheatgrass, elk sedge, and pine reedgrass. Forage production can be increased and soil protected by seeding disturbed areas to suitable plants such as timothy, orchardgrass, tall fescue, and White Dutch clover. The vegetation should be managed to permit timber regeneration and to maintain enough litter for soil protection. This soil will produce forage for 15 to 20 years following opening of the canopy. During this period, annual production will vary from about 1,200 pounds of air-dry herbage per acre under an open canopy to less than 300 pounds as the canopy closes.

The main restrictions on use of this soil for sanitary facilities are slope, depth to rock, and moderate permeability in the subsoil. The design of roads and dwellings should compensate for slope, depth to rock, the shrink-swell potential of the soil, and its inherent low strength.

Slope and the large stones in the surface layer restrict use of this soil for recreation.

This soil is in capability subclass VIe.

**111—Suloaf-Meland silt loams.** This complex consists of moderately sloping to steep soils on plateaus and mountain foot slopes. Slopes are 7 to 40 percent. Elevation is 2,500 to 4,200 feet. This complex is about 40 percent Suloaf silt loam and 25 percent Meland silt loam.

Included with these soils in mapping are small areas of Bluesprin silt loam, De Masters silt loam, and Riggins very gravelly silt loam.

The Suloaf soil is deep and well drained. It formed in loess and residuum weathered from Columbia River Basalt or Seven Devils Volcanics. The average annual precipitation is about 26 inches, the average annual air temperature is about 42 degrees F, and the frost-free period is about 90 days.

Typically, the surface layer is brown silt loam about 17 inches thick. The subsoil is light yellowish brown and light brown gravelly silt loam about 24 inches thick. The substratum is reddish yellow gravelly sandy loam about 13 inches thick. Basalt bedrock is at a depth of 54 inches.

Permeability is moderate. The effective rooting depth is 40 to 60 inches. Available water capacity is moderate. Reaction is neutral in the surface layer and slightly acid in the subsoil and substratum. Runoff is rapid and very rapid, and the hazard of erosion is severe and very severe.

The Meland soil is moderately deep and well drained. It formed in loess and residuum from Columbia River Basalt. The average annual precipitation is about 22 inches, the average annual air temperature is about 46 degrees F, and the frost-free period is about 120 days.

Typically, the surface layer is dark grayish brown and grayish brown silt loam about 16 inches thick. The upper part of the subsoil is brown silt loam about 5 inches thick, and the lower part is brown and light yellowish brown clay loam about 11 inches thick. Decomposing basalt bedrock is at a depth of 32 inches.

Permeability is moderately slow. Effective rooting depth is 20 to 40 inches. Available water capacity is moderate. Reaction is slightly acid and medium acid throughout. Runoff is rapid and very rapid, and the hazard of erosion is very severe.

This complex is used mainly for woodland, woodland grazing, and range. It is also used for hay and pasture.

These soils are well suited to pasture and hay. Under a high level of management, production is good. A well balanced fertilization program is needed. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Latar orchardgrass, smooth brome, Regar brome, intermediate wheatgrass, and alfalfa are suitable for planting.

The Suloaf soil is suited to Douglas-fir and ponderosa pine. It can produce about 3,400 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 40 years, or it can produce 38,000 board feet (Scribner rule) of merchantable timber 11.6 inches or more in diameter in 130 years in an unmanaged stand based upon the culmination of the mean annual increment. The main problem in managing timber is the erosion hazard. Conventional methods can be used for tree harvest, but roads, skid trails, and landings must be carefully planned to minimize soil loss.

The Suloaf soil has potential for producing forage if the canopy is opened by logging, fire, or other disturbance. The main native forage plants on this soil include elk sedge and pine reedgrass. Forage production can be



increased and soil protected by seeding disturbed areas to suitable plants such as timothy, orchardgrass, tall fescue, and White Dutch clover. The vegetation should be managed to permit timber regeneration and to maintain enough litter for soil protection. This soil will produce forage for 15 to 20 years following opening of the canopy. During this period, annual production will vary from about 1,500 pounds of air-dry herbage per acre under an open canopy to less than 400 pounds as the canopy closes.

The Meland soil has a cover of bluebunch wheatgrass, Idaho fescue, and balsamroot with scattered ponderosa pine. If range condition declines, the proportion of Idaho fescue and bluebunch wheatgrass decreases and the proportion of forbs, shrubs, weeds and annual grasses increases. If the soil is used for range, a planned grazing system is essential in maintaining or improving range condition.

The main restrictions on use of these soils for sanitary facilities are slope, the depth to rock, and the moderate permeability in the subsoil. The design of roads and dwellings should compensate for the depth to rock, and the shrink-swell potential of the soil.

These soils are suitable for picnic areas and paths and trails. However, slope is a restriction in the steep areas.

This complex is in capability subclass VIe.

**112—Tannahill loam, 7 to 40 percent slopes.** This sloping to steep soil is in south-facing areas. It is deep and well drained. Elevation is 1,200 to 2,800 feet. This soil formed in colluvium and residuum weathered from Columbia River Basalt or Seven Devils Volcanics with some loess mixed in the upper part. The average annual precipitation is about 14 inches, the average annual air temperature is about 52 degrees F, and the frost-free period is about 170 days.

Typically, the upper part of the surface layer is dark brown loam about 3 inches thick, and the lower part is dark brown gravelly silty clay loam about 7 inches thick. The subsoil is brown very gravelly silty clay loam about 9 inches thick. The substratum is pale brown and very pale brown, strongly calcareous very gravelly loam about 33 inches thick. Fractured, weathered basalt bedrock is at a depth of 52 inches.

Included with this soil in mapping are small areas of Bluesprin silt loam and Ferdinand silt loam and small areas where slopes are more than 40 percent.

In this Tannahill soil permeability is moderately slow. Effective rooting depth is 40 to 60 inches. Available water capacity is low. Reaction is mildly alkaline in the surface layer and subsoil and moderately alkaline and strongly alkaline in the substratum. Runoff is rapid and very rapid, and the hazard of erosion is severe and very severe.

This soil is used mainly for range. It is also used for hay and pasture.

This soil is well suited to pasture and hay. Under a high level of management, production is fair. A well bal-

anced fertilization program is needed. Nitrogen and possibly sulfur are essential. If legumes are included in the stand, phosphorus is also needed. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Pubescent wheatgrass and alfalfa are suitable for planting.

The potential native vegetation is mainly bluebunch wheatgrass and Sandberg bluegrass. If range condition declines, the proportion of bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and sand dropseed become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition. Providing adequate stock water is often a problem, especially during the hot, dry summer. Mechanical seeding is possible.

The main restriction on use of this soil for roads, homesites, and sanitary facilities is slope. Roads and dwellings are also restricted by the depth to rock. Septic tank filter fields are restricted by the depth to rock and moderately slow permeability.

Slope and the gravelly surface layer restrict use of this soil for recreation.

This soil is in capability subclass IVe.

**113—Tannahill-Licksillet complex.** This complex consists of very steep, south-facing soils on side slopes. Slopes are 40 to 90 percent. Elevation is 900 to 2,800 feet. This complex is about 50 percent Tannahill cobbly loam and 20 percent Licksillet gravelly clay loam.

Included with these soils in mapping are small areas of Bluesprin very cobbly loam, Lawyer silt loam, a soil that is similar to Licksillet soils but that has more than 35 percent clay in the subsoil, and Rock outcrop.

The Tannahill soil is deep and well drained. It formed in colluvium and residuum weathered from Columbia River Basalt or Seven Devils Volcanics with some loess mixed in the upper part. The average annual precipitation is about 14 inches, the average annual air temperature is about 52 degrees F, and the frost-free period is about 170 days.

Typically, the upper part of the surface layer is dark brown cobbly loam about 3 inches thick, and the lower part is dark brown gravelly silty clay loam about 7 inches thick. The subsoil is brown very gravelly silty clay loam about 9 inches thick. The substratum is pale brown and very pale brown, strongly calcareous very gravelly loam about 33 inches thick. Fractured, weathered basalt bedrock is at a depth of 52 inches.

Permeability is moderately slow. Effective rooting depth is 40 to 60 inches. Available water capacity is low. Reaction is mildly alkaline in the surface layer and subsoil and moderately alkaline and strongly alkaline in the substratum. Runoff is very rapid, and the hazard of erosion is very severe.

The Licksillet soil is shallow and well drained. It formed in some loess mixed with material weathered from Columbia River Basalt or Seven Devils Volcanics.

The average annual precipitation is about 14 inches, the average annual air temperature is about 52 degrees F, and the frost-free period is about 170 days.

Typically, the surface layer is brown and dark brown gravelly clay loam about 10 inches thick. The subsoil is brown very gravelly clay loam about 7 inches thick. Fractured basalt bedrock with lime in some fractures is at a depth of 17 inches.

Permeability is moderate. The effective rooting depth is 10 to 20 inches. Available water capacity is very low. Reaction is mildly alkaline. Runoff is very rapid, and the hazard of erosion is very severe.

This complex is used for range.

The potential native vegetation on these soils is mainly bluebunch wheatgrass and Sandberg bluegrass. If range condition declines, the proportion of bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and annual plants become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition. Potential forage production is good, but the very steep slopes limit accessibility of forage and movement of livestock. Providing adequate stock water is often a problem, especially during the hot, dry summer.

The very steep slopes restrict the use of these soils for all construction and recreation.

This complex is in capability subclass VIIe.

**114—Tannahill-Rock outcrop complex.** This complex consists of very steep, south-facing soils on canyon-sides. Slopes are 40 to 90 percent. Elevation is 1,200 to 2,800 feet. This complex is about 45 percent Tannahill cobbly loam and 25 percent Rock outcrop.

Included in mapping are small areas of Lawyer silt loam and Lickskillet gravelly loam.

The Tannahill soil is deep and well drained. It formed in colluvium and residuum weathered from Columbia River Basalt or Seven Devils Volcanics with some loess mixed in the upper part. The average annual precipitation is about 14 inches, the average annual air temperature is about 52 degrees F, and the frost-free period is about 170 days.

Typically, the upper part of the surface layer is dark brown cobbly loam, and the lower part is dark brown gravelly silty clay loam about 9 inches thick. The substratum is pale brown and very pale brown, strongly calcareous very gravelly loam about 33 inches thick. Fractured, weathered basalt rock is at a depth of 52 inches.

Permeability is moderately slow. The effective rooting depth is 40 to 60 inches. Available water capacity is low. Reaction is mildly alkaline in the surface layer and subsoil and moderately alkaline and strongly alkaline in the substratum. Runoff is very rapid, and the hazard of erosion is very severe.

Rock outcrop consists of Columbia River Basalt or Seven Devils Volcanics.

This complex is used for range.

The potential native vegetation on the Tannahill soil is mainly bluebunch wheatgrass and Sandberg bluegrass. If

range condition declines, the proportion of bluebunch wheatgrass decreases and the proportion of forbs and shrubs increases. Weeds and annual plants become more abundant if range condition declines further. A planned grazing system is essential in maintaining or improving range condition. Potential forage production is good, but the very steep slopes and Rock outcrops limit accessibility of forage and movement of livestock. Providing adequate stock water is often a problem, especially during the hot, dry summer.

Rock outcrop has no value for grazing. It often interferes with livestock movement, thereby limiting accessibility of forage.

The very steep slopes and Rock outcrops restrict the use of this complex for all construction and recreation.

This complex is in capability subclass VIIe.

**115—Telcher silt loam, 3 to 7 percent slopes.** This gently sloping, north-facing soil is on plateaus and mountain foot slopes. It is very deep and well drained. Elevation is 3,300 to 4,500 feet. This soil formed in loess and residuum weathered from Columbia River Basalt or Seven Devils Volcanics. The average annual precipitation is about 28 inches, the average annual air temperature is about 42 degrees F, and the frost-free period is about 90 days.

Typically, the surface layer is yellowish brown silt loam about 12 inches thick. The subsurface layer is light yellowish brown silt loam about 8 inches thick. The upper part of the subsoil is light yellowish brown and yellow silty clay loam about 24 inches thick, and the lower part is very pale brown gravelly clay loam to a depth of 60 inches.

Included with this soil in mapping are small areas of Suloaf silt loam and Brody cobbly loam, cool.

In this Telcher soil, permeability is moderately slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is neutral above a depth of 6 inches and slightly acid below that depth. Runoff is medium, and the hazard of erosion is moderate.

This soil is used mainly for woodland and woodland grazing. It is also used for hay and pasture.

After timber is harvested from this soil, the area can be converted to pasture or hay. Under a high level of management, production is good. A well balanced fertilization program is needed. Nitrogen and sulfur are essential. If legumes are included in the stand, phosphorus is also needed. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Latar orchardgrass, smooth brome, Regar brome, and alfalfa are suitable for planting.

This soil is suited to grand fir, Douglas-fir, western larch, lodgepole pine, and ponderosa pine. It can produce about 11,850 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 100 years, or it can produce 70,500 board feet (Scribner rule) of merchantable timber 12.6 inches or more in diameter in 140 years in an unmanaged mixed conifer stand based on the culmination



of the mean annual increment. Conventional methods can be used for tree harvest.

This soil has potential for producing forage if the canopy is opened by logging, fire or other disturbance. The main native forage plants on this soil include pine reedgrass, elk sedge, willow, and snowberry. Forage production can be increased and soil protected by seeding disturbed areas to suitable plants such as timothy, tall fescue, orchardgrass, and White Dutch clover. The vegetation should be managed to permit timber regeneration and to maintain enough litter for soil protection. This soil will produce forage for 10 to 15 years following opening of the canopy. During this period, annual production will vary from about 1,700 pounds of air-dry herbage per acre under an open canopy to less than 200 pounds as the canopy closes.

The use of this soil for septic tank absorption fields is restricted by the moderately slow permeability of the subsoil. Sewage lagoon construction is somewhat restricted by slope. This soil is generally suited to construction of sanitary landfills, but the soil can be sticky when wet. The design of roads and dwellings should compensate for the inherent low strength of the soil and its shrink-swell potential. The gravel in the soil restricts suitability of the soil as a source of topsoil.

This soil is suited to most kinds of recreation. Slope and gravel in the soil restrict use for playgrounds.

This soil is in capability subclass IIIe.

**116—Telcher silt loam, 7 to 25 percent slopes.** This sloping and moderately steep, north-facing soil is on plateaus and mountain foot slopes. It is very deep and well drained. Elevation is 3,300 to 4,500 feet. This soil formed in loess and residuum weathered from Columbia River Basalt or Seven Devils Volcanics. The average annual precipitation is about 28 inches, the average annual air temperature is about 42 degrees F, and the frost-free period is about 90 days.

Typically, the surface layer is yellowish brown silt loam about 12 inches thick. The subsurface layer is light yellowish brown silt loam about 8 inches thick. The upper part of the subsoil is light yellowish brown and yellow silty clay loam about 24 inches thick, and the lower part is very pale brown gravelly clay loam to a depth of 60 inches.

Included with this soil in mapping are small areas of Suloaf silt loam and Brody cobbly loam, cool, and small areas where slopes are less than 7 percent or more than 25 percent.

In this Telcher soil, permeability is moderately slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is neutral above a depth of 6 inches and slightly acid below that depth. Runoff is rapid, and the hazard of erosion is severe.

This soil is used mainly for woodland and woodland grazing. It is also used for hay and pasture.

After timber is harvested from this soil, the area can be converted to pasture or hay. Under a high level of

management, production is good. A well balanced fertilization program is needed. Nitrogen and sulfur are essential. If legumes are included in the stand, phosphorus is also needed. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Latar orchardgrass, smooth brome, Regar brome, and alfalfa are suitable for planting.

This soil is suited to grand fir, Douglas-fir, western larch, lodgepole pine, and ponderosa pine. It can produce about 11,850 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 100 years, or it can produce 70,500 board feet (Scribner rule) of merchantable timber 12.6 inches or more in diameter in 140 years in an unmanaged mixed conifer stand based on the culmination of the mean annual increment. Conventional methods can be used for tree harvest, but logging roads, skid trails, and landings must be carefully planned to minimize soil loss.

This soil has potential for producing forage if the canopy is opened by logging, fire, or other disturbance. The main native forage plants on this soil include pine reedgrass, elk sedge, willow, and snowberry. Forage production can be increased and soil protected by seeding disturbed areas to suitable plants such as timothy, tall fescue, orchardgrass, and White Dutch clover. The vegetation should be managed to permit timber regeneration and to maintain enough litter for soil protection. This soil will produce forage for 10 to 15 years following opening of the canopy. During this period, annual production will vary from about 1,700 pounds of air-dry herbage per acre under an open canopy to less than 200 pounds as the canopy closes.

The use of this soil for septic tank absorption fields is restricted by the moderately slow permeability of the subsoil and by slope in the steeper areas. This soil is suitable for sanitary landfills in the flatter areas, although the soil is sometimes sticky when wet. The design of roads and dwellings should compensate for slope and the inherent low strength of the soil. Gravel in the soil and slope restrict use of this soil as a source of topsoil.

This soil is suited to most kinds of recreation. Slope is a restriction in the steeper areas.

This soil is in capability subclass IVe.

**117—Telcher silt loam, 25 to 40 percent slopes.** This steep, north-facing soil is on plateaus and mountain foot slopes. It is very deep and well drained. Elevation is 3,300 to 4,500 feet. This soil formed in loess and residuum weathered from Columbia River Basalt or Seven Devils Volcanics. The average annual precipitation is about 28 inches, the average annual air temperature is about 42 degrees F, and the frost-free period is about 90 days.

Typically, the surface layer is yellowish brown silt loam about 12 inches thick. The subsurface layer is light yellowish brown silt loam about 8 inches thick. The upper part of the subsoil is light yellowish brown and yellow silty clay loam about 24 inches thick, and the lower part

is very pale brown gravelly clay loam to a depth of 60 inches.

Included with this soil in mapping are small areas of Sulof silt loam, Brody cobbly loam, cool, and Wapshilla loam and small areas where slopes are less than 25 percent.

In this Telcher soil, permeability is moderately slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is neutral above a depth of 6 inches and slightly acid below that depth. Runoff is very rapid, and the hazard of erosion is very severe.

This soil is used mainly for woodland and woodland grazing. It is also used for hay and pasture.

After timber is harvested from this soil, the area can be converted to pasture or hay. Under a high level of management, production is good. A well balanced fertilization program is needed. Nitrogen and sulfur are essential. If legumes are included in the stand, phosphorus is also needed. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Lata orchardgrass, smooth brome, Regar brome, and alfalfa are suitable for planting.

This soil is suited to grand fir, Douglas-fir, western larch, lodgepole pine, and ponderosa pine. It can produce about 11,850 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 100 years, or it can produce 70,500 board feet (Scribner rule) of merchantable timber 12.6 inches or more in diameter in 140 years in an unmanaged mixed conifer stand based on the culmination of the mean annual increment.

The main problem in managing timber is the erosion hazard. Conventional methods can be used for tree harvest, but logging roads, skid trails, and landings should be carefully planned to minimize soil loss.

This soil has potential for producing forage if the canopy is opened by logging, fire, or other disturbance. The main native forage plants on this soil include pine reedgrass, elk sedge, willow, and snowberry. Forage production can be increased and soil protected by seeding disturbed areas to suitable plants such as timothy, tall fescue, and White Dutch clover. The vegetation should be managed to permit timber regeneration and to maintain enough litter for soil protection. This soil will produce forage for 10 to 15 years following opening of the canopy. During this period, annual production will vary from about 1,700 pounds of air-dry herbage per acre under an open canopy to less than 200 pounds as the canopy closes.

The steep slopes are the main restriction on use of this soil for all construction and recreation.

This soil is in capability subclass VIe.

**118—Telcher-Sulof silt loams.** This complex consists of moderately sloping to steep soils on timbered plateaus and mountain foot slopes. Slopes are 7 to 40 percent. Elevation is 3,300 to 4,500 feet. This complex is about 40 percent Telcher silt loam and 40 percent Sulof silt loam.

Included with these soils in mapping are small areas of Uptmor silt loam and Wapshilla loam.

The Telcher soil is very deep and well drained. It formed in loess and residuum weathered from Columbia River Basalt or Seven Devils Volcanics. The average annual precipitation is about 28 inches, the average annual air temperature is about 42 degrees F, and the frost-free period is about 90 days.

Typically, the surface layer is yellowish brown silt loam about 12 inches thick. The subsurface layer is a light yellowish brown silt loam about 8 inches thick. The upper part of the subsoil is light yellowish brown and yellow silty clay loam about 24 inches thick and the lower part is very pale brown gravelly clay loam to a depth of 60 inches.

Permeability is moderately slow. The effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is neutral above a depth of 6 inches and slightly acid below that depth. Runoff is rapid and very rapid, and the hazard of erosion is severe and very severe.

The Sulof soil is deep and well drained. It formed in loess and residuum from Columbia River Basalt or Seven Devils Volcanics. The average annual precipitation is about 26 inches, the average annual air temperature is about 42 degrees F, and the frost-free period is about 90 days.

Typically, the surface layer is brown silt loam about 17 inches thick. The subsoil is light yellowish brown and light brown gravelly silt loam about 24 inches thick. The substratum is reddish yellow gravelly sandy loam about 13 inches thick. Basalt bedrock is at a depth of 54 inches.

Permeability is moderate. The effective rooting depth is 40 to 60 inches. Available water capacity is moderate. Reaction is neutral above a depth of 17 inches and slightly acid below that depth. Runoff is rapid and very rapid, and the hazard of erosion is severe and very severe.

This complex is used mainly for woodland and woodland grazing. It is also used for hay and pasture.

After timber is harvested from these soils, the area can be converted to pasture or hay. Under a high level of management, production is good. A well balanced fertilization program is needed. Nitrogen and sulfur is essential. If legumes are included in the stand, phosphorus is also needed. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Lata orchardgrass, smooth brome, Regar brome, and alfalfa are suitable for grazing.

The Telcher soil is suited to grand fir, Douglas-fir, western larch, lodgepole pine, and ponderosa pine. It can produce about 11,850 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 100 years, or it can produce 70,500 board feet (Scribner rule) of merchantable timber 12.6 inches or more in diameter in 140 years in an unmanaged mixed conifer stand based on the culmination of the mean annual increment.



The Suloaf soil is suited to Douglas-fir and ponderosa pine. It can produce about 3,400 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 40 years, or it can produce 38,000 board feet (Scribner rule) of merchantable timber 11.6 inches or more in diameter in 130 years in an unmanaged stand based on the culmination of the mean annual increment.

The main problem in managing these soils for timber is the erosion hazard. Conventional methods can be used for tree harvest, but logging roads, skid trails, and landings should be carefully planned to minimize soil loss.

These soils have potential for producing forage if the canopy is opened by logging, fire, or other disturbance. The main native forage plants include pine reedgrass, elk sedge, willow, and snowberry on the Telcher soil and elk sedge and pine reedgrass on the Suloaf soil. Forage production can be increased and soil protected by seeding disturbed areas to suitable plants such as timothy, tall fescue, orchardgrass, and White Dutch clover. The vegetation should be managed to permit timber regeneration and to maintain enough litter for soil protection. Once the canopy is open, the Telcher soil will produce forage for 10 to 15 years; during this period, annual production will vary from about 1,700 pounds of air-dry herbage per acre under an open canopy to less than 200 pounds as the canopy closes. The Suloaf soil will produce forage for 15 to 20 years following opening of the canopy; during this period, annual production will vary from about 1,500 pounds of air-dry herbage per acre under an open canopy to less than 400 pounds as the canopy closes.

The main restrictions on use of these soils for sanitary facilities are the depth to rock, moderate and moderately slow permeability in the subsoil, and slope. The design of roads and dwellings should compensate for the depth to rock slope.

These soils are suited to paths and trails, but slope restricts use for other kinds of recreation.

This complex is in capability subclass VIe.

**119—Typic Xerofluvents, cobbly.** These soils are on low terraces and flood plains along stream channels. The soils are mainly mixed, stratified, unconsolidated, recent alluvium and colluvium from various sources. The material is a varied mixture of sand, gravel, and cobbles and some fine material. Slopes are generally less than 20 percent but are as much as 40 percent on fans at the mouth of drainageways.

These soils are used mainly for wildlife habitat, but some small areas are used for range, hay and pasture, and garden plots.

This soil supports a limited amount of grazing. Where there is a high percentage of fine material in the soil, forage production is good and the site can be seeded to improved grasses. Reed canarygrass, creeping foxtail, brome, and Kentucky bluegrass are suitable for seeding. Where there is a high percentage of cobbles, much of the vegetation is shrubs and relatively unpalatable forbs.

Use of these soils for recreation is limited by the cobbles in the surface layer.

These soils are in capability subclass VIIc.

**120—Uhlorn silt loam, 2 to 7 percent slopes.** This gently sloping, north-facing soil is on prairies. It is very deep and well drained. Elevation is 2,800 to 4,200 feet. This soil formed in loess. The average annual precipitation is about 22 inches, the average annual air temperature is about 46 degrees F, and the frost-free period is about 110 days.

Typically, the surface layer is dark gray and dark grayish brown silt loam about 13 inches thick. The upper part of the subsoil is brown silt loam about 5 inches thick, and the lower part is yellowish brown and brown silty clay loam to a depth of 60 inches.

Included with this soil in mapping are small areas of Nez Perce and Chicane silt loams and areas where slopes are more than 7 percent. Also included are small areas of a soil that is similar to Uhlorn soils but that has a surface layer more than 20 inches thick.

In this Uhlorn soil, permeability is moderately slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is neutral and slightly acid. Runoff is medium, and the hazard of erosion is moderate.

This soil is used for winter wheat (fig. 10), barley, peas, clover seed, and some hay and pasture. No significant areas remain in native vegetation.

If this soil is properly managed, production of all commonly grown crops is good. Soil is conserved by growing annual crops of small grains and peas, keeping tillage to a minimum, and returning crop residue to the soil. Grassed waterways prevent formation of gullies in the natural drainageways. Crops of legumes and grasses are also suited to this soil and help control erosion. Nitrogen, sulfur, and sometimes phosphorus are necessary. Weed control is important.

This soil is well suited to pasture and hay. Under a high level of management, including a well balanced fertilization program, production is good. Grazing should be rotated during the growing season and a minimum height of stubble should be maintained. Latar orchardgrass, smooth brome, and alfalfa are suitable for planting.

The use of this soil for septic tank absorption fields is restricted by the moderately slow permeability of the subsoil. Sewage lagoon construction is restricted by slope. The soil is generally suitable for sanitary landfills, but the soil can be sticky when wet. The design of roads and dwellings should compensate for the shrink-swell potential of the soil, its inherent low strength, and, for roads, potential frost action. This soil is a potential source of topsoil. Slope should be considered in designing terraces and diversions.

This soil is suited to most kinds of recreation, but the surface tends to be dusty when dry. Slope restricts use for playgrounds.

This soil is in capability subclass IIe.



Figure 10.—Area of Uhlorn soils in winter wheat.

**121—Uhlorn silt loam, 7 to 12 percent slopes.** This sloping, north-facing soil is on prairies. It is very deep and well drained. Elevation is 2,800 to 4,200 feet. This soil formed in loess. The average annual precipitation is about 22 inches, the average annual air temperature is about 46 degrees F, and the frost-free period is about 110 days.

Typically, the surface layer is dark gray and dark grayish brown silt loam about 13 inches thick. The upper part of the subsoil is brown silt loam about 5 inches thick, and the lower part is yellowish brown and brown silty clay loam to a depth of 60 inches.

Included with this soil in mapping are small areas of Nez Perce and Chicane silt loams and areas where slopes are more than 12 percent or less than 7 percent. Also included are small areas of a soil that is similar to Uhlorn soils, but that has a surface layer more than 20 inches thick.

In this Uhlorn soil, permeability is moderately slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is neutral and slightly acid. Runoff is rapid, and the hazard of erosion is severe.

This soil is used to grow winter wheat, barley, peas, clover seed, and some hay and pasture. No significant areas remain in native vegetation.

If this soil is properly managed, production of all commonly grown crops is good. The hazard of erosion is severe if the soil is tilled intensively, as in summer-fallow practice. Soil can be conserved by growing annual crops of small grains and peas, tilling across the slope, keep-

ing tillage to a minimum, and returning crop residue to the soil. Grassed waterways prevent formation of gullies in the natural drainageways. Crops of legumes and grasses are suited to this soil and help control erosion. Nitrogen, sulfur, and sometimes phosphorus are necessary. Weed control is important.

This soil is well suited to pasture and hay. Under a high level of management, including a well balanced fertilization program, production is good. Grazing should be rotated during the growing season, and a minimum height of stubble should be maintained. Larar orchard-grass, smooth brome, and alfalfa are suitable for planting.

The use of this soil for septic tank absorption fields is restricted by the moderately slow permeability of the subsoil. This soil is suited to sanitary landfills, although it is sticky when wet. The design of roads and dwellings should compensate for the shrink-swell potential of the soil, its inherent low strength, and, for roads, potential frost action. This soil is a potential source of topsoil.

This soil is suited to most kinds of recreation, but slope is a restriction in the steeper areas.

This soil is capability subclass IIIe.

**122—Uhlorn silt loam, 12 to 25 percent slopes.** This moderately steep, north-facing soil is on prairies. It is very deep and well drained. Elevation is 2,800 to 4,200 feet. This soil formed in loess. The average annual precipitation is about 22 inches, the average annual air temperature is about 46 degrees F, and the frost-free period is about 110 days.



Typically, the surface layer is dark gray and dark grayish brown silt loam about 13 inches thick. The upper part of the subsoil is brown loam about 5 inches thick and the lower part is yellowish brown and brown silty clay loam to a depth of 60 inches.

Included with this soil in mapping are small areas of Nez Perce and Chicane silt loams, and areas where slopes are more than 25 percent or less than 12 percent. Also included are small areas of a soil that is similar to Uhlorn soils, but that has a surface layer more than 20 inches thick.

In this Uhlorn soil, permeability is moderately slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is neutral and slightly acid. Runoff is rapid, and the hazard of erosion is severe.

This soil is used to grow winter wheat, barley, peas, clover seed, and some hay and pasture. No significant areas remain in native vegetation.

If this soil is properly managed, production of all commonly grown crops is good. The hazard of erosion is severe if the soil is tilled intensively, as in summer-fallow practice. Soil can be conserved by growing annual crops of small grains and peas, keeping tillage to a minimum, and returning crop residue to the soil. Grassed waterways help prevent formation of gullies in the natural drainageways. Contour farming, divided-slope farming, using gradient terraces, and field stripcropping also reduce erosion. Crops of legumes and grasses are also suited to this soil and help control erosion. Nitrogen, sulfur, and sometimes phosphorus are necessary. Weed control is important.

This soil is well suited to pasture and hay. Under a high level of management, including a well balanced fertilization program, production is good. Grazing should be rotated during the growing season, and a minimum height of stubble should be maintained. Latar orchardgrass, smooth brome, and alfalfa are suitable for planting.

The use of this soil for septic tank absorption fields is restricted by slope and the moderately slow permeability of the subsoil. Slope restricts use for sanitary landfills. The design of roads and dwellings should compensate for slope, the shrink-swell potential of the soil, its inherent low strength, and, for roads, potential frost action. Use as a source of topsoil is restricted by slope.

Slope restricts use of this soil for most kinds of recreation. The soil can be used for paths and trails.

This soil is in capability subclass IIIe.

**123—Uhlorn silt loam, 25 to 40 percent slopes.** This steep, north-facing soil is on prairies. It is very deep and well drained. Elevation is 2,800 to 4,200 feet. This soil formed in loess. The average annual precipitation is about 22 inches, the average annual air temperature is about 46 degrees F, and the frost-free period is about 110 days.

Typically, the surface layer is dark gray and dark grayish brown silt loam about 13 inches thick. The upper part

of the subsoil is brown silt loam about 5 inches thick, and the lower part is yellowish brown and brown silty clay loam to a depth of 60 inches.

Included with this soil in mapping are small areas of Chicane silt loam and areas where slopes are less than 25 percent. Also included are small areas of a soil that is similar to Uhlorn soils, but that has a surface layer more than 20 inches thick.

In this Uhlorn soil, permeability is moderately slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is neutral and slightly acid. Runoff is very rapid, and the hazard of erosion is very severe.

This soil is used to grow winter wheat, barley, hay, and pasture. No significant areas remain in native vegetation.

If this soil is properly managed, production of all commonly grown crops is good. The hazard of erosion is very severe if the soil is tilled intensively, as in summer-fallow practice. Soil is conserved by keeping a permanent cover crop on the soil at least half of the time, annual cropping, cross-slope farming, keeping tillage to a minimum, and returning crop residue to the soil. Grassed waterways prevent formation of gullies in the natural drainageways. Contour farming, divided-slope farming, using gradient terraces, field strip-cropping, and building structures for water and sediment control also reduce erosion. Chiseling in the stubble in fall helps slow runoff and reduce soil loss in years when the snow melts rapidly while the surface is frozen. Crops of legumes and grasses can also be grown and help control erosion. Nitrogen, sulfur, and sometimes phosphorus are necessary. Weed control is important.

This soil is well suited to pasture and hay. Under a high level of management, production is good. A well balanced fertilization program is needed. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Latar orchardgrass, smooth brome, and alfalfa are suitable for planting.

The steep slopes are the main restriction on use of this soil for all construction and recreation. The moderately slow permeability of the soil and potential frost action also restrict many uses.

This soil is in capability subclass IVe.

**124—Uhlorn silt loam, 40 to 65 percent slopes.** This very steep, north-facing soil is on prairies. It is very deep and well drained. Elevation is 3,800 to 4,200 feet. This soil formed in loess. The average annual precipitation is about 22 inches, the average annual air temperature is about 46 degrees F, and the frost-free season is about 110 days.

Typically, the surface layer is dark gray and dark grayish brown silt loam about 13 inches thick. The upper part of the subsoil is brown silt loam about 5 inches thick, and the lower part is yellowish brown and brown silty clay loam to a depth of 60 inches.

Included with this soil in mapping are small areas where slopes are less than 40 percent and small cobbly

areas. Also included are areas of soils that are similar to Uhlorn soils but that have a loamy subsoil or a surface layer that is 20 to 25 inches thick.

In this Uhlorn soil, permeability is moderately slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is neutral and slightly acid. Runoff is very rapid, and the hazard of erosion is very severe.

This soil is used for range.

The potential native vegetation is mainly Idaho fescue, wild rose, snowberry, and bluebunch wheatgrass. If range condition declines, the proportion of bluebunch wheatgrass and Idaho fescue decreases and the proportion of forbs and shrubs increases. Weeds and sod forming grasses become more abundant if range condition declines further. Vegetation should be managed to increase production of bluebunch wheatgrass and fescue. A planned grazing system is essential in maintaining or improving range condition. The very steep slopes limit movement of livestock and accessibility of forage.

The very steep slopes restrict use of this soil for all construction and recreation.

This soil is in capability subclass VIIe.

**125—Uptmor silt loam, 3 to 7 percent slopes.** This gently sloping soil is on plateaus and mountain foot slopes. It is very deep and well drained. Elevation is 3,000 to 4,500 feet. This soil formed in loess and residuum from Columbia River Basalt. The average annual precipitation is about 26 inches, the average annual air temperature is about 42 degrees F, and the frost-free period is about 90 days.

Typically, the surface layer is dark grayish brown silt loam about 4 inches thick. The upper part of the subsoil is light brown and brown silty clay loam and brown silty clay about 21 inches thick, and the lower part is strong brown cobbly silty clay about 21 inches thick. The substratum is brownish yellow very gravelly clay loam to a depth of 61 inches.

Included with this soil in mapping are small areas of Boles and Suloaf silt loams and areas where slopes are more than 7 percent. Also included are small areas of a soil that is similar to Uptmor soils but that has a thin, light gray subsurface layer.

In this Uptmor soil, permeability is slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is slightly acid and medium acid in the surface layer and upper part of the subsoil and neutral in the lower part of the subsoil and substratum. Runoff is medium, and the hazard of erosion is moderate.

This soil is used mainly for hay, pasture, woodland, and woodland grazing. It is also used for winter wheat and barley.

Use of this soil for crops is limited by the hazard of erosion. Production of locally grown crops is fair. Soil is conserved by growing annual crops of small grains or forage crops, keeping tillage to a minimum, and returning crop residue to the soil. Nitrogen, sulfur, and sometimes

phosphorus are necessary. Weed control is important. Grassed waterways prevent formation of gullies in the natural drainageways.

This soil is suited to pasture and hay. Under a high level of management, including a well balanced fertilization program, production is good. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Latar orchardgrass, Regar brome, smooth brome, and alfalfa are suitable for planting.

This soil is suited to Douglas-fir and ponderosa pine. It can produce about 3,400 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 40 years, or it can produce 38,000 board feet (Schribner rule) of merchantable timber 11.6 inches or more in diameter in 130 years in an unmanaged stand based upon the culmination of the mean annual increment. Conventional methods can be used for tree harvest.

This soil has potential for producing forage if the canopy is opened by logging, fire, or other disturbance. The main native forage plants on this soil include pine reedgrass, elk sedge, wild rose, and snowberry. Forage production can be increased and soil protected by seeding disturbed areas to suitable plants such as timothy, tall fescue, orchardgrass, and White Dutch clover. The vegetation should be managed to permit timber regeneration and to maintain enough litter for soil protection. This soil will produce forage for 15 to 20 years following opening of the canopy. During this period, annual production will vary from about 1,500 pounds of air-dry herbage per acre under an open canopy to less than 400 pounds as the canopy closes.

The main restriction on use of this soil for septic tank filter fields is the slow permeability. Sanitary landfills are restricted by the high clay content of the subsoil. The design of roads and dwellings should compensate for the shrink-swell potential of the soil. Excavation can be hindered by the high clay content of the subsoil.

This soil is suited to recreation, but the surface tends to be dusty when dry.

This soil is in capability subclass IIIe.

**126—Uptmor silt loam, 7 to 25 percent slopes.** This sloping and moderately steep soil is on plateaus and mountain foot slopes. It is very deep and well drained. Elevation is 3,000 to 4,500 feet. This soil formed in loess and residuum from Columbia River Basalt. The average annual precipitation is about 26 inches, the average annual air temperature is about 42 degrees F, and the frost-free period is about 90 days.

Typically, the surface layer is dark grayish brown silt loam about 4 inches thick. The upper part of the subsoil is light brown and brown silty clay loam and brown silty clay about 21 inches thick, and the lower part is strong brown cobbly silty clay about 21 inches thick. The substratum is brownish yellow very gravelly clay loam to a depth of 61 inches.

Included with this soil in mapping are small areas of Boles and Suloaf silt loams and a soil that is similar to



Uptmor soils but that has a thin, light gray subsurface layer.

In this Uptmor soil, permeability is slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is slightly acid and medium acid in the surface layer and upper part of the subsoil and neutral in the lower part of the subsoil and substratum. Runoff is rapid, and the hazard of erosion is severe.

This soil is used mainly for woodland and woodland grazing. It is also used for hay and pasture, winter wheat, and barley.

Use of this soil for crops is limited by the hazard of erosion. Production of locally grown crops is fair. Soil is conserved by growing annual crops of small grains or forage crops, keeping tillage to a minimum, returning crop residue to the soil, and cross-slope planting. Contour farming, divided-slope farming, field stripcropping, using gradient terraces, and building structures for water and sediment control also reduce erosion. Nitrogen, sulfur, and sometimes phosphorus are necessary. Weed control is important. Grassed waterways help prevent formation of gullies in the natural drainageways.

This soil is well suited to pasture and hay. Under a high level of management, including a balanced fertilization program, production is good. Grazing should be rotated during the growing season, and a minimum height of stubble should be maintained. Latar orchardgrass, Regar brome, smooth brome, and alfalfa are suitable for planting.

This soil is suited to Douglas-fir and ponderosa pine. It can produce about 3,400 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 40 years, or it can produce 38,000 board feet (Scribner rule) of merchantable timber 11.6 inches or more in diameter in 130 years in an unmanaged stand based upon the culmination of the mean annual increment. Conventional methods can be used for tree harvest, but logging roads, skid trails, and landings should be carefully planned to minimize soil loss.

This soil has potential for producing forage if the canopy is opened by logging, fire, or other disturbance. The main native forage plants include pine reedgrass, elk sedge, wild rose, and snowberry. Forage production can be increased and soil protected by seeding disturbed areas to suitable plants such as timothy, tall fescue, orchardgrass, and White Dutch clover. The vegetation should be managed to permit timber regeneration and to maintain enough litter for soil protection. This soil will produce forage for 15 to 20 years following opening of the canopy. During this period, annual production will vary from about 1,500 pounds of air-dry herbage per acre under an open canopy to less than 400 pounds as the canopy closes.

The main restrictions on use of this soil for septic tank filter fields are slope and slow permeability. Sanitary landfills are restricted by slope and the high clay content of the subsoil. The design of roads and dwellings should compensate for slope and the shrink-swell potential of

the soil. Excavation can be hindered by the high clay content of the subsoil and by slope.

Slope restricts use of this soil for most kinds of recreation. The soil can be used for paths and trails.

This soil is in capability subclass IVe.

#### **127—Uptmor silt loam, 25 to 40 percent slopes.**

This steep soil is on plateaus and mountain foot slopes. It is very deep and well drained. Elevation is 3,000 to 4,500 feet. This soil formed in loess and residuum from Columbia River Basalt. The average annual precipitation is about 26 inches, and the average annual air temperature is about 42 degrees F, and the frost-free period is about 90 days.

Typically, the surface layer is dark grayish brown silt loam about 4 inches thick. The upper part of the subsoil is light brown and brown silty clay loam and brown silty clay about 21 inches thick, and the lower part is strong brown cobbly silty clay about 21 inches thick. The substratum is brownish yellow very gravelly clay loam to a depth of 61 inches.

Included with this soil in mapping are small areas of De Masters and Suloaf silt loams and areas where slopes are less than 25 percent. Also included are small areas of a soil that is similar to Uptmor soils but that has a thin, light gray subsurface layer.

In this Uptmor soil, permeability is slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is slightly acid and medium acid in the surface layer and upper part of the subsoil and neutral in the lower part of the subsoil and in the substratum. Runoff is very rapid, and the hazard of erosion is very severe.

This soil is used mainly for woodland and woodland grazing. It is also used for hay and pasture.

This soil is well suited to pasture and hay. Under a high level of management, including a balanced fertilization program, production is good. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Latar orchardgrass, Regar brome, smooth brome, and alfalfa are suitable for planting.

This soil is suited to Douglas-fir and ponderosa pine. It can produce about 3,400 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 40 years, or it can produce 38,000 board feet (Scribner rule) of merchantable timber 11.6 inches or more in diameter in 130 years in an unmanaged stand based upon the culmination of the mean annual increment. The main problem in managing timber is the erosion hazard. Conventional methods can be used for tree harvest, but logging roads, skid trails, and landings must be carefully planned to minimize soil loss.

This soil has potential for producing forage if the canopy is opened by logging, fire, or other disturbance. The main native forage plants include pine reedgrass, elk sedge, wild rose, and snowberry. Forage production can be increased and soil protected by seeding disturbed areas to suitable plants such as timothy, tall



fescue, orchardgrass, and White Dutch clover. The vegetation should be managed to permit timber regeneration and to maintain enough litter for soil protection. This soil will produce forage for 15 to 20 years following opening of the canopy. During this period, annual production will vary from about 1,500 pounds of air-dry herbage per acre under an open canopy to less than 400 pounds as the canopy closes.

Slope is the main restriction on use of this soil for all construction and recreation. The design of roads and dwellings should compensate for the low strength of the soil and its shrink-swell potential. Excavation can be hindered by the high clay content of the subsoil and by slope.

This soil is in capability subclass VIe.

**128—Wapshilla loam, 7 to 25 percent slopes.** This sloping and moderately steep, north-facing soil is on high plateaus and sides of mountains and canyons. It is very deep and well drained. Elevation is 3,500 to 5,000 feet. This soil formed in loess and colluvium and residuum from Columbia River Basalt or Seven Devils Volcanics. The average annual precipitation is about 28 inches, the average annual air temperature is about 42 degrees F, and the frost-free period is about 90 days.

Typically, the surface layer is brown loam about 14 inches thick. The subsoil is light brown gravelly loam and light yellowish brown very gravelly loam to a depth of 60 inches.

Included with this soil in mapping are small areas of Brody cobbly loam, cool; Klickson silt loam; and Telcher silt loam.

In this Wapshilla soil, permeability is moderate. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Reaction is medium acid in the upper part of the surface layer and slightly acid and neutral below. Runoff is rapid, and the hazard of erosion is severe.

This soil is used mainly for woodland and woodland grazing. It is also used for hay and pasture.

After timber is harvested from this soil, the area can be converted to pasture or hay. Under a high level of management, production is good. A well balanced fertilization program is needed. Nitrogen and sulfur are essential. If legumes are included in the stand, phosphorus is also needed. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Lata orchardgrass, smooth brome, tall fescue, and alfalfa are suitable for planting.

This soil is suited to grand fir, Douglas-fir, western larch, lodgepole pine, and ponderosa pine. It can produce about 11,850 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 100 years, or it can produce 70,500 board feet (Scribner rule) of merchantable timber 12.6 inches or more in diameter in 140 years in an unmanaged mixed conifer stand based upon the culmination of the mean annual increment. Conventional methods can be used for tree harvest, but roads, skid

trails, and landings must be carefully planned to minimize soil loss.

This soil has potential for producing forage if the canopy is opened by logging, fire, or other disturbance. The main native forage plants include pine reedgrass, sedge, wild rose, willow, and gooseberry. Forage production can be increased and soil protected by seeding disturbed areas to suitable plants such as tall fescue, timothy, orchardgrass, and White Dutch clover. The vegetation should be managed to permit timber regeneration and to maintain enough litter for soil protection. This soil will produce forage for 5 to 15 years following opening of the canopy. During this period, annual production will vary from about 1,100 pounds of air-dry herbage per acre under an open canopy to less than 200 pounds as the canopy closes.

The use of this soil for septic tank absorption fields and sewage lagoons is restricted by slope in the steeper areas. This soil is suited to sanitary landfills in the flatter areas. Excavation can be hindered by slope and the hazard of cutbanks caving.

This soil is suited to picnic areas and paths and trails. Slope is a restriction in the steeper areas. The surface tends to be dusty when dry.

This soil is in capability subclass IVe.

**129—Westlake silt loam.** This nearly level soil is on bottom lands and drainageways. It is very deep and somewhat poorly drained. Elevation is 3,000 to 4,000 feet. This soil formed in alluvium derived primarily from loess. The average annual precipitation is about 22 inches, the average annual air temperature is about 44 degrees F, and the frost-free period is about 100 days.

Typically, the surface layer is dark gray and gray silt loam about 25 inches thick. The underlying material is gray silt loam and clay loam to a depth of 60 inches.

Included with this soil in mapping are small areas of Wilkins silt loam, Nicodemus loam, and a soil that is similar to Westlake soils but that is poorly drained.

In this Westlake soil, permeability is moderately slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is neutral. Runoff is very slow, and the hazard of erosion is none to slight. This soil is flooded in winter for brief periods. The water table is at a depth of 1/2 foot to 1 1/2 feet in late winter and spring.

This soil is used for hay and pasture. No significant areas remain in native vegetation.

This soil is well suited to long-term hay and pasture. Under a high level of management, production is excellent. A well balanced fertilization program is needed, including nitrogen, sulfur, and possibly phosphorus. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Creeping foxtail, meadow foxtail, timothy, reed canarygrass, trefoil, and clovers are suitable for planting.

Use of this soil for sanitary facilities is restricted by the seasonal high water table and the potential flooding. The



moderately slow permeability of the subsoil also limits use for septic tank absorption fields. The design of roads and dwellings should compensate for the flooding hazard and the seasonal high water table. Designs of roads in protected areas should compensate for the inherent low strength of the soil and the potential frost action. This soil is a potential source of topsoil. The hazard of flooding should be considered in designing drainage systems.

Use of this soil for recreation is restricted by the seasonal high water table.

This soil is in capability subclass IVw.

**130—Wilkins silt loam.** This nearly level soil is on narrow bottom lands. It is very deep and somewhat poorly drained. Elevation is 2,500 to 3,500 feet. This soil formed in alluvium derived primarily from loess. The average annual precipitation is about 21 inches, the average annual air temperature is about 44 degrees F, and the frost-free period is about 110 days.

Typically, the surface layer is dark gray and grayish brown silt loam about 20 inches thick. The subsurface layer is white silt loam about 7 inches thick. The buried subsoil is gray clay about 13 inches thick. The substratum is light brownish gray clay to a depth of 60 inches.

Included with this soil in mapping are small areas of Nez Perce, Chicane, and Westlake silt loams.

In this Wilkins soil, permeability is slow. Effective rooting depth is 60 inches or more. Available water capacity is high. Reaction is slightly acid above a depth of 36 inches and moderately alkaline below that depth. Runoff is slow, and the hazard of erosion is none to slight. This soil is flooded for brief periods in some years. It has a perched water table at a depth of 1 to 3 feet in spring.

This soil is used for hay and pasture. No significant areas remain in native vegetation.

This soil is well suited to long-term hay and pasture. Under a high level of management, including a balanced fertilization program, production is excellent. Nitrogen, sulfur, and possibly phosphorus are needed. Grazing should be rotated during the growing season to maintain a minimum height of stubble. Timothy, smooth brome, tall fescue, creeping and meadow foxtail, and clover are suitable for planting.

The restrictions on use of this soil for homesites are the seasonal high water table, potential flooding, and the high shrink-swell potential. The slow permeability of the subsoil, flooding, and the high water table limit use for septic tank absorption fields. The design of roads should compensate for the low strength of the soil and its shrink-swell potential. Excavation can be hindered by the high clay content of the subsoil. This soil is suited to excavated ponds. The slow permeability of the soil should be considered in designing drainage systems.

Use of this soil for recreation is restricted by the seasonal high water table.

This soil is in capability subclass IVw.

**131—Zaza loam, 7 to 40 percent slopes.** This sloping to steep, south-facing soil is in canyons and on

mountains. It is shallow and well drained. Elevation is 4,000 to 5,000 feet. This soil formed in residuum and colluvium from basalt that has loess mixed into the upper part. The average annual precipitation is about 26 inches, the average annual air temperature is about 45 degrees F, and the frost-free period is about 110 days.

Typically, the upper part of the surface layer is brown loam about 3 inches thick, and the lower part is brown very gravelly loam about 4 inches thick. The subsoil is reddish brown very gravelly loam about 5 inches thick. Basalt bedrock is at a depth of 12 inches.

Included with this soil in mapping are small areas of Wapshilla loam; Brody cobbly loam, cool; and Rock outcrop.

In this Zaza soil, permeability is moderate. Effective rooting depth is 10 to 20 inches. Available water capacity is very low. Reaction is medium acid. Runoff is rapid and very rapid, and the hazard of erosion is severe and very severe.

This soil is used for woodland and woodland grazing.

This soil is suited to Douglas-fir and ponderosa pine. It can produce about 3,400 cubic feet of wood per acre from trees 0.6 inch or more in diameter in 40 years, or it can produce 40,900 board feet (Scribner rule) of merchantable timber 11.6 inches or more in diameter in 140 years in an unmanaged stand based upon the culmination of the mean annual increment. The main problems in managing timber are the depth to bedrock, erosion hazard, and low water holding capacity, which increases seedling mortality. Conventional methods can be used for tree harvest, but road construction is restricted by the shallow depth. Harvest and site preparation must be carefully planned to keep new seedlings from dying during the dry summer.

This soil has potential for producing forage if the canopy is opened by fire or logging. The main native forage plants on this soil include Idaho fescue, bluebunch wheatgrass, wild rose, and sedge. Forage production can be increased by seeding disturbed areas to suitable plants such as timothy or orchardgrass. The vegetation should be managed to permit timber regeneration and maintain enough litter for soil protection. Once the canopy is opened, this soil will produce forage for 20 to 25 years. During this period, annual production will vary from about 800 pounds of air-dry herbage per acre under an open canopy to less than 250 pounds as the canopy closes.

The depth to rock is the main restriction on use of this soil for all construction. Slope is also a restriction in the steeper areas.

Use of this soil for recreation is restricted by slope.

This soil is in capability subclass VIe.

## 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 avoid 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 behavior 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 crops and pasture; as rangeland and woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

## Native grazing land

This section prepared by Dennis K. Froeming, range conservationist, SCS.

This survey area contains approximately 470,000 acres of native grazing land. Of this, 320,000 acres is rangeland and 150,000 acres is grazable woodland (discussed under "Woodland understory vegetation"). The rangeland is mainly in the canyons adjacent to the Snake, Salmon, and Clearwater Rivers and their tributaries. The grazable woodlands are on the upper plateaus adjacent to the canyons and in forested areas where timber harvesting or fire has opened the forest canopy sufficiently to allow production of usable vegetation.

Approximately one-third of the agricultural income of the Area is from the sale of livestock products. Cow-calf operations are primary. Some calves are held over or purchased to be sold as yearlings. There are a few sheep operations headquartered within the survey area. The average size of the ranches is about 7,000 acres.

Typically, the livestock are kept in a feedlot for some period during winter. Feed for this period is either pro-

duced locally or imported into the Area. As spring growth begins, the livestock are turned onto the range and work to higher elevations as the season and forage conditions allow. Most livestock spend summer and early fall on the forested ranges. These may be private or industrial woodland, or they may be grazed under permit from the Forest Service, the State of Idaho, or the Bureau of Land Management. In early to mid October the livestock are rounded up, calves are weaned, and the brood cow herd is started back to the home range and wintering areas. Normally calving is during the winter feed period, January through March.

At lower elevations in the canyons, the native vegetation has been greatly depleted by continued heavy use in winter and early spring since the early 1860's. Much of the original bluebunch wheatgrass has been replaced by annual bromes, sand dropseed, and red threeawn and undesirable weeds such as goatweed and yellow starthistle.

The higher canyon ranges and open forested ranges have a good stand of native vegetation. The higher plateaus are usually forested. These areas vary from open stands of ponderosa pine and Douglas-fir, which have excellent natural potential for forage production, to dense stands of timber where forage is produced only for a short time following opening of the canopy.

The production of forage in the woodland depends mainly on the amount of light that reaches the forest floor. After logging or fire, there is a big increase in herbage production for a number of years. As the canopy closes, the understory production decreases. In many kinds of woodland, the density of the tree canopy that provides for maximum wood production allows only a sparse understory.

## Rangeland

In areas that have similar climate and topography, differences in the kind and amount of vegetation produced on rangeland are closely related to the kind of soil. Effective management is based on the relationship between the soils and vegetation and water.

Table 8 shows, for each soil in the survey area, the range site; the total annual production of vegetation in favorable, normal, and unfavorable years; the characteristic vegetation; and the average percentage of each species. Only those soils that are used as or are suited to rangeland are listed. Explanation of the column headings in table 8 follows.

A *range site* is a distinctive kind of rangeland that produces a characteristic natural plant community that differs from natural plant communities on other range sites in kind, amount, and proportion of range plants. The relationship between soils and vegetation was established during this survey; thus, range sites generally can be determined directly from the soil map. Soil properties that affect moisture supply and plant nutrients have the greatest influence on the productivity of range



plants. Soil reaction, salt content, and a seasonal high water table are also important.

*Total production* is the amount of vegetation that can be expected to grow annually on well managed range-land that is supporting the potential natural plant community. It includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year's growth of leaves, twigs, and fruits of woody plants. It does not include the increase in stem diameter of trees and shrubs. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year, the amount and distribution of precipitation and the temperatures make growing conditions substantially better than average. In a normal year, growing conditions are about average. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture.

*Dry weight* is the total annual yield per acre reduced to a common percent of air-dry moisture.

*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. Under *composition*, the expected percentage of the total annual production is given for each species making up the characteristic vegetation. The amount that can be used as forage depends on the kinds of grazing animals and on the grazing season.

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 condition. Range condition is determined by comparing the present plant community with the potential natural plant community on a particular range site. The more closely the existing community resembles the potential community, the better the range condition. Range condition is an ecological rating only. It does not have a specific meaning that pertains to the present plant community in a given use.

The objective in range management is to control grazing so that the plants growing on a site are about the same in kind and amount as the potential natural plant community for that site. Such management generally results in the optimum production of vegetation, conservation of water, and control of erosion. Sometimes, however, a range condition somewhat below the potential meets grazing needs, provides wildlife habitat, and protects soil and water resources.

Along the Salmon, Snake, and Clearwater Rivers the soils are loam, gravelly loam, and stony loam. The soils are often very steep, having slopes of more than 40 percent. Associated with the very steep slopes are Rock outcrop or rock bluffs.

The soil and slope characteristics usually limit range management to such practices as proper grazing, deferred grazing, and noncontinuous grazing. Fencing and developing water supplies are difficult and expensive.

Range management should control undesirable range weeds, protect the soil, provide optimum quantities of

forage for livestock and wildlife, and maintain or improve associated scenic, watershed, and esthetic values.

## Crops and pasture

By Kenneth E. Riersgard, area agronomist, Soil Conservation Service.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Soil maps for detailed planning." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

Crops are grown on about 165,000 acres of the survey area. This includes about 35,000 acres of hay and pasture.

The acreage of crops remains fairly stable. Only small areas of forest are cleared for crops each year, and urban development is minor. The recent development of small rural homesites will probably not be a major change in land use.

Soil erosion by water is the major problem on the prairie as well as on cleared woodland. Soil losses are caused by excessive tillage, such as that performed for weed control in summer fallow practice. The amount of tillage has been decreased with the introduction of herbicides and better tillage machines. Grain straw should be incorporated into the soil. Burning of grain straw aggravates water erosion, especially if done frequently and on the whole field.

Minor wind erosion occasionally occurs on the Fenn and Nez Perce soils around Fenn if stubble is burned or the soil is tilled smooth and left bare over winter.

A combination of practices are needed to control soil erosion, including continuous cropping, use of crop residue, minimum tillage, and grassed waterways. Gradient terraces or strip cropping can also be used.

Grasses and legumes grown for hay protect and improve the soil. Fertilizer is necessary for good production. Pasture management needs to include a system of rotation grazing and to maintain a minimum stubble height.

Wetness is a minor and localized problem in the crop area. Wet spots caused by seepage occur in several prairie soils. If the wetness is serious enough, tile drains can be installed. Surface water from snow melt and rains can erode the soil and can damage crops when water ponds in flat areas.

Field crops suited to the soils in this Area are mainly winter and spring wheat, spring barley, oats, dry peas,

and Austrian winter peas. Grass and clover seed can be grown. Alfalfa, red clover, and alsike clover are grown for hay and pasture. Poor drainage in some soils adversely affects alfalfa stands.

The only special crops grown are irrigated peaches on the warm terraces along the Salmon River. These terraces are Chard soils.

### Yields per acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 9. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green-manure crops; and harvesting that insures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 9 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils.

### 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 grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor does it consider 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 woodland, and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only

class and subclass are used in this survey. These levels are defined in the following paragraphs.

*Capability classes*, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have slight limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

*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, IIe. The letter *e* shows that the main limitation is 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.

The capability classification of each map unit is given in the section "Soil maps for detailed planning."

### Woodland management and productivity

Table 10 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination (woodland suitability) symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *x* indicates stoniness or rockiness; *w*, excessive water in or on the soil; *t*, toxic



substances in the soil; *d*, restricted root depth; *c*, clay in the upper part of the soil; *s*, sandy texture; *f*, high content of coarse fragments in the soil profile; and *r*, steep slopes. The letter *o* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: *x*, *w*, *t*, *d*, *c*, *s*, *f*, and *r*.

In table 10, *slight*, *moderate*, and *severe* indicate the degree of the major soil limitations to be considered in management.

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

*Seedling mortality* ratings indicate the degree to which the soil affects the mortality of tree seedlings. Plant competition is not considered in the ratings. The ratings apply to seedlings from good stock that are properly planted during a period of sufficient rainfall. A rating of *slight* indicates that the expected mortality is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

Ratings of *windthrow hazard* are based on soil characteristics that affect the development of tree roots and the ability of the soil to hold trees firmly. A rating of *slight* indicates that a few trees may be blown down by normal winds; *moderate*, that some trees will be blown down during periods of excessive soil wetness and strong winds; and *severe*, that many trees are blown down during periods of excessive soil wetness and moderate or strong winds.

Ratings of *plant competition* indicate the degree to which undesirable plants are expected to invade where there are openings in the tree canopy. The invading plants compete with native plants or planted seedlings. A rating of *slight* indicates little or no competition from other plants; *moderate* indicates that plant competition is expected to hinder the development of a fully stocked stand of desirable trees; *severe* indicates that plant competition is expected to prevent the establishment of a desirable stand unless the site is intensively prepared, weeded, or otherwise managed to control undesirable plants.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index*. This 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. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

*Trees to plant* are those that are suited to the soils and to commercial wood production.

Bulletins of the U.S. Department of Agriculture provide the information used to determine volume yields for ponderosa pine and Douglas-fir (4) and for mixed conifers (3).

## Woodland understory vegetation

Understory vegetation consists of grasses, forbs, shrubs, and other plants. Some woodland, if well managed, can produce enough understory vegetation to support grazing of livestock or wildlife, or both, without damage to the trees.

The quantity and quality of understory vegetation vary with the kind of soil, the age and kind of trees in the canopy, the density of the canopy, and the depth and condition of the litter. The density of the canopy determines the amount of light that understory plants receive.

Table 11 shows, for each soil suitable for woodland use, the potential for producing understory vegetation. The total production of understory vegetation includes the herbaceous plants and the leaves, twigs, and fruit of woody plants up to a height of 4 1/2 feet. It is expressed in pounds per acre of air-dry vegetation in favorable, normal, and unfavorable years. In a favorable year, soil moisture is above average during the optimum part of the growing season; in a normal year, soil moisture is average; and in an unfavorable year, it is below average.

Table 11 also lists the common names of the characteristic vegetation on each soil and the percentage composition, by air-dry weight, of each kind of plant. The table shows the kind and percentage of understory plants expected under a canopy density that is most nearly typical of woodland in which the production of wood crops is highest.

The management objectives on the grazable forested areas must include grazing at an intensity which will not damage the future timber crop.

## Windbreaks and environmental plantings

Windbreaks protect livestock, buildings, and yards from wind and snow. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil. Field windbreaks protect cropland and crops from wind, hold snow on the fields, and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To insure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Table 12 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various

soils. The estimates in table 12 are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from local offices of the Soil Conservation Service or the Cooperative Extension Service or from a nursery.

## Recreation

The survey area has an abundance of recreational opportunities.

Wildlife in the Area include elk, deer, bear, chukar, Hungarian partridge, and wild turkey. Fish are abundant in the streams and rivers and farm ponds.

There are two skiing areas, one south of Grangeville and the other on Cottonwood Butte. They are quite popular during the skiing season.

This area is also the gateway to back country, which provides a great deal of backpacking and summer hiking. The Salmon River supports water sports such as jet boating, water skiing, and salmon and steelhead fishing.

The soils of the survey area are rated in table 13 according to limitations that affect their suitability for recreation. The ratings 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 sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 13, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 13 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 16 and interpretations for dwellings without basements and for local roads and streets in table 15.

*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 best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

*Picnic areas* are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

*Playgrounds* require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

*Paths and trails* for hiking, horseback riding, and bicycling should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

## Wildlife habitat

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 14, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations



are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

*Grain and seed crops* are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

*Grasses and legumes* are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, lovegrass, brome grass, clover, and alfalfa.

*Wild herbaceous plants* are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, and wheatgrass.

*Coniferous plants* furnish browse, seeds, and cones. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

*Shrubs* are bushy woody plants that produce fruit, buds, twigs, bark, and foliage. Soil properties and features that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and soil moisture. Examples of shrubs are mountain mahogany, bitterbrush, and snowberry.

*Wetland plants* are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wildrice, saltgrass, cordgrass, rushes, sedges, and reeds.

*Shallow water areas* have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface

stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

*Habitat for openland wildlife* consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include pheasant, meadowlark, field sparrow, cottontail, and red fox.

*Habitat for woodland wildlife* consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodpeckers, squirrels, gray fox, raccoon, deer, and bear.

*Habitat for wetland wildlife* consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

*Habitat for rangeland wildlife* consists of areas of shrubs and wild herbaceous plants. Wildlife attracted to rangeland include deer, meadowlark, and lark bunting.

## Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data in the "Soil properties" section.

*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 within a depth of 5 or 6 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 need to be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determi-

nations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, 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 kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

### Building site development

Table 15 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

*Shallow excavations* are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone

content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

*Dwellings and small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

*Local roads and streets* have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic supporting capacity.

### Sanitary facilities

Table 16 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 16 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are



unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

*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 is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to effectively filter the effluent. Many local ordinances require that this material be of a certain thickness.

*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. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 16 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive 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.

*Sanitary landfills* are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted,

and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 16 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

*Daily cover for landfill* is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

### Construction materials

Table 17 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good*, *fair*, or *poor* as a source of roadfill, sand, gravel, and topsoil. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

*Roadfill* is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering properties

provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

*Sand and gravel* are used in great quantities in many kinds of construction. The ratings in table 17 provide guidance as to where to look for probable sources and are based on the probability that soils in a given area contain sizable quantities of sand or gravel. A soil rated *good* or *fair* has a layer of suitable material at least 3 feet thick, the top of which is within a depth of 6 feet. Coarse fragments of soft bedrock material, such as shale and siltstone, are not considered to be sand and gravel. Fine-grained soils are not suitable sources of sand and gravel.

The ratings do not take into account depth to the water table or other factors that affect excavation of the material. Descriptions of grain size, kinds of minerals, reaction, and stratification are given in the soil series descriptions and in table 19.

*Topsoil* is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less

than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

### Water management

Table 18 gives information on the soil properties and site features that affect water management. The kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds.

This table also gives for each soil the restrictive features that affect drainage, terraces and diversions, and grassed waterways.

*Pond reservoir areas* hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

*Embankments, dikes, and levees* are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

*Aquifer-fed excavated ponds* are pits or dugouts that extend to a ground-water aquifer or to a depth below a



permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

*Drainage* is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

*Terraces and diversions* are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

*Grassed waterways* are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

## Soil properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

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 grain-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 characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

## Engineering properties

Table 19 gives estimates of the engineering classification and of the range of properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

*Depth* to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil series and morphology."

*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 a soil contains particles coarser than sand, 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 (2) and the system adopted by the American Association of State Highway and Transportation Officials (1).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as Pt. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refine-



ment, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

*Rock fragments* larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

*Percentage (of soil particles) passing designated sieves* is the percentage of the soil fraction less than 3 inches in diameter based on an oven-dry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

*Liquid limit and plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

## Physical and chemical properties

Table 20 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

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

*Available water capacity* refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. 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.

*Soil reaction* is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major 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.

*Shrink-swell potential* is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

*Erosion factor K* indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value the more susceptible the soil is to sheet and rill erosion by water.

*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.

*Organic matter* is the plant and animal residue in the soil at various stages of decomposition.

In table 20, the estimated content of organic matter of the plow layer is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

## Soil and water features

Table 21 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

*Hydrologic soil groups* are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped ac-



cording to the intake of water when the soils 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 permanent 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.

*Flooding*, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt and water in swamps and marshes is not considered flooding.

Table 21 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, common, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *common* that it is likely under normal conditions; *occasional* that it occurs on an average of once or less in 2 years; and *frequent* that it occurs on an average of more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May.

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 absence of distinctive horizons that form in soils that are not subject to flooding.

Also considered is 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.

*High water table* (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 21 are the depth to the seasonal high water table; the kind of water table—that is, perched, artesian, or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 21.

An apparent water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. An artesian water table is under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole. A perched water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

*Depth to bedrock* is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is rippable, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

*Potential frost action* is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured clayey soils that have a high water table in winter are 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 mainly to pavements and other rigid structures.

*Risk of corrosion* pertains to potential soil-induced electrochemical or chemical action that dissolves 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 creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel 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 is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

## Classification of the soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (7). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. In table 22, the soils of the survey area are classified according to the system. The categories are defined in the following paragraphs.

**ORDER.** Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Mollisol.

**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 Xeroll (*Xer*, meaning dry summer, plus *oll*, from Mollisol).

**GREAT GROUP.** Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Argixeroll (*Argi*, meaning a layer in which clay has accumulated, plus *xeroll*, the suborder of the Mollisols that have moist winters and dry summers).

**SUBGROUP.** Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. An example is Calic Argixerolls. The adjective *Calic* identifies the subgroup having lime in the substratum.

**FAMILY.** Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine, montmorillonitic, mesic Calcic Argixerolls.

**SERIES.** The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

## Soil series and morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other 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 (6). Many of the technical terms used in the descriptions are defined in Soil Taxonomy (7). Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Soil maps for detailed planning."

### Banner series

The Banner series consists of very deep, well drained soils that formed in loess and material weathered from Columbia River Basalt. Banner soils are on benches and along ridges sloping to the Salmon River. Slopes are 3 to 25 percent. Average annual precipitation is about 16 inches, and the average annual air temperature is about 52 degrees F.

Banner soils are similar to Ferdinand and Tannahill soils and are near Licksillet and Tannahill soils. Those soils have a loamy-skeletal or clayey-skeletal control section.

Typical pedon of Banner silt loam, 3 to 7 percent slopes, about 2/3 mile north of White Bird, about 970 feet south of the center of sec. 1, T. 28 N., R. 1 E.

Ap1—0 to 3 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; moderate



thin platy structure parting to moderate very fine granular; slightly hard, friable, slightly sticky and slightly plastic; many very fine and common medium roots; many very fine interstitial pores; neutral; abrupt smooth boundary.

Ap2—3 to 7 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; moderate very fine and fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and common medium roots; many very fine tubular pores; moderately alkaline; abrupt smooth boundary.

B21t—7 to 19 inches; dark brown (7.5YR 3/2) silty clay, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to strong medium angular blocky; extremely hard, firm, very sticky and very plastic; common very fine and medium roots; common very fine tubular pores; common moderately thick clay films; about 3 percent basalt gravel and 3 percent cobbles concentrated in lower part; organic stains on peds; moderately alkaline; gradual smooth boundary.

B22t—19 to 32 inches; brown (7.5YR 5/4) silty clay, brown (7.5YR 4/4) moist; strong medium angular blocky structure; hard, firm, very sticky and very plastic; few very fine and medium roots; common very fine tubular pores; many thick clay films; moderately calcareous; strongly alkaline; gradual smooth boundary.

C1ca—32 to 54 inches; very pale brown (10YR 7/3) silty clay loam, pale brown (10YR 6/3) moist; weak fine subangular blocky structure parting to weak fine granular; slightly hard, friable, very sticky and very plastic; few very fine roots; many very fine tubular pores; strongly calcareous; strongly alkaline; abrupt smooth boundary.

IIc2—54 to 60 inches; yellowish brown (10YR 5/4) gravelly loam, dark brown (10YR 4/3) moist; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; no roots; many very fine tubular pores; about 30 percent gravel; strongly calcareous; strongly alkaline.

The solum is 20 to 40 inches thick. In some areas rock fragments make up as much as 15 percent of the B2t horizon. The A Horizon ranges from neutral to moderately alkaline, and the B horizon ranges from mildly alkaline to strongly alkaline.

The B2t horizon is dark brown and brown silty clay, silty clay loam, or clay.

### Bluesprins series

The Bluesprins series consists of moderately deep, well drained soils. They formed in loess and residuum and colluvium from Columbia River Basalt or Seven Devils volcanics. Bluesprins soils are on south-and west-facing canyonsides. Slopes are 7 to 90 percent. Average

annual precipitation is about 18 inches, and the average annual air temperature is 48 degrees F.

Bluesprins soils are similar to Keuterville, Lawyer, Meland, and Riggins soils and are near Ferdinand, Keuterville, Klickson, Lawyer, Licksillet, Riggins, Suloaf, and Tannahill soils. Keuterville soils have hue of 7.5YR and 5YR in the argillic horizon. Lawyer soils have a mollic epipedon that is pachic. Meland and Suloaf soils have a fine-loamy argillic horizon. Licksillet and Riggins soils are lithic. Ferdinand soils have a clayey-skeletal argillic horizon. Klickson soils are frigid. Tannahill soils have secondary lime in the subsoil.

Typical pedon of Bluesprins very cobbly loam in an area of Ferdinand-Bluesprins very cobbly loams, about 8 miles west of Boles, about 2,100 feet west and 2,600 feet south of the northeast corner of sec. 36, T. 30 N., R. 3 W.

A11—0 to 3 inches; dark grayish brown (10YR 4/2) very cobbly loam, very dark gray (10YR 3/1) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine roots; many very fine interstitial pores; about 15 percent cobbles and 25 percent gravel; slightly acid; gradual wavy boundary.

A12—3 to 12 inches; dark grayish brown (10YR 4/2) very cobbly loam, very dark grayish brown (10YR 3/2) moist; weak medium and coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; many very fine vesicular and fine tubular pores; about 10 percent cobbles and 25 percent gravel; neutral; abrupt wavy boundary.

B21t—12 to 19 inches; dark yellowish brown (10YR 4/4) very cobbly clay loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; common very fine roots; many very fine vesicular and fine tubular pores; about 25 percent cobbles and 25 percent gravel; many moderately thick clay films on faces of peds and surfaces of pores; neutral; clear wavy boundary.

B22t—19 to 31 inches; dark yellowish brown (10YR 4/4) very cobbly clay loam, dark grayish brown (10YR 4/2) moist; moderate medium and coarse subangular blocky structure; hard, friable, sticky and plastic; few very fine, fine, and medium roots; many very fine vesicular and fine tubular pores; about 30 percent cobbles and 35 percent gravel; many moderately thick clay films on faces of peds and surfaces of pores; slightly acid; abrupt wavy boundary.

R—31 inches; basalt rock.

Thickness of the solum and depth to bedrock are 20 to 40 inches. Rock fragments make up 35 to 65 percent of the B2t horizon. Reaction ranges from slightly acid to neutral.

The A horizon is dark grayish brown and very dark grayish brown very cobbly loam or silt loam. The B horizon is dark yellowish brown, brown, or dark brown.

## Boles series

The Boles series consists of very deep, moderately well drained soils. They formed mainly in loess and some residuum weathered from Columbia River Basalt or andesite, greenstone, or similar rocks of the Seven Devils Volcanics. Boles soils are on the higher plateaus. Slopes are 3 to 25 percent. Average annual precipitation is about 23 inches, and the average annual air temperature is about 43 degrees F.

Boles soils are similar to Chicane, Kooskia, Nez Perce, Uptmor, and Wilkins soils and are near De Masters, Keuterville, Suloaf, and Uptmor soils. Chicane, Kooskia, and Nez Perce soils are mesic. Keuterville, Suloaf, Uptmor, and De Masters soils do not have an A2 horizon. De Masters soils have a fine-loamy argillic horizon. Wilkins soils are somewhat poorly drained.

Typical pedon of Boles silt loam, 3 to 7 percent slopes, about 5 miles southwest of Cottonwood, about 66 feet east and 346 feet south of the Northwest corner of the NE1/4NE1/4 sec. 22, T. 31 N., R. 1 W.

- Ap—0 to 5 inches; dark grayish brown (10YR 4/2) silt loam, black (10YR 2/1) moist; moderate fine and medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots, slightly acid; abrupt smooth boundary.
- A12—5 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, black (10YR 2/1) moist; weak medium subangular blocky structure parting to weak fine and medium granular; hard, friable, slightly sticky and slightly plastic; common very fine roots; many very fine and medium tubular pores; neutral; clear wavy boundary.
- B2—9 to 14 inches; dark brown (10YR 4/3) silt loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; very hard, friable, slightly sticky and slightly plastic; common very fine roots; many very fine and medium tubular pores; few iron and manganese concretions up to 3 millimeters in diameter; slightly acid; abrupt wavy boundary.
- A2b—14 to 19 inches; light gray (10YR 7/2) silt loam, dark grayish brown (10YR 4/2) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine roots; many very fine tubular pores in the upper part and a few in the lower part; many iron and manganese concretions up to 4 millimeters in diameter; neutral; abrupt wavy boundary.
- B21tb—19 to 25 inches; dark grayish brown (10YR 4/2) silty clay, dark grayish brown (10YR 4/2) moist; weak medium prismatic structure parting to strong fine and medium angular blocky; extremely hard, firm, very sticky and very plastic, more plastic than other horizons; few very fine roots; few very fine tubular pores; common thin clay films on surfaces of peds and pores; some A2 material on prisms; some interfingering of A2 material in the upper 2 inches;

few basalt and quartz pebbles; many iron and manganese concretions up to 3 millimeters in diameter; few pressure faces; neutral; clear wavy boundary.

- B22tb—25 to 34 inches; brown (10YR 5/3) silty clay, dark brown (10YR 4/3) moist; strong fine and medium angular blocky structure; extremely hard, firm, very sticky and very plastic, few very fine roots; common very fine tubular pores; many thin clay films on surfaces of pores; some A2 material on peds; few dark wavy horizontal bands; many pressure faces and wedge-shaped aggregates that intersect and are oriented 50 degrees from horizontal; a trace of basalt and quartz gravel; many iron and manganese concretions up to 3 millimeters in diameter; neutral; gradual wavy boundary.

- B23tb—34 to 50 inches; brown (10YR 5/3) silty clay, brown (10YR 5/3) moist; moderate medium angular blocky structure; very hard, very firm, very sticky and very plastic; few very fine roots; few very fine tubular pores; many thin clay films on surfaces of pores; few pressure faces and wedge-shaped aggregates oriented 45 degrees from horizontal, some intersect; a trace of basalt and quartz gravel; many iron and manganese concretions up to 3 millimeters in diameter; neutral; gradual wavy boundary.

- B24tb—50 to 60 inches; brown (10YR 5/3) clay, brown (10YR 5/3) moist; strong fine and medium angular blocky structure; very hard, very firm, very sticky and very plastic; few very fine roots; few very fine tubular pores; many thin clay films on surfaces of pores; a trace of basalt gravel; many pressure faces and wedge-shaped aggregates that intersect and are oriented 50 degrees from horizontal; many iron and manganese concretions up to 3 millimeters in diameter; neutral; clear wavy boundary.

The solum is 60 inches or more thick. Reaction ranges from slightly acid to neutral.

The A1 horizon is dark grayish brown, dark gray, very dark gray, and very dark grayish brown. The A2 horizon is light gray and light brownish gray. The B2tb horizon is dark grayish brown, brown, grayish brown, and yellowish brown silty clay or clay.

## Brody series

The Brody series consists of moderately deep, well drained soils. They formed in volcanic ash and residuum weathered from Columbia River Basalt or Seven Devils Volcanics. Brody soils are on mountainsides and high plateaus. Slopes are 12 to 90 percent. Average annual precipitation is about 34 inches, and the average annual air temperature is about 38 degrees F.

Brody soils are similar to Jughandle and Wapshilla soils and are near Telcher, Wapshilla, and Zaza soils. Jughandle soils have a coarse-loamy control section. Telcher and Wapshilla soils do not have a B2ir horizon. Zaza soils are lithic.



Typical pedon of Brody cobbly loam, cool, 12 to 40 percent slopes, about 4.6 miles south of Grangeville on Adams Camp Road, in the NE1/4NE1/4SE1/4 sec. 4, T. 29 N., R. 3 E.

O1—3 inches to 1 inch; slightly decomposed litter.

O2—1 inch to 0; decomposed litter.

B21ir—0 to 11 inches; brown (7.5YR 5/4) cobbly loam, dark brown (7.5YR 3/4) moist; weak fine and medium granular structure; soft, very friable, non-sticky and nonplastic; common very fine and few fine and coarse roots; many very fine interstitial pores; about 15 percent cobbles and 5 percent gravel; medium acid; gradual smooth boundary.

B22ir—11 to 22 inches; light brown (7.5YR 6/4) cobbly loam, dark brown (7.5YR 4/4) moist; weak fine, medium, and coarse granular structure; soft, very friable, nonsticky and nonplastic; few very fine, fine and medium roots; many very fine interstitial pores; about 25 percent cobble and 5 percent gravel; medium acid; clear smooth boundary.

B23—22 to 32 inches; light yellowish brown (10YR 6/4) very cobbly loam, dark yellowish brown (10YR 4/4) moist; moderate very fine and fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; few very fine, fine, and medium roots; many very fine interstitial and few fine interstitial and tubular pores; about 50 percent cobbles and 10 percent gravel; slightly acid; gradual wavy boundary.

B24—32 to 39 inches; reddish yellow (7.5YR 6/5) very cobbly loam, dark brown (7.5 YR 4/5) moist; moderate very fine and fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; few very fine and fine roots; many very fine and common fine and medium interstitial pores; about 60 percent cobbles and 15 percent gravel; slightly acid.

R—39 inches; basalt bedrock.

The solum is 20 to 40 inches thick. Rock fragments make up 35 to 75 percent of the soil below a depth of 10 inches. Reaction is medium acid or slightly acid. Bedrock is at a depth of 20 to 40 inches.

The O horizon may be absent in disturbed areas. The B2ir horizon is brown and light brown loam or cobbly loam.

### **Brower series**

The Brower series consists of very deep, well drained soils. They formed in colluvium and residuum from granitic rock and some loess. Brower soils are on steep, south-facing Salmon River canyonsides. Slopes are 12 to 90 percent. Average annual precipitation is about 20 inches, and the average annual air temperature is about 49 degrees F.

Brower soils are similar to Oland and Spokel soils and are near Brownlee, Nazaton, Nez Perce, Oland, Oland Variant, and Spokel soils. Oland, Oland Variant, and Na-

zaton soils have a mollic epipedon that is pachic. Spokel soils have a B2 horizon and have less than 75 percent base saturation in at least parts of the upper 30 inches. Brownlee soils have a fine-loamy argillic horizon. Nez Perce soils have a clayey argillic horizon.

Typical pedon of Brower very gravelly loam in an area of Brower-Brownlee complex, about 7 1/2 miles south-southwest of Riggins, about 2,440 feet north and 120 feet east of the southwest corner of sec. 20, T. 23 N., R. 1 E.

A11—0 to 2 inches; brown (10YR 4/3) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; common very fine roots; about 20 percent gravel; neutral; clear wavy boundary.

A12—2 to 9 inches; brown (10YR 4/3) very gravelly loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; about 45 percent gravel; neutral; clear wavy boundary.

A13—9 to 25 inches; grayish brown (2.5YR 5/2) very gravelly loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; about 50 percent gravel; neutral; gradual wavy boundary.

C—25 to 60 inches; brown (10YR 5/3) very gravelly loam, dark brown (10YR 4/3) moist; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; about 70 percent gravel; neutral.

The solum is 10 to 40 inches thick. Rock fragments make up 35 to 80 percent of the soil between depths of 10 and 40 inches. Reaction ranges from neutral to moderately alkaline.

The A1 horizon is grayish brown, brown, or dark grayish brown gravelly loam or very gravelly loam. The C horizon is grayish brown, brown, or dark grayish brown. Some pedons have a B2 horizon above the C horizon.

### **Brownlee series**

The Brownlee series consists of deep, well drained soils. They formed in loess and material weathered from granitic residuum and colluvium. Brownlee soils are on south-facing sides of steptoes. Slopes are 2 to 40 percent. Average annual precipitation is about 22 inches, and the average annual air temperature is about 47 degrees F.

The Brownlee soils are similar to De Masters, Johnson, Meland, Naz, and Uhlorn soils and are near Brower, Johnson, Naz, Nez Perce, Oland, and Uhlorn soils. De Masters soils have a mollic epipedon that is pachic. Johnson and Uhlorn soils are very deep. Meland soils are moderately deep. Naz soils have a coarse-loamy

control section. Brower and Oland soils have a loamy-skeletal control section. Nez Perce soils have a clayey argillic horizon.

Typical pedon of Brownlee loam, 25 to 40 percent slopes, about 2 miles south of Ferdinand, about 2,500 feet east and 1,400 feet north of the southwest corner of sec. 12, T. 32 N., R. 1 W.

A1—0 to 8 inches; dark gray (10YR 4/1) loam, black (10YR 2/1) moist; strong fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine and common medium and coarse roots; many fine and very fine interstitial pores; neutral; clear smooth boundary.

B1t—8 to 14 inches; dark grayish brown (10YR 4/2) clay loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky and weak fine granular structure; slightly hard, friable, slightly sticky and plastic; common medium and coarse roots; many fine and very fine tubular and interstitial pores; thin patchy clay films in pores; few cobbles; neutral; clear smooth boundary.

B2t—14 to 28 inches; pale brown (10YR 6/3) clay loam, dark brown (10YR 4/3) moist; weak medium and fine subangular blocky structure; hard, friable, sticky and plastic; common very fine and fine and few medium and coarse roots; many fine and very fine tubular and interstitial pores; thin nearly continuous clay films on peds, moderate continuous clay films in pores; few cobbles; slightly acid; clear smooth boundary.

B3t—28 to 42 inches; pale brown (10YR 6/3) loam, dark brown (10YR 4/3) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; few fine tubular pores; thin patchy clay films in pores; about 10 percent gravel; neutral; clear smooth boundary.

R—42 inches; slightly to moderately decomposed quartz diorite bedrock.

Thickness of the solum and depth to bedrock are 40 to 60 inches. Rock fragments make up as much as 25 percent of the B2t horizon. Reaction of the profile ranges from medium acid to neutral.

The A horizon is dark gray or dark grayish brown. The B horizon is dark grayish brown, brown, or pale brown loam, clay loam, or gravelly clay loam.

### Chard series

The Chard series consists of very deep, well drained soils. They formed in alluvium. Chard soils are on stream terraces along the Salmon River. Slopes are 3 to 40 percent. Average annual precipitation is about 14 inches, and the average annual air temperature is about 54 degrees F.

Chard soils are similar to Chard Variant soils and are near Chard Variant, Licksillet, and Tannahill soils. Chard

Variant soils have a sandy control section. Licksillet soils are lithic. Tannahill soils have a loamy-skeletal argillic horizon.

Typical pedon of Chard sandy loam, 12 to 25 percent slopes, about 8 miles south of White Bird, about 2,900 feet west and 700 feet south of the northeast corner of sec. 36, T. 27 N., R. 1 E.

A1—0 to 8 inches; dark grayish brown (10YR 4/2) sandy loam, very dark grayish brown (10YR 3/2) moist; moderate very fine granular structure; soft, very friable, nonsticky and nonplastic; many fine roots; many fine interstitial pores; neutral; clear wavy boundary.

A3—8 to 16 inches; brown (10YR 5/3) sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky and weak very fine granular structure; soft, very friable, nonsticky and nonplastic; many fine roots; many fine tubular pores; neutral; clear wavy boundary.

B2—16 to 30 inches; pale brown (10YR 6/3) sandy loam, dark grayish brown (10YR 4/2) moist; weak fine and medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common fine roots; common fine tubular pores; slightly firmer than above or below; neutral; clear wavy boundary.

C1ca—30 to 47 inches; very pale brown (10YR 7/3) loamy sand, pale brown (10YR 6/3) moist; weak fine and medium subangular blocky structure; hard, very friable, nonsticky and nonplastic; few fine roots; common fine tubular pores; strongly calcareous; strongly alkaline; gradual wavy boundary.

C2—47 to 60 inches; very pale brown (10YR 7/3) loamy sand, pale brown (10YR 6/3) moist; single grain; loose; few fine roots; few tubular pores; moderately calcareous; strongly alkaline.

The solum is 20 to 40 inches thick. In some areas rock fragments make up as much as 10 percent of the soil between depths of 10 and 40 inches. Reaction ranges from neutral to strongly alkaline.

### Chard Variant

The Chard Variant consists of very deep, somewhat excessively drained soils. They formed in sandy and gravelly alluvium. Chard Variant soils are on stream terraces along the Salmon River. Slopes are 2 to 25 percent. Average annual precipitation is about 14 inches, and the average annual air temperature is about 54 degrees F.

Chard Variant soils are similar to Chard soils and are near Chard and Tannahill soils. Chard soils have a coarse-loamy control section. Tannahill soils have a loamy-skeletal argillic horizon.

Typical pedon of Chard Variant loamy fine sand, 2 to 7 percent slopes, about 2 miles south of White Bird, about



1,150 feet west and 2,200 feet north of the southeast corner of sec. 27, T. 28 N., R. 1 E.

- Ap—0 to 5 inches; dark grayish brown (10YR 4/2) loamy fine sand, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many fine roots; few fine pores; few pebbles and cobbles; neutral; abrupt smooth boundary.
- A12—5 to 8 inches; grayish brown (10YR 5/2) loamy fine sand, very dark grayish brown (2.5YR 3/2) moist; single grain; loose; common fine roots; slightly calcareous; neutral; abrupt smooth boundary.
- A13—8 to 12 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; common fine roots; few fine pores; slightly acid; abrupt smooth boundary.
- C1—12 to 19 inches; light gray (10YR 7/2) loamy fine sand, dark grayish brown (10YR 4/2) moist; massive; soft, very friable, nonsticky and nonplastic; common fine roots; few fine pores; slightly calcareous; neutral; abrupt smooth boundary.
- IIC2—19 to 32 inches; light gray (10YR 7/2) coarse sand, dark gray (2.5Y 4/1) moist; single grain; loose; few very fine roots; slightly calcareous; mildly alkaline; abrupt smooth boundary.
- IIIC3—32 to 34 inches; dark grayish brown (2.5Y 4/2) loamy fine sand, very dark grayish brown (2.5Y 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; few very fine pores; slightly calcareous; mildly alkaline; abrupt smooth boundary.
- IVC4—34 to 50 inches; light brownish gray (2.5Y 6/2) sand, dark grayish brown (2.5Y 4/2) moist; single grain; loose; no roots; slightly calcareous; mildly alkaline; abrupt smooth boundary.
- VC5—50 to 60 inches; stratified sand, gravel, and cobbles.

The solum is 10 to 20 inches thick. In some areas rock fragments make up as much as 10 percent of the soil between depths of 10 and 40 inches. Reaction is neutral or slightly acid in the A horizon and neutral to strongly alkaline in the C horizon.

The A horizon is dark grayish brown, grayish brown, and brown and is loamy fine sand throughout in some areas. The upper part of the C horizon is light gray, dark grayish brown, and light brownish gray loamy fine sand, sand, and coarse sand. The lower part of the C horizon is multicolored stratified layers of sand, gravel, and cobbles.

### Chicane series

The Chicane series consists of very deep, moderately well drained soils. They formed in loess. Chicane soils

are on north-facing side slopes on the prairie north and west of Grangeville. Slopes are 2 to 40 percent. Average annual precipitation is about 23 inches, and the average annual air temperature is about 44 degrees F.

Chicane soils are similar to Boles, Kooskia, Nez Perce, Shebang, and Wilkins soils and are near Nez Perce, Uhlorn, and Wilkins soils. Boles and Wilkins soils are frigid. Wilkins soils are also somewhat poorly drained. Kooskia soils have an average of less than 3.5 percent organic matter in the upper 20 inches. Nez Perce and Shebang soils are less than 25 inches deep to the B2t horizon and have a B2tca horizon. Uhlorn soils do not have an A2 horizon.

Typical pedon of Chicane silt loam, 7 to 12 percent slopes, about 4 miles north of Grangeville, about 418 feet south and 115 feet west of the northeast corner of sec. 35, T. 31 N., R. 2 E.

- Ap—0 to 5 inches; very dark grayish brown (10YR 3/2) silt loam, black (10YR 2/1) moist; moderate fine granular structure; hard, friable, slightly sticky and slightly plastic; common very fine roots; neutral; abrupt smooth boundary.
- A12—5 to 14 inches; very dark grayish brown (10YR 3/2) silty clay loam, black (10YR 2/1) moist; weak medium subangular blocky structure parting to weak medium granular; very hard, friable, sticky and plastic; common very fine roots; many very fine and common fine tubular pores; neutral; gradual wavy boundary.
- B2—14 to 21 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark gray (10YR 3/1) moist; weak medium subangular blocky structure; very hard, firm, sticky and plastic; common very fine roots; many very fine and common medium and coarse tubular pores; speckling of uncoated silt grains; 20 percent rodent holes filled with A1 material; neutral; clear wavy boundary.
- A2b—21 to 28 inches; pale brown (10YR 6/3) silt loam, dark grayish brown (10YR 4/2) moist; massive; hard, friable, slightly sticky and slightly plastic; common very fine roots; common very fine and fine tubular pores; many iron and manganese concretions up to 2 millimeters in diameter; 20 percent rodent holes filled with A1 material; neutral; abrupt wavy boundary.
- B21tb—28 to 35 inches; yellowish brown (10YR 5/4) clay, dark yellowish brown (10YR 3/4) moist; strong medium and coarse angular blocky structure; very hard, very firm, very sticky and very plastic; many very fine and common fine tubular pores; many dark brown (10YR 4/3) thick clay films, very dark grayish brown (10YR 3/2) moist, on surfaces of peds and pores; many iron and manganese concretions up to 2 millimeters in diameter; some interfingering of A2 material; neutral; clear wavy boundary.
- B22tb—35 to 41 inches; dark yellowish brown (10YR 4/4) clay, dark brown (10YR 4/3) moist; moderate

coarse prismatic structure parting to moderate medium and coarse angular blocky; extremely hard, very firm, very sticky and very plastic; many very fine and common fine tubular pores; many thick clay films on surfaces of peds and pores; many iron and manganese concretions up to 2 millimeters in diameter; organic stains on about 80 percent of faces of peds, slickensides on 20 percent; neutral; clear wavy boundary.

B23tb—41 to 51 inches; yellowish brown (10YR 5/4) clay, dark yellowish brown (10YR 4/4) moist; moderate coarse angular blocky structure; very hard, very firm, very sticky and very plastic; common very fine and fine tubular pores; many moderately thick clay films on surfaces of peds and pores; many iron and manganese concretions up to 3 millimeters in diameter; neutral; abrupt wavy boundary.

B24tb—51 to 67 inches; dark yellowish brown (10YR 4/4) clay, dark yellowish brown (10YR 4/4) moist; strong coarse angular blocky structure; very hard, very firm, very sticky and very plastic; common very fine tubular pores; many moderately thick clay films on surfaces of peds and pores; many iron and manganese concretions up to 4 millimeters in diameter; many slickensides oriented 45 degrees from horizontal; about 1 percent basalt and quartz gravel; moderately alkaline.

The solum is more than 60 inches thick. Reaction ranges from neutral to moderately alkaline.

The B2tb horizon is yellowish brown, brown, or dark yellowish brown clay, silty clay, or silty clay loam.

## De Masters series

The De Masters series consists of deep, well drained soils. They formed in loess and material weathered from Columbia River Basalt or Seven Devils Volcanics. De Masters soils are on north-facing side slopes and higher plateaus. Slopes are 7 to 40 percent. Average annual precipitation is about 24 inches, and the average annual air temperature is about 43 degrees F.

De Masters soils are similar to Jacket, Johnson, and Suloaf soils and are near Bluesprin, Boles, Keuterville, Meland, Riggins, Suloaf, and Uptmor soils. Jacket, Boles, and Uptmor soils have a clayey argillic horizon. Johnson, Keuterville, Suloaf, Bluesprin, and Meland soils have a mollic epipedon that is not pachic. Keuterville and Bluesprin soils also have a loamy-skeletal argillic horizon. Riggins soils are lithic.

Typical pedon of De Masters silt loam, 25 to 40 percent slopes, about 19 miles southwest of Cottonwood, about 1,850 feet west and 1,470 feet north of the southeast corner of sec. 18, T. 29 N., R. 2 W.

O1—0.5 inch to 0; slightly to moderately decomposed organic material.

A11—0 to 15 inches; dark grayish brown (10YR 4/2) silt loam, black (10YR 2/1) moist; weak medium suban-

gular blocky structure parting to moderate fine granular; soft, very friable, nonsticky and slightly plastic; many very fine, fine, and coarse roots; many very fine and common fine tubular pores; few gravel; slightly acid; clear wavy boundary.

A12—15 to 33 inches; dark brown (10YR 4/3) silt loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and many medium roots; many very fine and fine tubular pores; few gravel; medium acid; gradual wavy boundary.

B21t—33 to 41 inches; yellowish brown (10YR 5/4) silt loam, dark brown (7.5YR 4/2) moist; moderate fine and medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine and many medium roots; many very fine and fine tubular pores; common thin clay films on surfaces of peds and pores; about 10 percent gravel and 5 percent cobbles; medium acid; clear wavy boundary.

B22t—41 to 47 inches; yellowish brown (10YR 5/4) cobbly silty clay loam, brown (10YR 4/3) moist; moderate fine and medium subangular blocky structure; hard, friable, sticky and plastic; common fine and many medium roots; many fine tubular pores; few thin clay films on surfaces of peds and pores; thin bleached coatings on peds; about 15 percent cobbles and 15 percent gravel; medium acid; clear wavy boundary.

B3t—47 to 55 inches; yellowish brown (10YR 5/4) very cobbly clay loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; hard, friable, sticky and plastic; few fine roots; many fine tubular pores; very few thin clay films on peds; about 20 percent cobbles and 25 percent gravel; medium acid; gradual wavy boundary.

R—55 inches; slightly weathered basalt bedrock.

Thickness of the solum and depth to rock are 40 to 60 inches. Rock fragments make up 5 to 35 percent of the upper 20 inches of the B2t horizon. Reaction ranges from medium acid to neutral.

The A horizon is very dark grayish brown, dark grayish brown, grayish brown, dark brown, or brown. The B horizon is yellowish brown, grayish brown, brown, dark brown, and light brownish gray silt loam, very gravelly loam, cobbly silty clay loam, or very cobbly clay loam. The content of gravel and cobbles increases with depth.

## Ericson series

The Ericson series consists of very deep, well drained soils. They formed in granitic residuum and colluvium. Ericson soils are on south-facing side slopes on uplands in a mountain valley. Slopes are, 4 to 65 percent. Average annual precipitation is about 30 inches, and the average annual air temperature is about 40 degrees F.

Ericson soils are similar to Jughandle, Suttler, and Telcher soils and are near Jughandle and Jughandle



Variant soils. Jughandle and Suttler soils have a coarse-loamy control section. Jughandle soils also have volcanic ash in the surface layer. Telcher soils formed in loess and basalt residuum and have moist color value of 2 or 3 in the upper 7 inches when mixed. Jughandle Variant soils are somewhat poorly drained and are on bottom lands.

Typical pedon of Ericson loam, 25 to 40 percent slopes, about 1 3/4 miles north of Elk City, about 360 feet south of the northwest corner of the SW1/4NW1/4 sec. 14, T. 29 N., R. 8 E.

- A1—0 to 2 inches; brown (10YR 5/3) loam, dark yellowish brown (10YR 3/4) moist; moderate fine and very fine granular structure; soft, very friable, nonsticky and nonplastic; many fine roots; many fine interstitial pores; about 5 percent gravel; strongly acid; clear wavy boundary.
- A2—2 to 12 inches; pale brown (10YR 6/3) loam, dark brown (7.5YR 4/4) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few fine roots; many fine tubular pores; about 5 percent gravel; strongly acid; clear wavy boundary.
- B1t—12 to 17 inches; light yellowish brown (10YR 6/4) loam, dark brown (7.5YR 4/4) moist; moderate fine subangular blocky structure; very hard, friable, slightly sticky and slightly plastic; few fine roots; many fine tubular pores; few thin clay films on peds; about 10 percent gravel; strongly acid; clear wavy boundary.
- B2t—17 to 31 inches; yellowish brown (10YR 5/4) fine gravelly loam, brown (7.5YR 4/4) moist; moderate fine subangular blocky structure; very hard, friable, slightly sticky and slightly plastic; few fine roots; many fine tubular pores; few thick clay films on peds; about 25 percent gravel; strongly acid; clear wavy boundary.
- B3t—31 to 60 inches; yellowish brown (10YR 5/4) fine gravelly loam, brown (7.5YR 4/4) moist; weak fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; no roots; many fine tubular pores; few thin clay films on peds; about 20 percent gravel; strongly acid.

The solum is 60 inches or more thick. Rock fragments make up 15 to 35 percent of the B2t horizon. Reaction is strongly acid or medium acid.

The A1 horizon is brown or grayish brown. The A2 horizon is pale brown or light brownish gray. The Bt horizon is light yellowish brown or yellowish brown.

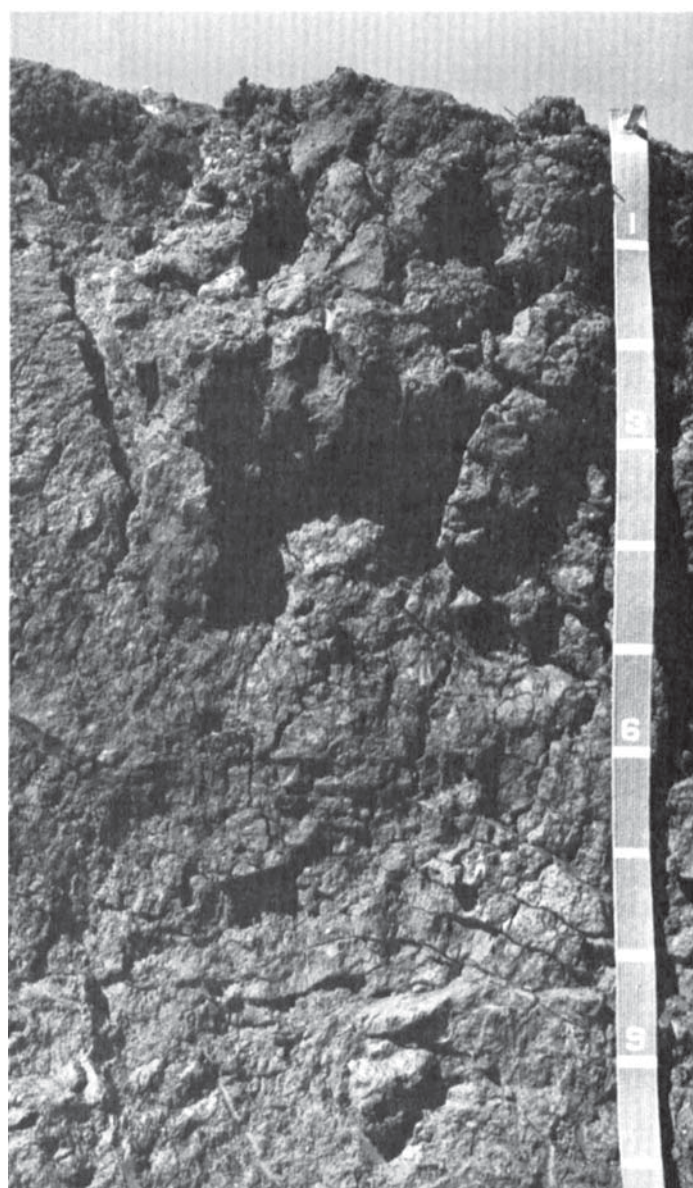
### Fenn series

The Fenn series consists of very deep, well drained soils. They formed in loess and possibly residuum weathered from Columbia River Basalt. Fenn soils are on the prairie on a plateau west and north of Grangeville.

Slopes are 2 to 25 percent. Average annual precipitation is about 22 inches, and the average annual air temperature is about 46 degrees F.

Fenn soils are similar to Fenn Variant and Shebang soils and are near Fenn Variant, Ferdinand, Nez Perce, and Shebang soils. Fenn Variant soils are somewhat poorly drained and have mottles in the upper 40 inches. Shebang, Ferdinand, and Nez Perce soils are Mollisols. Ferdinand soils have a clayey-skeletal argillic horizon.

Typical pedon (fig. 11) of Fenn silty clay, 2 to 7 percent slopes, about 8 miles northwest of Grangeville, about 418 feet south and 92 feet west of the northeast corner of the SE1/4 sec. 31, T. 31 N., R. 2 E.



Ap—0 to 6 inches; very dark gray (10YR 3/1) silty clay, black (10YR 2/1) moist; strong very fine and fine granular structure; very hard, firm, very sticky and very plastic; few very fine roots; slightly acid; abrupt smooth boundary.

A12—6 to 17 inches; very dark gray (10YR 3/1) clay, black (10YR 2/1) moist; strong fine angular blocky structure; very hard, firm, very sticky and very plastic; few very fine roots; common very fine tubular pores; many thin clay films on surfaces of pores; many slickensides and wedge-shaped aggregates oriented 50 degrees from the horizontal, many intersect; neutral; gradual wavy boundary.

C1—17 to 27 inches; dark grayish brown (10YR 4/2) clay, dark brown (10YR 3/3) moist; strong fine and medium angular blocky structure; extremely hard, firm, very sticky and very plastic; few very fine roots; common very fine tubular pores; many thin clay films on surfaces of pores; very few iron and manganese concretions up to 2 millimeters in diameter; many slickensides and wedge-shaped aggregates oriented 50 degrees from the horizontal, many intersect; neutral; gradual wavy boundary.

C2—27 to 39 inches; brown (10YR 5/3) clay, dark brown (10YR 4/3) moist; strong moderate and coarse angular blocky structure; very hard, firm, very sticky and very plastic; few very fine roots; common very fine tubular pores; many thin clay films on surfaces of pores; very few iron and manganese concretions up to 2 millimeters in diameter; many slickensides and wedge-shaped aggregates oriented 50 degrees from horizontal, many intersect; slightly calcareous; moderately alkaline; gradual wavy boundary.

C3—39 to 63 inches; dark brown (10YR 4/3) clay, dark brown (10YR 4/3) moist; strong moderate and coarse angular blocky structure; extremely hard, firm, very sticky and very plastic; few very fine roots; common very fine tubular pores; many thin clay films on surfaces of pores; very few iron and manganese concretions up to 2 millimeters in diameter; many slickensides and wedge-shaped aggregates oriented 50 degrees from horizontal, many intersect; few filled holes about 5 centimeters in diameter; slightly calcareous; moderately alkaline.

The solum is 10 to 20 inches thick. Rock fragments make up as much as 35 percent of the soil between depths of 10 and 40 inches. Reaction is slightly acid or neutral in the A horizon, and neutral to moderately alkaline in the C horizon. Large cracks extend to the surface in late summer.

The A horizon is very dark gray or dark gray silty clay or stony silty clay. The C horizon is dark grayish brown, brown, dark brown, or grayish brown clay, silty clay, or cobbly clay.

## Fenn Variant

The Fenn Variant consists of very deep, somewhat poorly drained soils. They formed in alluvium from loess and residuum weathered from basalt. Fenn Variant soils are on nearly level to gently sloping bottom lands. Slopes are 0 to 7 percent. Average annual precipitation is about 23 inches, and the average annual air temperature is about 46 degrees F.

Fenn Variant soils are similar to Fenn soils and are near Fenn and Shebang soils. Fenn soils are well drained. Shebang soils are Mollisols.

Typical pedon of Fenn Variant silty clay, 0 to 7 percent slopes, about 5.5 miles west of Grangeville, in the SW1/4NW1/4NW1/4 sec. 28, T. 30 N., R. 2 E.

Ap—0 to 6 inches; very dark gray (2.5Y 3/1) silty clay, black (2.5Y 2/1) moist; weak and moderate very fine and fine and strong very fine granular structure; extremely hard, friable, sticky and very plastic; few very fine roots; few very fine tubular and many very fine interstitial pores; neutral; clear wavy boundary.

A12—6 to 10 inches; very dark gray (2.5Y 3/1) silty clay, black (2.5Y 2/1) moist; weak coarse prismatic structure parting to weak fine and medium angular blocky; extremely hard, firm, very sticky and very plastic; few very fine roots; few very fine tubular pores; some slickensides; few fine pebbles; neutral; gradual wavy boundary.

A13—10 to 19 inches; very dark gray (2.5Y 3/1) silty clay, black (2.5Y 2/1) moist; few fine faint brown mottles; weak coarse prismatic structure parting to weak fine and very fine angular blocky; extremely hard, firm, very sticky and very plastic; few very fine roots; common very fine tubular pores; some slickensides; neutral; gradual wavy boundary.

A14—19 to 31 inches; dark grayish brown (2.5Y 4/2) clay, black (2.5Y 2/1) moist; weak very coarse prismatic structure parting to weak very fine, fine, and medium subangular blocky; extremely hard, firm, very sticky and very plastic; few very fine roots; few very fine tubular pores; moderately alkaline; gradual wavy boundary.

C1g—31 to 42 inches; gray (2.5Y 5/1) silty clay, very dark gray (2.5Y 3/1) moist; few fine and coarse faint brown mottles; weak coarse prismatic structure parting to weak coarse platy and moderate very fine and fine subangular blocky; extremely hard, firm, sticky and very plastic; few very fine roots; few very fine tubular pores; few manganese concretions less than one millimeter in diameter; some slickensides; many bluish streaks 1/4 to 1 inch wide tending to vertical; very few pockets of line; moderately alkaline; gradual wavy boundary.

C2g—42 to 53 inches; gray (10YR 5/1) silty clay, very dark gray (2.5 3/1) moist; few fine faint mottles; weak coarse prismatic structure parting to moderate very fine and fine angular blocky; extremely hard,



firm, sticky and very plastic; few roots; few very fine tubular pores; common lime concretions up to 3/4 inch in diameter; few dark manganese concretions 1 to 2 millimeters in diameter; some slickensides; common bluish streaks 2 to 4 millimeters wide; few small pockets of lime; moderately alkaline; gradual smooth boundary.

C3g—53 to 65 inches; gray (2.5Y 5/1) silty clay, very dark gray (2.5Y 3/1) moist; few fine faint brown mottles; moderate very fine and fine angular blocky structure; extremely hard, firm, sticky and very plastic; few very fine tubular pores; few lime concretions 2 to 10 millimeters in diameter; some bluish streaks; few lime veins; strongly alkaline.

The solum is 20 to 35 inches thick. Reaction of the A horizon is neutral to moderately alkaline, and reaction of the C horizon is moderately alkaline or strongly alkaline.

The A1 horizon is very dark gray, dark grayish brown, or very dark grayish brown silty clay or clay. The C horizon is silty clay or clay.

### Ferdinand series

The Ferdinand series consists of moderately deep, well drained soils. They formed in loess and residuum weathered from Columbia River Basalt or Seven Devils Volcanics. Ferdinand soils are on the prairie north and west of Grangeville and on steep, south-facing canyon-sides. Slopes are 2 to 90 percent. Average annual precipitation is about 22 inches, and the average annual air temperature is about 47 degrees F.

Ferdinand soils are similar to Banner and Tannahill soils and are near Bluesprin, Fenn, Flybow, Lawyer, Meland, Nez Perce, Riggins, Shebang, and Tannahill soils. Banner, Nez Perce, and Shebang soils have a clayey argillic horizon. Tannahill, Bluesprin, and Lawyer soils have a loamy-skeletal argillic horizon. Fenn soils are Vertisols. Flybow and Riggins soils are lithic. Meland soils have a fine-loamy argillic horizon.

Typical pedon of Ferdinand silt loam in an area of Ferdinand-Riggins complex, about 5.5 miles east of Cottonwood, about 990 feet west of the southeast corner of sec. 31, T. 32 N., R. 2 E.

A11—0 to 4 inches; dark grayish brown (10YR 4/2) silt loam, black (10YR 2/1) moist; moderate thin and medium platy structure parting to strong fine granular; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine tubular pores; about 5 percent basalt gravel; slightly acid; clear smooth boundary.

A12—4 to 13 inches; dark grayish brown (10YR 4/2) silt loam, black (10YR 2/1) moist; weak medium and coarse subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots; many very fine and common medium tubular pores; about 5 percent basalt gravel; neutral; clear wavy boundary.

B21t—13 to 19 inches; grayish brown (10YR 5/2) cobbly silty clay loam, very dark gray (10YR 3/1) moist; moderate fine and medium subangular blocky structure; very hard, firm, sticky and plastic; common very fine and fine roots; many very fine tubular pores; many thin clay films on surfaces of peds and pores; thin discontinuous dark grayish brown (10YR 4/2) moist, uncoated silty material on top of this horizon; about 25 percent angular cobbles and 5 percent gravel; neutral; abrupt wavy boundary.

B22tca—19 to 32 inches; brown (7.5YR 4/4), (7.5YR 5/4 rubbed) very cobbly silty clay; dark yellowish brown (10YR 3/4) (10YR 4/3 rubbed) moist; strong medium and coarse angular blocky structure; very hard, very firm, very sticky and very plastic; few very fine and fine roots; common very fine tubular pores; many very dark grayish brown (10YR 3/2) moderately thick clay films on surfaces of peds and pores; common slickensides; about 40 percent angular cobbles and 10 percent gravel; thin lime coatings on undersides of coarse fragments below a depth of 27 inches; neutral.

R—32 inches; basalt bedrock.

Thickness of the solum and depth to bedrock are 20 to 40 inches. Rock fragments make up 35 to 80 percent of the upper 20 inches of the B2t horizon. Reaction ranges from slightly acid to neutral.

The A horizon is grayish brown, dark grayish brown, dark gray, or gray silt loam or very cobbly loam. The B horizon is grayish brown or brown, cobbly silty clay loam, very cobbly clay loam, or very cobbly silty clay.

### Flybow series

The Flybow series consists of very shallow, well drained soils. They formed in material weathered from basalt and andesite. Flybow soils are on the higher plateaus. Slopes are of 7 to 40 percent. Average annual precipitation is about 19 inches, and the average annual air temperature is about 47 degrees F.

Flybow soils are similar to Licksillet, Riggins, and Zaza soils and are near Bluesprin, Ferdinand, Meland, and Riggins soils. Those soils are more than 10 inches deep to bedrock.

Typical pedon of Flybow very cobbly loam in an area of Ferdinand-Flybow-Riggins complex, about 3 miles southwest of Boles, about 500 feet east and 70 feet north of the southwest corner of the SE1/4 sec. 2, T. 29 N., R. 2 W.

A1—0 to 5 inches; dark yellowish brown (10YR 4/4) very cobbly loam, dark brown (7.5YR 3/3) moist; weak very fine granular structure; slightly hard, very friable, sticky and plastic; many very fine and fine and few medium roots; many very fine and fine interstitial pores; 40 percent cobbles and 30 percent gravel; slightly acid; abrupt smooth boundary.

R—5 inches; fractured basalt bedrock; soil material in fractures; few roots.

Thickness of the solum and depth to bedrock are 4 to 10 inches. Rock fragments make up 35 to 70 percent of the solum. Reaction is medium acid or slightly acid.

### Jacket series

The Jacket series consists of very deep, well drained soils. They formed in loess and in colluvium and residuum from Columbia River Basalt. Jacket soils are on canyon benches and broad canyon ridges. Slopes are 3 to 40 percent. Average annual precipitation is about 24 inches, and the average annual air temperature is about 45 degrees F.

Jacket soils are similar to De Masters, Jacket Variant, Lawyer, and Uptmor soils and are near Bluesprin, Ferdinand, Keuterville, Klickson, and Nez Perce soils. De Masters soils have a fine-loamy argillic horizon. Jacket Variant soils have a fine-silty control section. Lawyer, Bluesprin, Keuterville, and Klickson soils have a loamy-skeletal argillic horizon. Uptmor soils have a mollic epipedon less than 20 inches thick. Ferdinand soils have a clayey-skeletal argillic horizon. Nez Perce soils have an A2 horizon.

Typical pedon of Jacket silt loam, 25 to 40 percent slopes, about 4 miles southwest of White Bird, about 1,500 feet south and 700 feet east of the northwest corner of sec. 4, T. 27 N., R. 1 E.

O1—2 inches to 0; slightly to moderately decomposed organic material; neutral.

A11—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, black (10YR 2/1) moist; moderate very fine and fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine and few coarse roots; neutral; clear wavy boundary.

A12—8 to 17 inches; very dark grayish brown (10YR 3/2) silt loam, very dark brown (10YR 2/2) moist; weak fine subangular blocky structure parting to moderate fine granular; hard, friable, slightly sticky and slightly plastic; common fine and few coarse roots; neutral; clear wavy boundary.

B1t—17 to 23 inches; brown (10YR 5/3) silty clay loam, dark brown (10YR 3/3) moist; moderate very fine and fine subangular blocky structure; hard, firm, sticky and plastic; common thin clay films on peds; common fine and few coarse roots; slightly acid; clear wavy boundary.

B21t—23 to 30 inches; brown (10YR 4/3) silty clay loam, dark brown (10YR 3/3) moist; moderate very fine and fine subangular blocky structure; very hard, firm, sticky and plastic; common thin clay films on peds; common fine and few coarse roots; medium acid; clear wavy boundary.

B22t—30 to 50 inches; brown (10YR 5/3) silty clay, dark brown (10YR 3/3) moist; weak medium subangular

blocky structure parting to moderate very fine angular blocky; extremely hard, very firm, very sticky and very plastic; continuous thick clay films on peds; few fine roots; few quartz sand grains; few basalt pebbles, and cobbles; slightly acid; clear wavy boundary.

B3t—50 to 63 inches; brown (10YR 5/3) silty clay, dark brown (10YR 4/3) moist; moderate very fine angular blocky and weak medium subangular blocky structure; extremely hard, very firm, very sticky and very plastic; continuous thick clay films on peds; few fine roots; few quartz sand grains; few basalt pebbles and cobbles; common slickensides; slightly acid.

The solum is 60 inches or more thick. Reaction ranges from medium acid to neutral.

The A horizon is very dark gray, very dark brown, very dark grayish brown, or dark brown. The B2t horizon is silty clay, silty clay loam, clay loam, or gravelly silty clay.

### Jacket Variant

The Jacket Variant consists of very deep, well drained soils. They formed in loess and some granite residuum. Jacket Variant soils are on high river terraces in the Kamiah area. Slopes are 7 to 40 percent. Average annual precipitation is about 24 inches, and the average annual air temperature is about 51 degrees F.

Jacket Variant soils are similar to Jacket and Oland Variant soils, and are near Nicodemus soils. Jacket soils have a clayey argillic horizon. Oland Variant soils have a coarse-loamy control section. Nicodemus soils formed in stratified alluvium and have a loamy-skeletal control section.

Typical pedon of Jacket Variant silt loam, 12 to 25 percent slopes, about 1 mile south of Kamiah, about 940 feet west and 80 feet south of the northeast corner of sec. 13, T. 33 N., R. 3 E.

A11—0 to 3 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; moderate fine and medium granular structure; slightly hard, very friable, nonsticky and slightly plastic; many fine roots; many very fine interstitial pores; neutral; clear wavy boundary.

A12—3 to 12 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; weak fine subangular blocky and moderate very fine granular structure; slightly hard, very friable, slightly sticky and plastic; many fine roots; many very fine interstitial pores; neutral; gradual wavy boundary.

A13—12 to 21 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky and moderate fine granular structure; slightly hard, very friable, sticky and plastic; many fine roots; many very fine interstitial pores; neutral; gradual wavy boundary.

A3—21 to 30 inches; brown (10YR 5/3) silt loam, dark brown (10YR 3/3) moist; weak medium subangular



blocky structure; hard, very friable, sticky and plastic; common fine roots; many fine tubular pores; neutral; gradual wavy boundary.

B21—30 to 46 inches; light yellowish brown (10YR 6/4) silt loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; very hard, very friable, sticky and plastic; few fine roots; common fine tubular pores; neutral; gradual wavy boundary.

B22—46 to 52 inches; light yellowish brown (10YR 6/4) silt loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; very hard, friable, sticky and plastic; no roots; common fine tubular pores; neutral; gradual wavy boundary.

B23—52 to 60 inches; reddish yellow (7.5YR 6/5) silty clay loam, brown (7.5YR 4/4) moist; weak medium subangular blocky structure; very hard, friable, sticky and plastic; no roots; common fine tubular pores; neutral.

The solum is 60 inches or more thick. The total amount of sand coarser than very fine sand in the B horizon is less than 15 percent. The mollic epipedon is 20 to 35 inches thick.

### Johnson series

The Johnson series consists of very deep, well drained soils. They formed in loess and residuum from granitic rocks. Johnson soils are on plateaus and mountainsides. Slopes are 7 to 40 percent. Average annual precipitation is about 24 inches, and the average annual air temperature is about 45 degrees F.

Johnson soils are similar to Brownlee, De Masters, and Suloaf soils, and are near Brownlee, Naz, and Spokel soils. Brownlee soils are deep and are mesic. De Masters soils have a mollic epipedon that is pachic. Suloaf soils have 15 to 30 percent sand coarser than very fine sand. Naz soils have a coarse-loamy control section. Spokel soils have a loamy-skeletal control section.

Typical pedon of Johnson loam, 25 to 40 percent slopes, about 8 miles east of Riggins, about 400 feet west and 100 feet south of the northeast corner of sec. 24, T. 24 N., R. 2 E.

O1—0.5 inch to 0; fresh and partially decomposed needles and twigs; medium acid.

A11—0 to 2 inches; very dark grayish brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; soft, very friable, slightly sticky and slightly plastic; many fine roots; many fine interstitial pores; medium acid; abrupt smooth boundary.

A12—2 to 7 inches; dark brown (10YR 3/3) loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; many fine interstitial pores; medium acid; gradual smooth boundary.

A13—7 to 19 inches; dark brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; weak fine subangular structure parting to moderate medium granular; hard, very friable, slightly sticky and slightly plastic; many fine roots; many fine interstitial pores; medium acid; clear smooth boundary.

B1t—19 to 27 inches; brown (7.5YR 4/4) loam, dark yellowish brown (10YR 3/4) moist; weak fine subangular blocky structure; very hard, friable, sticky and plastic; common fine roots, many fine tubular pores; few thin clay films; slightly acid; gradual smooth boundary.

B21t—27 to 39 inches; brown (7.5YR 4/4) loam, dark brown (7.5YR 3/4) moist; moderate fine and medium subangular blocky structure; very hard, friable, sticky and plastic; common fine and few coarse roots; many fine tubular pores; few moderately thick clay films; slightly acid; gradual smooth boundary.

B22t—39 to 55 inches; brown (7.5YR 4/4) clay loam, dark brown (7.5YR 3/4) moist; moderate fine and medium subangular blocky structure; extremely hard, friable, sticky and plastic; few fine and coarse roots; common fine tubular pores; few moderately thick clay films; neutral; gradual smooth boundary.

B3t—55 to 65 inches; brown (7.5YR 4/4) loam, dark brown (7.5YR 3/4) moist; weak fine subangular blocky structure; extremely hard, friable, sticky and plastic; few fine roots; common fine tubular pores; few thin clay films; neutral.

The solum is 60 inches or more thick. In some areas rock fragments make up 25 percent of the B horizon. Reaction ranges from medium acid to neutral.

The A horizon is very dark grayish brown, dark brown, dark grayish brown, and brown loam or silt loam. The B2t horizon is brown and light brown loam, or clay loam; in some areas some layers are gravelly.

### Jughandle series

The Jughandle series consists of deep, somewhat excessively drained soils. They formed in volcanic ash and residuum weathered from granitic rocks. Jughandle soils are on uplands in a mountain valley and on mountains. Slopes are 7 to 90 percent. Average annual precipitation is about 34 inches, and the average annual air temperature is about 38 degrees F.

Jughandle soils are similar to Brody, Ericson, Jughandle Variant, and Suttler soils and are near Ericson, Jughandle Variant, and Suttler soils. Brody soils have a loamy-skeletal control section. Ericson soils have a fine-loamy argillic horizon. Suttler soils have an umbric epipedon. Jughandle Variant soils are somewhat poorly drained, are on bottom lands, and do not have a B2ir horizon.

Typical pedon of Jughandle loam in an area of Jughandle-Ericson association, about 2/3 mile north-north-

east of Elk City, about 400 feet south and 400 feet east of the center of sec. 23, T. 29 N., R. 8 E.

O1—3 inches to 1 inch; slightly decomposed litter.

O2—1 inch to 0; decomposed litter.

B2ir—0 to 11 inches; brown (7.5YR 5/4) loam, dark brown (7.5YR 3/4) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few fine and common very fine, medium, and coarse roots; about 35 percent volcanic ash with small pockets of nearly pure pyroclastic material; medium acid; abrupt wavy boundary.

IIC1—11 to 27 inches; pale brown (10YR 6/3) loam, yellowish brown (10YR 5/4) moist; weak coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; common fine interstitial pores; medium acid; clear wavy boundary.

IIC2—27 to 41 inches; light brown (7.5YR 6/4) and pale brown (10YR 6/3) sandy loam, strong brown (7.5YR 5/6) and yellowish brown (10YR 5/4) moist; massive; slightly hard, firm, slightly sticky and slightly plastic; few medium roots; many very fine tubular pores; medium acid; clear wavy boundary.

IIC3r—41 inches; decomposing gneiss.

The solum is 7 to 14 inches thick. Rock fragments make up 10 percent of some pedons. Reaction ranges from strongly acid to slightly acid. Depth to decomposing granitic rock is 40 to 60 inches.

The O horizon is absent in some disturbed areas; where present it is up to 3 inches thick. The B2ir horizon is yellowish brown or brown.

### Jughandle Variant

The Jughandle Variant series consists of very deep somewhat poorly drained soils. They formed in sandy and gravelly alluvium derived from granitic material. Jughandle Variant soils are on bottom lands in the higher valleys. Slopes are 0 to 3 percent. Average annual precipitation is about 30 inches, and the average annual air temperature is about 38 degrees F.

Jughandle Variant soils are similar to Jughandle soils and are near Ericson and Jughandle soils. Jughandle soils are somewhat excessively drained and have a B2ir horizon. Ericson soils are well drained and have a fine-loamy control section.

Typical pedon of Jughandle Variant silt loam, about 1 1/4 miles north of Elk City, about 1,000 feet north and 500 feet east of the southwest corner of sec. 14, T. 29 N., R. 8 E.

A11—0 to 9 inches; brown (10YR 5/3) silt loam, very dark grayish brown (10YR 3/2) moist, common fine distinct dark reddish brown (5YR 3/4), moist, mottles; weak medium granular structure; hard, friable, nonsticky and nonplastic; many very fine roots; medium acid; clear wavy boundary.

A12—9 to 15 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; common fine distinct dark reddish brown (5YR 3/4), moist, mottles; weak medium subangular blocky structure; hard, very friable, nonsticky and nonplastic; few very fine roots; many very fine tubular pores; large krotovina; medium acid; gradual wavy boundary.

IIC1—15 to 36 inches; very pale brown (10YR 7/3) sandy loam, dark grayish brown (10YR 4/2) moist; common fine distinct dark reddish brown (5YR 3/4), moist, mottles; massive; slightly hard, friable, nonsticky and nonplastic; few very fine roots; many very fine tubular and common medium interstitial pores; much mica; medium acid; clear wavy boundary.

IIC2—36 to 43 inches; light gray (2.5Y 7/2) sandy loam, dark grayish brown (2.5Y 4/2) moist; many medium prominent strong brown (7.5YR 5/6), moist, mottles; massive; slightly hard, friable, nonsticky and nonplastic; few very fine roots; common fine interstitial pores; medium acid; clear wavy boundary.

IIC3—43 to 52 inches; light gray (10YR 6/1) stream deposited sand, gray (10YR 5/1) moist; single grain; loose; few fine roots; medium acid; clear wavy boundary.

IIC4—52 to 60 inches; light gray (5Y 6/1) stream deposited sand and gravel, gray (N 5/1) moist; single grain; loose; few fine roots; strongly acid.

The solum is 10 to 20 inches thick. Reaction ranges from strongly acid to slightly acid. Depth to stratified sand or gravel is 40 to 60 inches.

The A horizon is very dark grayish brown, dark brown, dark grayish brown, or brown (moist).

### Keuterville series

The Keuterville series consists of very deep, well drained soils. They formed in basalt residuum and colluvium that have some loess mixed into the upper part. Keuterville soils are on uplands and canyon sides. Slopes are 7 to 90 percent. Average annual precipitation is about 24 inches, and average annual air temperature is about 47 degrees F.

Keuterville soils are similar to Bluesprings, Klickson, and Spokel soils and are near Bluesprings, De Masters, Klickson, Jacket, Lawyer, Riggins, and Sulloaf soils. Bluesprings soils have hue of 10YR in the argillic horizon. Klickson soils are frigid. Spokel soils do not have an argillic horizon. De Masters, Jacket, and Lawyer soils have a mollic epipedon that is pachic. Riggins soils are lithic. Sulloaf soils have a fine-loamy argillic horizon and are frigid.

Typical pedon of Keuterville gravelly loam, 25 to 40 percent slopes, about 8 miles south of Riggins, about 550 feet south and 450 feet east of the center of sec. 28, T. 23 N., R. 1 E.

O1—2 inches to 0; undecomposed and partially decomposed needles, leaves, and twigs; medium acid.



- A1—0 to 10 inches; dark brown (7.5YR 3/3) gravelly loam, very dark brown (7.5YR 2/2) moist; moderate fine subangular blocky and moderate medium granular structure; slightly hard, friable, slightly sticky and plastic; many fine and common coarse roots; many fine interstitial pores; about 10 percent gravel and 5 percent cobbles; slightly acid; clear wavy boundary.
- B1t—10 to 18 inches; brown (7.5YR 4/4) gravelly loam, dark brown (7.5YR 4/4) moist; moderate fine subangular blocky structure; slightly hard, friable, sticky and plastic; many fine and common coarse roots; many very fine tubular pores; about 10 percent gravel and 5 percent cobbles; thin nearly continuous clay films; neutral; clear wavy boundary.
- B21t—18 to 36 inches; brown (7.5YR 5/5) very gravelly silty clay loam, brown (7.5YR 4/4) moist; strong fine subangular blocky structure; hard, firm, very sticky and very plastic; common fine and coarse roots; many fine tubular pores; about 40 percent gravel and 5 percent cobbles; thick continuous clay films; slightly acid; gradual wavy boundary.
- B22t—36 to 60 inches; strong brown (7.5YR 5/6) very gravelly loam, brown (7.5YR 4/4) moist; moderate fine subangular blocky structure; hard, friable, sticky and plastic; few fine and coarse roots; common fine tubular pores; about 40 percent gravel and 10 percent cobbles; moderately thick continuous clay films; neutral.

The solum is 50 inches or more thick. Rock fragments make up 35 to 60 percent of the B2t horizon. Reaction is slightly acid or neutral.

The A horizon is dark brown and brown gravelly loam or very cobbly loam.

### Klickson series

The Klickson series consists of very deep, well drained soils. They formed in loess and material weathered from residuum and colluvium from Columbia River Basalt. Klickson soils are on north-facing canyonsides and the lower mountainsides. Slopes are 40 to 90 percent. Average annual precipitation is about 26 inches, and the average annual air temperature is about 42 degrees F.

Klickson soils are similar to Keuterville, Suloaf, and Wapshilla soils and are near Bluesprin, Keuterville, Lawyer, Suloaf, Telcher, Wapshilla, and Zaza soils. Keuterville, Bluesprin, and Lawyer soils are mesic. Lawyer soils have a mollic epipedon that is pachic. Suloaf and Telcher soils have a fine-loamy argillic horizon. Telcher and Wapshilla soils do not have a mollic epipedon. Zaza soils are lithic.

Typical pedon of Klickson silt loam in an area of Klickson-Bluesprin association, about 4 miles south of Cottonwood, about 800 feet west and 350 feet south of the northwest corner of the NE1/4SE1/4 sec. 30, T. 31 N., R. 1 E.

O—0.5 inch to 0; decomposed litter under moss.

A1—0 to 6 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; strong medium and coarse granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine, medium, and coarse roots; many fine interstitial pores; about 5 percent cobbles and 5 percent gravel; slightly acid; clear wavy boundary.

A3—6 to 15 inches; brown (10YR 4/3) cobbly silt loam, dark brown (7.5YR 3/2) moist; weak medium and coarse subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few very fine and many coarse roots; many very fine and fine tubular pores; about 10 percent cobbles and 5 percent gravel; large piece of charcoal; slightly acid; gradual wavy boundary.

B1—15 to 21 inches; brown (10YR 5/3) cobbly silt loam, dark yellowish brown (10YR 3/4) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and medium roots; many very fine tubular pores; about 15 percent cobbles and 10 percent gravel; slightly acid; gradual wavy boundary.

B21t—21 to 51 inches; brown (7.5YR 5/4) very cobbly loam, dark brown (7.5YR 3/4) moist; moderate fine and medium subangular blocky structure; hard, friable, sticky and plastic; few very fine, fine, and coarse roots; many very fine and fine tubular pores; few thin clay films on peds; several clayey bands 5 to 10 millimeters thick; few cleaned silt grains; about 20 percent cobbles and 20 percent gravel; slightly acid; clear wavy boundary.

IIB22tb—51 to 60 inches; brown (7.5YR 5/3) very cobbly clay, dark brown (7.5YR 4/3) moist; moderate medium angular blocky structure; very hard, firm, sticky and plastic; few very fine roots; common very fine tubular pores; about 30 percent cobbles and 20 percent gravel; thin nearly continuous clay films on peds; few pressure faces; slightly acid.

The solum is 60 inches or more thick. Rock fragments make up 35 to 55 percent of the B2t horizon.

The A horizon is dark grayish brown and brown silt loam or cobbly loam. The B2 horizon is brown or yellowish brown very cobbly loam or very cobbly clay. The IIB22tb horizon is absent in some areas.

### Kooskia series

The Kooskia series consists of very deep, moderately well drained soils. They formed in loess. Kooskia soils are on plateaus. Slopes are 3 to 25 percent. Average annual precipitation is about 23 inches, and the average annual air temperature is about 45 degrees F.

Kooskia soils are similar to Boles, Chicane, Nez Perce, and Shebang soils and are near Wilkins soils. Boles and Wilkins soils are frigid. Wilkins soils are somewhat poorly drained. Chicane soils have an average of more than 3.5 percent organic matter in the upper 20 inches. Nez

Perce soils do not have a B2 horizon above an A2 horizon. Shebang soils have a mollic epipedon less than 12 inches thick.

Typical pedon of Kooskia silt loam, low rainfall, 7 to 12 percent slopes, about 7 miles northeast of Grangeville, about 2,050 feet east and 1,150 feet south of the north-west corner of sec. 32, T. 31 N., R. 4 E.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; hard, friable, slightly sticky and slightly plastic; common fine roots; many fine interstitial pores; slightly acid; abrupt smooth boundary.

A12—6 to 9 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; weak fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine roots; many fine tubular pores; neutral; abrupt wavy boundary.

B2—9 to 14 inches; brown (10YR 5/3) silt loam, dark brown (10YR 3/3) moist; moderate fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine roots; many fine tubular pores; neutral; clear wavy boundary.

A2b—14 to 21 inches; light gray (10YR 7/2) silt loam, brown (10YR 5/3) moist; massive; hard, friable, non-sticky and slightly plastic; common fine roots; common fine tubular pores; many fine iron-manganese concretions, few larger than 2 millimeters; some yellowish brown (10YR 5/4) B2 material, dark yellowish brown (10YR 4/4) moist; neutral; abrupt wavy boundary.

B21tb—21 to 24 inches; yellowish brown (10YR 5/4) silty clay, dark yellowish brown (10YR 4/4) moist; moderate very fine angular blocky structure; very hard, very firm, sticky and very plastic; common fine roots; many fine tubular pores; thick continuous clay films; few slickensides; many fine iron-manganese concretions, few larger than 2 millimeters; neutral; clear wavy boundary.

B22tb—24 to 40 inches; brown (7.5YR 4/4) silty clay, brown (7.5YR 4/4) moist; weak very fine angular blocky structure; very hard, very firm, very sticky and very plastic; few fine roots; many fine tubular pores; common moderately thick clay films; neutral; gradual wavy boundary.

B23tb—40 to 60 inches; brown (7.5YR 5/4) silty clay, brown (7.5YR 5/4) moist; weak very fine and fine subangular blocky structure; very hard, very firm, very sticky and very plastic; no roots; many fine tubular pores; few moderately thick clay films; few pebbles and cobbles; mildly alkaline.

The solum is 60 inches or more thick. In some areas rock fragments make up as much as 5 percent of the B2tb horizon. Reaction is medium acid to neutral in the A horizon and slightly acid or neutral in the B horizon.

## Lawyer series

The Lawyer series consists of very deep, well drained soils. They formed in loess and residuum and colluvium from Columbia River Basalt or Seven Devils Volcanics. Lawyer soils are on north-facing canyonsides along the Salmon and Snake Rivers. Slopes are 40 to 90 percent. Average annual precipitation is about 20 inches, and average annual air temperature is 47 degrees F.

Lawyer soils are similar to Bluesprink and Jacket soils and are near Bluesprink, Keuterville, Klickson, Lickskillet, Riggins, and Tannahill soils. Bluesprink, Keuterville, Klickson, Lickskillet, Riggins, and Tannahill soils have a mollic epipedon that is not pachic. Klickson soils are frigid. Lickskillet and Riggins soils are lithic. Tannahill soils have secondary carbonates above a depth of 43 inches. Jacket soils have a clayey argillic horizon.

Typical pedon (fig. 12) of Lawyer silt loam in an area of Lawyer-Bluesprink association, about 9 miles southwest of Grangeville near U.S. 95 on the White Bird grade, at Poe Saddle, about 950 feet west and 1,570 feet south of the northeast corner of sec. 30, T. 29 N., R. 2 E.

A11—0 to 6 inches; very dark grayish brown (10YR 3/2) silt loam, very dark brown (10YR 2/2) moist; strong very fine and fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very

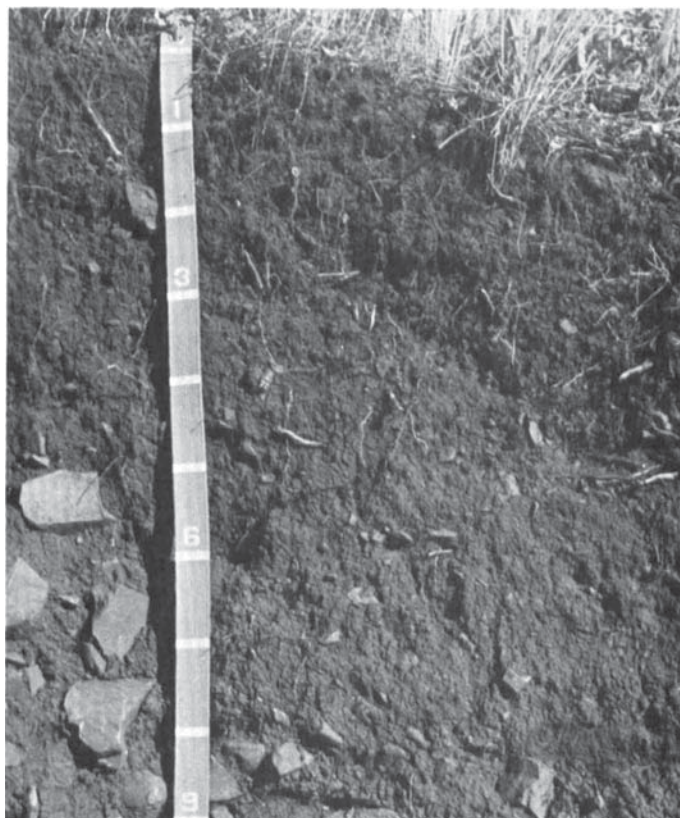


Figure 12.—Profile of Lawyer silt loam. (Scale in decimeters)



fine and fine and common medium roots; about 5 percent gravel and cobbles; neutral; clear wavy boundary.

A12—6 to 13 inches; very dark grayish brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; strong very fine, fine, and medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine and common medium and few coarse roots; about 5 percent gravel and 5 percent cobbles; neutral; clear wavy boundary.

A3—13 to 23 inches; very dark grayish brown (10YR 3/2) gravelly loam, very dark brown (10YR 2/2) moist; weak very fine, fine, and medium prismatic structure parting to moderate very fine and fine subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine and few medium and coarse roots; common very fine tubular pores; about 20 percent gravel and 5 percent cobbles; neutral; diffuse wavy boundary.

B21t—23 to 40 inches; dark grayish brown (10YR 4/2) very gravelly clay loam, very dark grayish brown (10YR 3/2) moist; strong very fine and fine subangular blocky structure; hard, firm, sticky and plastic; common very fine, fine, and medium and few coarse roots; common very fine tubular pores; many thin clay films on peds and in pores; about 40 percent gravel and 5 percent cobbles; neutral; gradual wavy boundary.

B22t—40 to 55 inches; dark grayish brown (10YR 4/2) very gravelly clay loam, dark grayish brown (10YR 4/2) moist; strong very fine and fine subangular blocky structure; hard, very firm, very sticky and very plastic; few very fine, fine, medium, and coarse roots; common very fine tubular pores; continuous thin clay films on peds and few moderately thick clay films in pores; about 50 percent gravel and 10 percent cobbles; neutral; clear wavy boundary.

B23t—55 to 72 inches; brown (10YR 5/3) very gravelly clay loam, dark brown (10YR 3/3) moist; strong very fine and fine subangular blocky structure; hard, firm, sticky and plastic; few very fine, fine, medium, and coarse roots; common very fine tubular pores; common moderately thick clay bridges between mineral grains; about 50 percent gravel and 10 percent cobbles; neutral.

The solum is 60 inches or more thick. Rock fragments make up 35 to 70 percent of the B2t horizon. Reaction is slightly acid or neutral.

The A horizon is very dark grayish brown or dark grayish brown. The B2t horizon is dark grayish brown, grayish brown, or brown.

### Lickskillet series

The Lickskillet series consists of shallow, well drained soils. They formed in some loess mixed with material weathered from Columbia River Basalt or Seven Devils Volcanics. Lickskillet soils are on lower, south-facing

Snake River and Salmon River canyonsides. Slopes are 7 to 90 percent. Average annual precipitation is about 14 inches, and the average annual air temperature is about 52 degrees F.

Lickskillet soils are similar to Flybow and Riggins soils and are near Banner, Bluesprin, Lawyer, and Tannahill soils. Flybow soils do not have a mollic epipedon. Riggins soils are usually moist and have an argillic horizon. Banner, Bluesprin, Lawyer, and Tannahill soils are moderately deep to very deep and have an argillic horizon. Banner soils also have a clayey argillic horizon. Lawyer soils have a mollic epipedon that is pachic.

Typical pedon (fig. 13) of Lickskillet gravelly clay loam in an area of Tannahill-Lickskillet complex, about 2 miles

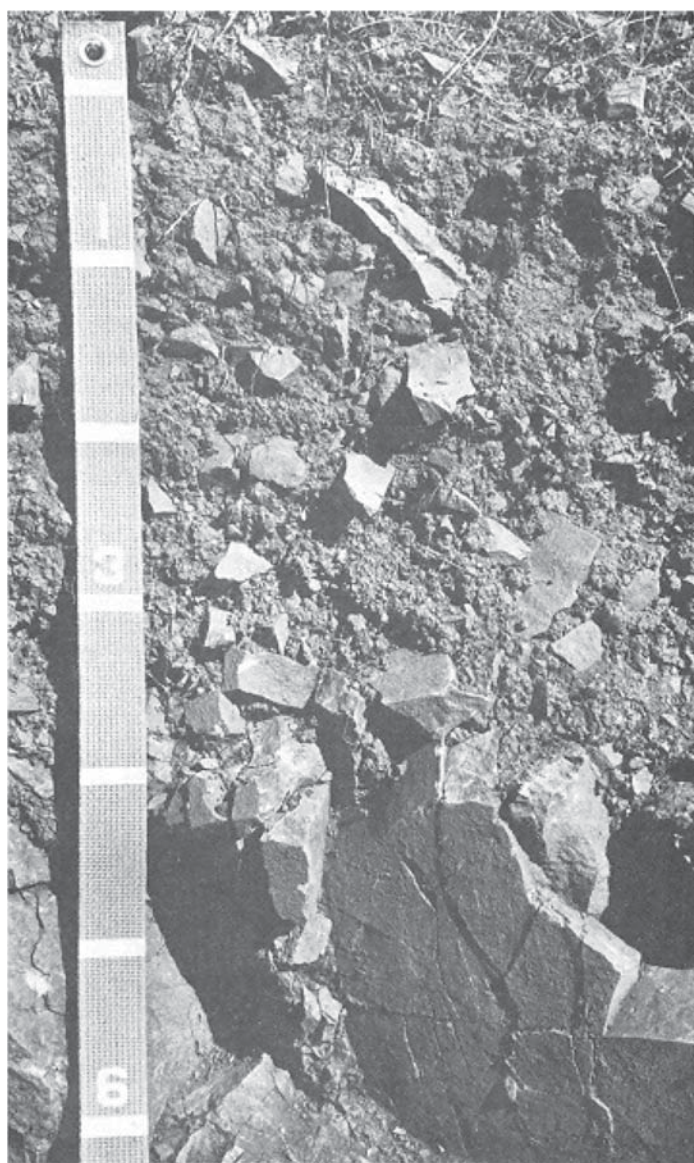


Figure 13.—Profile of Lickskillet gravelly clay loam. Bedrock is at a depth of 10 to 20 inches (2 1/2 to 5 dm). (Scale in decimeters)



south of White Bird, about 440 feet south and 390 feet west of the northeast corner of sec. 27, T. 28 N.

### Meland series

The Meland series consists of moderately deep, well drained soils. They formed in loess and basalt residuum. Meland soils are on uplands. Slopes are 3 to 40 percent. Average annual precipitation is about 22 inches, and the average annual air temperature is about 46 degrees F.

Meland soils are similar to Bluesprin, Brownlee, Suloaf, and Uhlorn soils and are near Bluesprin, De Masters, Ferdinand, Flybow, Nez Perce, Riggins, Suloaf, and Uhlorn soils. Bluesprin, Riggins, and Flybow soils have a loamy-skeletal control section. Riggins and Flybow soils are lithic. Brownlee and Suloaf soils are deep. Suloaf soils are frigid. Uhlorn soils are very deep and have a fine-silty argillic horizon. De Masters soils are frigid and have a mollic epipedon that is pachic. Ferdinand soils have a clayey-skeletal argillic horizon. Nez Perce soils have a clayey argillic horizon.

Typical pedon of Meland silt loam in an area of Riggins-Meland complex, about 5 miles southwest of Boles, about 600 feet east and 130 feet north of southwest corner of sec. 10, T. 29 N., R. 2 W.

- A11—0 to 4 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; moderate thin and medium platy structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; few very fine interstitial pores; about 1 percent gravel; slightly acid; clear smooth boundary.
- A12—4 to 10 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; moderate fine and medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine roots; few very fine interstitial pores; about 1 percent gravel; slightly acid; gradual smooth boundary.
- A13—10 to 16 inches; grayish brown (10YR 5/2) silt loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; few medium roots; few very fine tubular pores; about 2 percent gravel; slightly acid; gradual smooth boundary.
- B1t—16 to 21 inches; brown (10YR 5/3) silt loam, dark yellowish brown (10YR 3/4) moist; weak fine subangular blocky structure; hard, firm, slightly sticky and plastic; few fine roots; few very fine tubular pores; few thin clay films on peds; about 2 percent gravel; slightly acid; gradual smooth boundary.
- B2lt—21 to 27 inches; brown (10YR 5/3) clay loam, dark yellowish brown (10YR 3/4) moist; moderate fine and medium subangular blocky structure; hard, firm, sticky and plastic; few fine roots; few very fine tubular pores; many thick clay films on peds; about 5 percent gravel; slightly acid; clear smooth boundary.

B22t—27 to 32 inches; light yellowish brown (10YR 6/4) clay loam, dark brown (10YR 4/3) moist; strong fine and medium subangular blocky structure; very hard, very firm, very sticky and very plastic; few fine roots; few very fine tubular pores; many moderately thick clay films on peds and in pores; about 10 percent gravel; medium acid; clear smooth boundary.

R—32 inches; basalt bedrock, weathered and fractured in the upper 7 inches; light yellowish brown (10YR 6/4) clay loam in fractures; few fine roots.

Thickness of the solum and depth to bedrock are 20 to 40 inches. Rock fragments make up 5 to 30 percent of the upper 20 inches of the B2 horizon. Reaction is medium acid or slightly acid.

The A horizon is dark grayish brown, dark brown, or grayish brown. The B2 horizon is brown, yellowish brown, and light yellowish brown clay loam or gravelly clay loam.

### Naz series

The Naz series consists of very deep, well drained soils. They formed in loess and material weathered from granitic rock. Naz soils are on the high plateaus, mountain foot slopes, and north-facing canyonsides. Slopes are 25 to 90 percent. Average annual precipitation is about 26 inches, and the average annual air temperature is about 43 degrees F.

Naz soils are similar to Nazaton, Oland Variant, and Suttler soils and are near Johnson, Nazaton, Spokel, and Suttler soils. Nazaton and Spokel soils have a loamy-skeletal control section. Oland Variant soils are mesic. Suttler soils do not have a mollic epipedon. Johnson soils have an argillic horizon.

Typical pedon of Naz sandy loam in an area of Nazaton-Naz complex, about 8 miles east-southeast of Riggins, about 1,260 feet north and 1,460 feet east of the southwest corner of sec. 25, T. 24 N., R. 2 E.

- O1—1 inch to 0; fresh and partially decomposed needles, leaves and twigs.
- A11—0 to 7 inches; dark grayish brown (10YR 4/2) sandy loam, black (10YR 2/1) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; many fine and common coarse roots; many fine interstitial pores; about 5 percent gravel; neutral; gradual smooth boundary.
- A12—7 to 24 inches; grayish brown (10YR 5/2) sandy loam, very dark brown (10YR 2/2) moist; weak fine subangular blocky and moderate fine granular structure; soft, very friable, nonsticky and nonplastic; many fine and common coarse roots; many fine interstitial pores; neutral; gradual smooth boundary.
- C1—24 to 36 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium subangular blocky and weak fine granular structure; slightly hard, very friable,



nonsticky and nonplastic; common fine and few coarse roots; many fine interstitial pores; neutral; gradual smooth boundary.

C2—36 to 65 inches; pale brown (10YR 6/3) sandy loam, dark brown (10YR 3/3) moist; weak fine subangular blocky and weak fine granular structure; slightly hard, very friable, nonsticky and nonplastic; few fine and coarse roots; many fine interstitial pores; medium acid.

The solum is 16 to 30 inches thick. Rock fragments make up as much as 15 percent of the soil between depths of 10 and 40 inches. Reaction of the C horizon ranges from medium acid to neutral.

The A1 horizon is dark grayish brown, grayish brown, or brown. The C horizon is pale brown, brown, or grayish brown sandy loam or loam.

### Nazaton series

The Nazaton series consists of very deep, well drained soils. They formed in loess and colluvium and residuum from granitic rock. Nazaton soils are on steep, north-facing canyonsides and mountainsides around Salmon River. Slopes are 40 to 90 percent. Average annual precipitation is about 26 inches, and average annual air temperature is about 43 degrees F.

Nazaton soils are similar to Naz, Oland, and Spokel soils and are near Brower, Jughandle, Naz, Oland, Spokel, Suttler, and Wapshilla soils. Naz, Jughandle, and Suttler soils have a coarse-loamy control section. Suttler soils do not have a mollic epipedon. Oland, Spokel, and Brower soils are mesic. Spokel and Brower soils have a mollic epipedon that is not pachic. Wapshilla soils do not have a mollic epipedon.

Typical pedon of Nazaton gravelly loam in an area of Spokel-Nazaton association, about 7 1/2 miles south of White Bird, about 2,300 feet north and 2,000 feet east of the southwest corner of sec. 21, T. 27 N., R. 1 E.

O1—3 inches to 1 inch; fresh and partially decomposed needles and twigs; medium acid.

O2—1 inch to 0; decomposed organic material; slightly acid.

A11—0 to 3 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark brown (10YR 2/2) moist; moderate very fine and fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium and coarse roots; many fine interstitial pores; about 15 percent gravel and 5 percent cobbles; slightly acid; abrupt smooth boundary.

A12—3 to 20 inches; dark brown (10YR 4/3) gravelly loam, dark brown (7.5YR 3/3) moist; weak fine and medium subangular blocky and weak fine and medium granular structure; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine and few medium and coarse roots; many fine interstitial pores; about 25 percent gravel and 5 percent

cobbles; slightly acid; abrupt smooth boundary.

B1—20 to 35 inches; brown (10YR 5/3) very gravelly loam, dark brown (10YR 3/3) moist; weak fine and medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few very fine, fine, medium, and coarse roots; common very fine and fine tubular pores; about 40 percent gravel and 10 percent cobbles; neutral; gradual smooth boundary.

B21—35 to 46 inches; light yellowish brown (10YR 6/4) very gravelly loam, dark yellowish brown (10YR 4/4) moist; weak medium and coarse subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots; common fine tubular pores; about 50 percent gravel and 10 percent cobbles; neutral; clear wavy boundary.

B22—46 to 50 inches; light brown (7.5YR 6/4) very gravelly sandy loam, brown (7.5YR 4/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; few fine and medium roots; few fine tubular pores; about 50 percent gravel and 10 percent cobbles; neutral; clear wavy boundary.

C—50 to 68 inches; light yellowish brown (10YR 6/4) very gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; few fine roots; common fine tubular pores; about 60 percent gravel and 25 percent cobbles; neutral.

The solum is 30 to 60 inches thick. Rock fragments make up 35 to 70 percent of the soil between depths of 10 and 40 inches. Reaction ranges from medium acid to neutral.

The A horizon is dark grayish brown, dark brown, or brown. The B horizon is brown, light yellowish brown, or light brown very gravelly loam and very gravelly sandy loam.

### Nez Perce series

The Nez Perce series consists of very deep, moderately well drained soils. They formed in loess that has some residuum weathered from basalt and granite in the lower part. Nez Perce soils are on the prairie on the plateau north and west of Grangeville. Slopes are 2 to 25 percent. Average annual precipitation is about 22 inches, and the average annual air temperature is about 46 degrees F.

Nez Perce soils are similar to Boles, Chicane, Kooskia, Shebang, and Wilkins soils and are near Brower, Chicane, Fenn, Ferdinand, Uhlorn, Westlake, and Wilkins soils. Boles, Wilkins, and Westlake soils are frigid. Wilkins and Westlake soils are somewhat poorly drained. Chicane soils have a mollic epipedon that is pachic. Kooskia soils have a B2 horizon above the A2 horizon. Shebang soils have a mollic epipedon less than 12 inches thick. Brower soils have a loamy-skeletal control section and do not have an A2 horizon. Fenn soils are

Vertisols. Ferdinand soils have a clayey-skeletal control section and do not have an A2 horizon. Uhlorn soils have a fine-silty control section and do not have an A2 horizon.

Typical pedon (fig. 14) of Nez Perce silt loam, 2 to 7 percent slopes, about 2 miles south of Cottonwood, about 1,400 feet west and 120 feet south of the northeast corner of sec. 20, T. 31 N., R. 1 E.

Ap—0 to 6 inches; dark gray (10YR 4/1) silt loam, black (10YR 2/1) moist; strong fine and very fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine and few medium roots; many very fine interstitial pores; slightly acid; clear wavy boundary.

A12—6 to 11 inches; dark gray (10YR 4/1) silt loam, black (10YR 2/1) moist; weak fine subangular blocky structure parting to weak fine granular; slightly hard, friable, slightly sticky and slightly plastic;

many very fine and fine and few medium roots; many very fine interstitial pores; few worm holes and grayish brown (10YR 3/2) casts; slightly acid; clear wavy boundary.

A13—11 to 14 inches; grayish brown (10YR 5/2) silt loam, very dark brown (10YR 2/2) moist; moderate medium and coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; many very fine and fine and few medium and coarse tubular pores; slightly acid; clear wavy boundary.

A14—14 to 17 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak medium and coarse subangular blocky structure parting to moderate fine and medium angular blocky; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; many very fine and fine and few medium and coarse tubular pores; few black and dark brown iron and manganese concretions; some mixing of dark A12 material; neutral; clear wavy boundary.

A2b—17 to 20 inches; light brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; few medium faint dark brown (10YR 4/3), moist, mottles; very weak medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; few very fine roots; many very fine and fine and few medium and coarse tubular pores; common black and dark brown iron manganese concretions; trace of very fine gravel; few large krotovinas filled with A1 material; neutral; abrupt smooth boundary.

B21tb—20 to 26 inches; pale brown (10YR 6/3) silty clay, dark brown (10YR 4/3) moist; grayish brown (10YR 5/2) coatings on peds, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to strong medium angular blocky; very hard, firm, sticky and plastic; few very fine roots, mostly between peds; few very fine and fine tubular pores; many moderately thick clay films on surfaces of peds and pores, films are about 1 unit darker in value than matrix; common black and dark brown iron and manganese concretions; about 5 percent very fine gravel; neutral; clear wavy boundary.

B22tb—26 to 30 inches; brown (7.5YR 5/3) silty clay, dark brown (7.5YR 4/3) moist; moderate medium and coarse prismatic structure parting to strong fine and medium subangular blocky; extremely hard, very firm, very sticky and very plastic; few very fine roots mostly between peds; few very fine and fine tubular pores; many moderately thick clay films on surfaces of peds and pores; few black and dark brown iron and manganese concretions; about 5 percent very fine gravel; mildly alkaline; clear wavy boundary.

B23tcab—30 to 42 inches; brown (10YR 5/3) silty clay, dark brown (10YR 4/3) moist; moderate medium prismatic structure parting to weak medium suban-

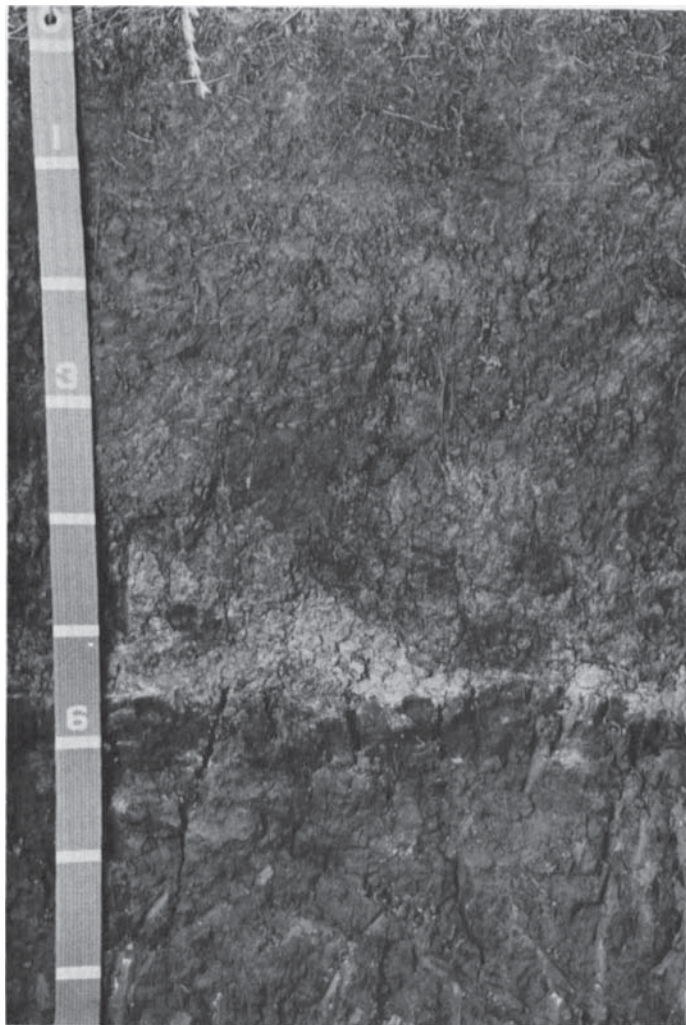


Figure 14.—Profile of Nez Perce silt loam. The fine textured subsoil is at a depth of 14 to 25 inches (3 1/2 to 6 dm). (Scale in decimeters)



gular blocky; extremely hard, very firm, very sticky and very plastic; few very fine roots, mostly between peds; few very fine and fine tubular pores; many moderately thick clay films on surfaces of peds and pores; about 10 percent fine and very fine gravel; common lime veins and pockets; mildly alkaline; clear wavy boundary.

B3tcab—42 to 69 inches; light brownish gray (10YR 6/2) light silty clay, dark grayish brown (10YR 4/2) moist; moderate medium angular blocky structure; extremely hard, very firm, sticky and plastic; few very fine roots; few very fine and fine tubular pores; many moderately thick clay films on surfaces of peds and pores; about 10 percent gravel; moderately calcareous; moderately alkaline; clear wavy boundary.

R—69 inches; lime-coated basalt bedrock.

The solum is 60 inches or more thick. In some areas rock fragments make up as much as 10 percent of the B2t horizon. Reaction is slightly acid or neutral in the A horizon and neutral to moderately alkaline in the B2tb horizon.

The A1 horizon is dark gray and grayish brown. The B2tb horizon is pale brown, brown, and light brownish gray silty clay loam, silty clay, clay loam, or clay. Depth to the B2tb horizon is 14 to 25 inches.

## Nicodemus series

The Nicodemus series consists of very deep, moderately well drained soils. They formed in mixed sandy, gravelly, and cobbly alluvium. Nicodemus soils are on bottom lands, low terraces, and alluvial fans mainly along the Clearwater River. Slopes are 0 to 3 percent. Average annual precipitation is about 25 inches, and the average annual air temperature is about 51 degrees F.

Nicodemus soils are similar to Nicodemus Variant, Oland, and Westlake soils and are near Jacket Variant, Nicodemus Variant, and Westlake soils. Nicodemus Variant soils have a coarse-loamy control section. Oland and Jacket Variant soils are well drained. Jacket Variant soils have a fine-silty control section. Westlake soils are somewhat poorly drained and have a fine-silty control section.

Typical pedon of Nicodemus loam, near Kamiah, about 1,650 feet south and 250 feet east of the northwest corner of sec. 7, T. 33 N., R. 4 E.

A11—0 to 2 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak thin platy structure parting to moderate fine granular; soft, friable, slightly sticky and slightly plastic; many very fine and few fine roots; many very fine and fine interstitial pores; about 5 percent gravel; few worm holes and casts; medium acid; clear smooth boundary.

A12—2 to 9 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; moderate

fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and few fine roots; common very fine and fine and few medium tubular pores; about 5 percent gravel; few worm holes and casts; medium acid.

IIA13—9 to 25 inches; dark grayish brown (10YR 4/2) very cobbly loam, very dark brown (10YR 2/2) moist; weak fine subangular blocky structure parting to moderate fine granular; soft, friable, slightly sticky and slightly plastic; common very fine and few fine medium roots; common very fine and few fine tubular pores; and many very fine and fine interstitial pores; about 20 percent cobbles and 25 percent gravel; slightly acid.

IIIC—25 to 60 inches; stratified layers of sand, gravel, and cobbles; single grain; loose.

The solum is 20 to 40 inches thick. Rock fragments make up 35 to 60 percent of the soil between depths of 10 and 40 inches. Reaction is strongly acid to neutral. The A horizon is grayish brown or dark grayish brown.

## Nicodemus Variant

The Nicodemus Variant consists of very deep, moderately well drained soils. They formed in alluvium from mixed sources, mainly loess and basalt. Nicodemus Variant soils are on bottom lands and alluvial terraces. Slopes are 0 to 3 percent. Average annual precipitation is about 25 inches, and the average annual air temperature is about 51 degrees F.

Nicodemus Variant soils are similar to Nicodemus, Oland Variant, and Westlake soils and are near Nicodemus soils. Nicodemus soils have a loamy-skeletal control section. Oland Variant soils are well drained and have a mollic epipedon that is pachic. Westlake soils have a fine-silty control section and are frigid.

Typical pedon of Nicodemus Variant loam, near Kamiah, about 1,560 feet south and 500 feet west of the northeast corner of sec. 12, T. 33 N., R. 3 E.

Ap—0 to 4 inches; dark gray (10YR 4/1) loam, black (10YR 2/1) moist; weak fine subangular blocky structure parting to moderate very fine and fine granular; soft, friable, slightly sticky and slightly plastic; many very fine, common fine, and few medium roots; many very fine and fine interstitial and tubular pores; about 2 percent gravel; slightly micaceous; slightly acid; clear wavy boundary.

A12—4 to 12 inches; dark gray (10YR 4/1) loam, black (10YR 2/1) moist; weak coarse prismatic structure parting to weak fine granular; slightly hard, friable, slightly sticky and slightly plastic; common very fine and few fine and medium roots; many very fine and fine and few medium tubular pores; about 2 percent gravel; slightly micaceous; many worm holes and casts; slightly acid; gradual wavy boundary.

A13—12 to 30 inches; dark grayish brown (10YR 4/2) loam, black (10YR 2/1) moist; weak very fine granular structure; soft, very friable, slightly sticky and slightly plastic; common very fine and few fine and medium pores; about 2 percent gravel; slightly micaceous; many worm holes and casts; one 3-inch krotovina; neutral; gradual wavy boundary.

C1—30 to 50 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; common medium distinct dark yellowish brown (10YR 3/4 moist) mottles; massive; slightly hard, friable, slightly sticky and slightly plastic; common very fine and few fine and medium roots; many very fine and fine and common medium and coarse pores; about 5 percent gravel; neutral; gradual smooth boundary.

C2—50 to 60 inches; brown (10YR 5/3) gravelly loam, very dark grayish brown (10YR 3/2) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; about 25 percent gravel; neutral.

The solum is 20 to 40 inches thick. Between depths of 10 and 40 inches, the soil is a trace to 20 percent rock fragments and 10 to 18 percent clay. Reaction is medium acid to neutral.

The A horizon is gray, dark gray, dark grayish brown, or grayish brown loam and cobbly loam. The C horizon is dark grayish brown, brown, or yellowish brown and is loam in the upper part and stratified gravelly loam to very cobbly loam in the lower part.

## Oland series

The Oland series consists of very deep, well drained soils. They formed in loess and weathered colluvium and residuum from granitic rock. Oland soils are on steep canyonsides and canyon benches around the community of Riggins. Slopes are 10 to 90 percent. Average annual precipitation is about 18 inches, and the average annual air temperature is about 46 degrees F.

Oland soils are similar to Brower, Nazaton, Nicodemus, Oland Variant, and Spokel soils and are near Brower, Brownlee, Nazaton, and Oland Variant soils. Brower, Spokel, and Brownlee soils have a mollic epipedon that is not pachic. Brownlee soils have a fine-loamy argillic horizon. Nazaton soils are cryic. Nicodemus soils are moderately well drained and have a mollic epipedon that is cumulic. Oland Variant soils have a coarse-loamy control section.

Typical pedon of Oland silt loam, 40 to 90 percent slopes, about 6 miles south of Riggins, about 1,490 feet north and 580 feet east of the southwest corner of sec. 20, T. 23 N., R. 1 E.

A11—0 to 4 inches; very dark grayish brown (10YR 3/2) silt loam, black (10YR 2/1) moist; moderate fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and few coarse

roots; about 2 percent fine gravel; neutral; clear wavy boundary.

A12—4 to 11 inches; very dark grayish brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and few coarse roots; about 10 percent fine gravel; slightly acid; clear wavy boundary.

B1—11 to 26 inches; dark brown (10YR 4/3) gravelly loam, dark brown (10YR 3/3) moist; moderate fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine and few coarse roots; about 20 percent gravel; slightly acid; gradual wavy boundary.

B2—26 to 40 inches; brown (10YR 4/3) very gravelly loam, dark yellowish brown (10YR 3/4) moist; moderate very fine subangular blocky structure; slightly hard, very friable, nonsticky and slightly plastic; many very fine and fine and few coarse roots; about 50 percent gravel and 5 percent cobbles; slightly acid; clear wavy boundary.

C—40 to 70 inches; very dark grayish brown (10YR 3/2) very gravelly sandy loam, very dark brown (10YR 2/2) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few fine roots; about 80 percent gravel and 15 percent cobbles; slightly acid.

The solum is 20 to 50 inches thick. Rock fragments make up 35 to 60 percent of the soil between depths of 10 and 40 inches. Reaction of the A horizon is slightly acid or neutral.

The A1 horizon is very dark grayish brown or dark grayish brown. The B horizon is brown or dark brown.

## Oland Variant

The Oland Variant consists of very deep, well drained soils. They formed in residuum from granitic rock. Oland Variant soils are on sloping benches. Slopes are 10 to 30 percent. Average annual precipitation is about 18 inches, and the average annual air temperature is about 47 degrees F.

Oland Variant soils are similar to Jacket Variant, Naz, Nicodemus Variant, and Oland soils and are near Brower and Oland soils. Jacket Variant soils have a fine-silty control section. Naz soils are cryic. Nicodemus Variant soils are moderately well drained and have a mollic epipedon that is cumulic. Oland and Brower soils have a loamy-skeletal control section. Brower soils have a mollic epipedon that is not pachic.

Typical pedon of Oland Variant loam, 10 to 30 percent slopes, about 7 miles south of Riggins, about 925 feet west and 1,060 feet north of the southeast corner of sec. 29, T. 23 N., R. 1 E.

A11—0 to 7 inches; very dark grayish brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; moderate fine and very fine granular structure; slightly hard,



very friable, nonsticky and nonplastic; many very fine roots; many fine interstitial pores; neutral; gradual wavy boundary.

A12—7 to 27 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak fine subangular blocky and moderate fine and very fine granular structure; hard, very friable, nonsticky and nonplastic; common very fine roots; many fine tubular pores; neutral; gradual wavy boundary.

B1—27 to 35 inches; brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; hard, very friable, slightly sticky and slightly plastic; few very fine roots; many fine and few coarse tubular pores; neutral; clear wavy boundary.

B2t—35 to 50 inches; dark brown (10YR 4/3) loam, dark brown (10YR 4/3) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine roots; many fine and few coarse tubular pores; few thin clay films; neutral; gradual wavy boundary.

C—50 to 62 inches; yellowish brown (10YR 5/4) loam, dark brown (7.5YR 4/3) moist; weak medium subangular blocky structure; slightly hard, friable, nonsticky and slightly plastic; few medium roots; few coarse pores; neutral.

The solum is 30 to 60 inches thick. Reaction ranges from neutral to slightly acid.

The A horizon is very dark grayish brown and dark grayish brown and is 20 to 35 inches thick. It contains up to 5 percent gravel. The B horizon is brown, dark brown, and yellowish brown loam that has gravelly layers in some pedons. Clay films are either absent or are few and thin.

### Riggins series

The Riggins series consists of shallow, well drained soils. They formed in some loess mixed with residuum and colluvium from Columbia River Basalt or Seven Devils Volcanics. Riggins soils are on south-facing side slopes. Slopes are 7 to 40 percent. Average annual precipitation is about 18 inches, and the average annual air temperature is about 48 degrees F.

Riggins soils are similar to Bluesprin, Flybow, Lickskillet, and Zaza soils and are near Bluesprin, De Masters, Ferdinand, Flybow, Keuterville, Lawyer, and Meland soils. Bluesprin soils are moderately deep. Flybow and Zaza soils do not have a mollic epipedon or an argillic horizon. Lickskillet soils are usually dry. De Masters soils are deep and have a mollic epipedon that is pachic. Ferdinand soils are moderately deep and have a clayey-skeletal argillic horizon. Keuterville soils are very deep. Lawyer soils are very deep and have a mollic epipedon that is pachic. Meland soils are moderately deep and have a fine-loamy argillic horizon.

Typical pedon (fig. 15) of Riggins very gravelly silt loam in an area of Ferdinand-Flybow-Riggins complex, about 7 1/2 miles southwest of Boles, about 2,000 feet



Figure 15.—Profile of Riggins very gravelly silt loam. Bedrock is at a depth of 10 to 20 inches.

east and 750 feet north of the southwest corner of sec. 17, T. 29 N., R. 2 W.

A1—0 to 8 inches; dark grayish brown (10YR 4/2) very gravelly silt loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; many fine interstitial pores; about 30 percent gravel and 10 percent cobbles; neutral; gradual wavy boundary.

B2t—8 to 13 inches; brown (10YR 4/3) very gravelly clay loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; hard, firm, sticky and plastic; common very fine and fine roots; many very fine and fine tubular pores; moderately thick nearly continuous clay films; about 35 percent gravel and 10 percent cobbles; neutral; clear wavy boundary.

R—13 inches; basalt bedrock.

Thickness of the solum and depth to bedrock are 10 to 20 inches. Rock fragments make up 35 to 65 percent of the solum. Reaction is slightly acid to neutral.

The B horizon is brown or yellowish brown very gravelly clay loam or very gravelly loam.

### Shebang series

The Shebang series consists of very deep, moderately well drained soils. They formed in loess mixed with some basalt residuum. Shebang soils are on the prairie on a plateau north and west of Grangeville. Slopes are 2 to 25 percent. Average annual precipitation is about 22 inches, and the average annual air temperature is about 46 degrees F.

Shebang soils are similar to Chicane, Fenn, Kooskia, Nez Perce, and Wilkins soils and are near Fenn, Ferdinand, Nez Perce, and Wilkins soils. Those soils have a mollic epipedon more than 12 inches thick. Fenn soils are Vertisols. Wilkins soils are somewhat poorly drained and are frigid. Ferdinand soils have a clayey-skeletal argillic horizon and do not have an A2 horizon.

Typical pedon (fig. 16) of Shebang silt loam, 2 to 7 percent slopes, about 6 miles west of Grangeville, about 75 feet south and 360 feet west of the northeast corner of the NW1/4NE1/4 sec. 18, T. 30 N., R. 2 E.

Ap—0 to 6 inches; dark gray (10YR 4/1) silt loam, black (10YR 2/1) moist; weak fine granular structure; hard, friable, slightly sticky and slightly plastic; few very fine roots; slightly acid; abrupt smooth boundary.

A12—6 to 9 inches; dark gray (10YR 4/1) silt loam, black (10YR 2/1) moist; weak fine and medium granular structure; hard, friable, slightly sticky and slightly plastic; common very fine roots; medium acid; abrupt wavy boundary.

A2—9 to 10 inches; gray (10YR 5/1) silt loam, very dark gray (10YR 3/1) moist; massive; hard, friable, slightly sticky and slightly plastic; common very fine roots; many very fine tubular pores; many iron and manganese concretions about 1 millimeter in diameter; neutral; abrupt wavy boundary.

B21tb—10 to 23 inches; very dark gray (10YR 3/1) clay, very dark gray (10YR 3/1) moist; strong very coarse prismatic structure parting to strong medium and coarse angular blocky; extremely hard, very firm, very sticky and very plastic; common very fine roots; many very fine tubular pores; continuous thin clay films on surfaces of pores and common thin clay films on peds; few iron and manganese concretions about 1 millimeter in diameter; few small pressure faces oriented about 20 degrees from horizontal; mildly alkaline; clear wavy boundary.

B22tcab—23 to 36 inches; dark grayish brown (10YR 4/2) clay, dark grayish brown (10YR 4/2) moist; moderate very coarse prismatic structure parting to strong fine and medium angular blocky; extremely hard, very firm, very sticky and very plastic; few very fine roots; many very fine tubular pores; continuous

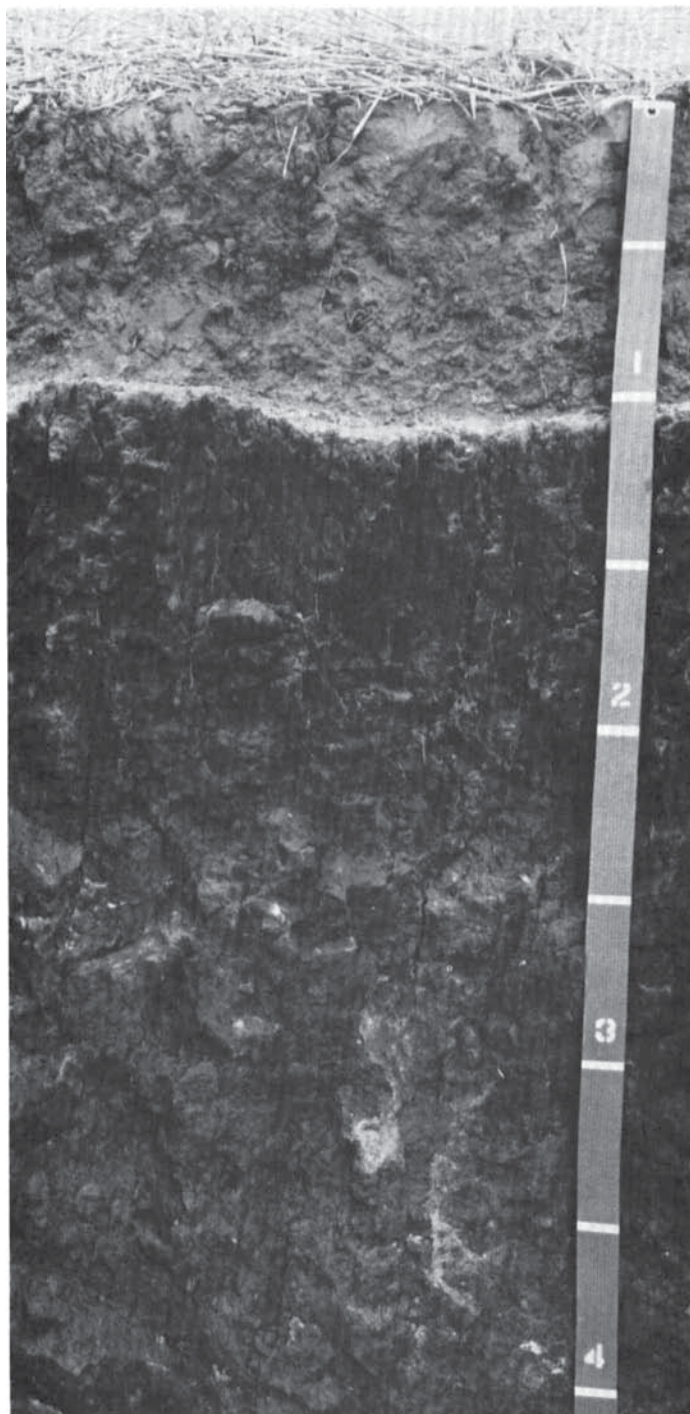


Figure 16.—Profile of Shebang silt loam. The fine textured subsoil is at a depth of 8 to 14 inches. (Scale in feet)

thin clay films on surfaces of pores and common thin clay films on peds; few iron and manganese concretions about 1 millimeter in diameter; few organic coatings on faces of peds; many slickensides and wedgeshaped aggregates oriented about 45 degrees from horizontal, some intersect; large pockets



of lime, noncalcareous matrix; strongly alkaline; gradual wavy boundary.

B23tcab—36 to 46 inches; brown (10YR 5/3) clay, brown (10YR 5/3) moist; weak very coarse prismatic structure parting to fine and medium angular blocky; very hard, very firm, very sticky and very plastic; few very fine roots; many very fine tubular pores; continuous thin clay films on surfaces of pores; large pockets of lime, noncalcareous matrix; moderately alkaline; gradual wavy boundary.

B24tcab—46 to 55 inches; brown (10YR 5/3) clay, dark brown (10YR 4/3) moist; strong fine and medium angular blocky structure; very hard, very firm, very sticky and very plastic; few very fine roots; many very fine tubular pores; continuous thin clay films on surfaces of pores; many small slickensides and wedge-shaped aggregates oriented about 45 degrees from horizontal, some intersect; small pockets of lime, noncalcareous matrix; moderately alkaline; clear wavy boundary.

B25tcab—55 to 65 inches; brown (10YR 5/3) clay, dark brown (10YR 4/3) moist; moderate fine and medium subangular blocky structure; very hard, very firm, very sticky and very plastic; few very fine roots; many very fine tubular pores; continuous thin clay films on surfaces of pores; small pockets of lime, slightly calcareous matrix; strongly alkaline.

The solum is 60 inches or more thick. In places rock fragments make up as much as 10 percent of the B2t horizon. Reaction of the A horizon ranges from medium acid to neutral, and reaction of the B2t horizon ranges from mildly alkaline to strongly alkaline.

The A1 horizon is dark gray or very dark gray. The B horizon is very dark gray, dark grayish brown, brown, or dark brown clay or silty clay. Depth to the B horizon is 8 to 14 inches.

### Spokel series

The Spokel series consists of very deep, well drained soils. They formed in residuum and colluvium from granitic rock. Spokel soils are on canyonsides, mainly along the Salmon River drainages. Slopes are 40 to 90 percent. Average precipitation is about 24 inches, and the average annual air temperature is about 46 degrees F.

Spokel soils are similar to Brower, Keuterville, Nazaton, and Oland soils and are near Brower, Brownlee, Johnson, Nazaton, Oland, Suttler, and Wapshilla soils. Brower soils do not have a B2 horizon and have more than 75 percent base saturation in the upper 30 inches. Keuterville, Brownlee, Johnson, and Wapshilla soils have an argillic horizon. Brownlee and Johnson soils have a fine-loamy control section. Wapshilla soils are cryic. Nazaton soils have a mollic epipedon that is pachic and they are cryic. Oland soils have a mollic epipedon that is pachic. Suttler soils have an umbric epipedon and have a coarse-loamy control section.

Typical pedon of Spokel very gravelly loam in an area of Spokel-Nazaton association, about 2 miles south of White Bird, about 850 feet west and 1,450 feet south of the northeast corner of sec. 28, T. 27 N., R. 1 E.

O1—2 inches to 1 inch; fresh and partially decomposed needles and twigs; neutral.

O2—1 inch to 0; well decomposed organic litter; medium acid.

A11—0 to 3 inches; grayish brown (10YR 5/2) very gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots; many very fine interstitial pores; about 60 percent gravel; slightly acid; clear smooth boundary.

A12—3 to 10 inches; grayish brown (10YR 5/2) very gravelly loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure parting to moderate fine and medium granular; soft, very friable, nonsticky and nonplastic; many very fine and few medium roots; common very fine interstitial pores; about 65 percent gravel; neutral; gradual smooth boundary.

B21—10 to 20 inches; pale brown (10YR 6/3) very gravelly sandy loam, dark brown (10YR 4/3) moist; moderate fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and few medium roots; common very fine tubular pores; about 70 percent gravel; neutral; gradual smooth boundary.

B22—20 to 38 inches; light yellowish brown (10YR 6/4) very gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; weak fine and medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine and few medium roots; about 70 percent gravel and 5 percent cobbles; neutral; clear smooth boundary.

C—38 to 64 inches; light yellowish brown (10YR 6/4) very gravelly loam, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; no roots; about 80 percent gravel and 5 percent cobbles; neutral.

The solum is 25 to 50 inches thick. Rock fragments make up 35 to 80 percent of the soil between depths of 10 and 40 inches. Reaction ranges from medium acid to neutral.

The A1 horizon is grayish brown or brown very gravelly loam or very stony loam. The B2 horizon is pale brown, light yellowish brown, or brown.

### Suloaf series

The Suloaf series consists of deep, well drained soils. They formed in loess and material weathered from Columbia River Basalt, andesite, or Seven Devils Volcanics. Suloaf soils are on moderately high plateaus, mountains, and north-facing canyonsides. Slopes are 3 to 90 per-

cent. Average annual precipitation is about 26 inches, and the average annual air temperature is about 42 degrees F.

Suloaf soils are similar to De Masters, Johnson, Klickson, Meland, and Uptmor soils and are near Bluesprin, Boles, De Masters, Keuterville, Klickson, Meland, Riggins, Telcher, Uptmor, and Wapshilla soils. De Masters soils have a mollic epipedon that is pachic. Johnson soils have 30 to 60 percent sand coarser than very fine sand. Keuterville, Klickson, Bluesprin, Riggins, and Wapshilla soils have a loamy-skeletal argillic horizon. Bluesprin soils are mesic. Riggins soils are lithic. Wapshilla soils do not have a mollic epipedon. Meland and Keuterville soils are mesic. Boles and Uptmor soils have a clayey argillic horizon. Telcher soils do not have a mollic epipedon.

Typical pedon of Suloaf silt loam, 25 to 40 percent slopes, about 7 miles southwest of White Bird, about 2,640 feet east and 230 feet north of the southwest corner of sec. 18, T. 27 N., R. 1 E.

- O1—1 inch to 0; fresh and partially decomposed needles and twigs.
- A11—0 to 3 inches; brown (7.5YR 4/2) silt loam, very dark brown (7.5YR 2/2) moist; moderate very fine and fine granular structure; soft, very friable, non-sticky and nonplastic; many very fine and common fine and medium roots; many fine interstitial pores; neutral; clear smooth boundary.
- A12—3 to 17 inches; brown (7.5YR 4/3) silt loam, dark brown (7.5YR 3/2) moist; weak very fine and fine subangular blocky and weak fine and medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and fine and many medium and coarse roots; common very fine and fine interstitial pores; neutral; gradual wavy boundary.
- B21t—17 to 28 inches; light yellowish brown (10YR 6/4) gravelly silt loam, dark brown (7.5YR 4/4) moist; moderate very fine and fine subangular blocky structure; hard, friable, sticky and plastic; few very fine and fine and many medium roots; common very fine and fine tubular pores; common moderately thick clay films on peds and in pores; about 20 percent gravel; slightly acid; gradual smooth boundary.
- B22t—28 to 41 inches; light brown (7.5YR 6/4) gravelly silt loam, dark brown (7.5YR 4/4) moist; moderate very fine and fine subangular blocky structure; hard, friable, sticky and plastic; few fine and medium roots; common fine tubular pores; common thin clay films on peds and in pores; about 25 percent gravel; slightly acid; gradual smooth boundary.
- C—41 to 54 inches; reddish yellow (7.5YR 6/6) gravelly sandy loam, strong brown (7.5YR 5/6) moist; weak fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine roots; about 25 percent gravel and 5 percent cobbles; slightly acid; clear smooth boundary.
- R—54 inches; partially decomposed basalt bedrock.

Thickness of the solum and depth to bedrock are 40 to 60 inches. Rock fragments make up 15 to 35 percent of the B2t horizon. Reaction ranges from medium acid to neutral.

The A1 horizon is dark grayish brown, grayish brown, or brown silt loam or cobbly silt loam. The B2t horizon is light yellowish brown, light brown, brown, pale brown, or yellowish brown gravelly silt loam or gravelly clay loam. The C horizon is varied and is reddish yellow, pinkish gray, light yellowish brown, or pale brown.

### Suttler series

The Suttler series consists of very deep, well drained soils. They formed in granitic residuum and colluvium. Suttler soils are on north-facing mountainsides. Slopes are 40 to 90 percent. Average annual precipitation is about 28 inches, and the average annual air temperature is about 42 degrees F.

Suttler soils are similar to Ericson, Jughandle, and Naz soils and are near Jughandle, Naz, Nazaton, and Spokel soils. Those soils do not have an umbric epipedon. Ericson soils have a fine-loamy argillic horizon. Naz and Nazaton soils have a mollic epipedon that is pachic. Nazaton and Spokel soils have a loamy-skeletal control section. Spokel soils are mesic.

Typical pedon of Suttler loam in an area of Jughandle-Suttler association, about 7 miles south of Riggins, about 1,100 feet south and 700 feet east of the northwest corner of sec. 27, T. 23 N., R. 1 E.

- A11—0 to 4 inches; brown (10YR 4/3) loam, very dark grayish brown (10YR 3/2) moist; moderate very fine granular structure; soft, very friable, slightly sticky and slightly plastic; many fine and medium roots; many fine interstitial pores; about 5 percent gravel; medium acid; clear wavy boundary.
- A12—4 to 10 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; weak fine subangular blocky and moderate fine granular structure; soft, very friable, slightly sticky and nonplastic; common fine and medium roots; many fine interstitial pores; about 5 percent gravel; neutral; clear wavy boundary.
- B1—10 to 31 inches; light yellowish brown (10YR 6/4) gravelly loam, yellowish brown (10YR 5/4) moist; weak medium and fine subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; common fine and few medium roots; many fine interstitial pores; about 20 percent gravel and 2 percent cobbles; medium acid; clear wavy boundary.
- B21—31 to 39 inches; light yellowish brown (10YR 6/4) gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few fine roots; common fine interstitial pores; about 25 percent gravel and 5 percent cobbles; medium acid; clear wavy boundary.
- B22—39 to 60 inches; light yellowish brown (10YR 6/5) very gravelly sandy loam, dark yellowish brown



(10YR 4/4) moist; weak fine subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few fine roots; common fine interstitial pores; about 30 percent gravel and 10 percent cobbles; medium acid.

The solum is 60 inches or more thick. Rock fragments make up 15 to 35 percent of the soil between depths of 10 and 40 inches. Reaction is medium acid to neutral.

### Tannahill series

The Tannahill series consists of deep, well drained soils. They formed in material weathered from Columbia River Basalt or Seven Devils Volcanics with some loess mixed in the upper part. Tannahill soils are on low, south- and west-facing Salmon River and Snake River canyonsides. Slopes are 7 to 90 percent. Average annual precipitation is about 14 inches, and the average annual air temperature is about 52 degrees F.

Tannahill soils are similar to Banner and Ferdinand soils and are near Banner, Bluesprin, Ferdinand, Lawyer, and Lickskillet soils. Banner soils have a clayey argillic horizon. Ferdinand soils have a clayey-skeletal argillic horizon. Bluesprin, Lawyer, and Lickskillet soils do not have secondary carbonates in the upper 43 inches. Lawyer soils have a mollic epipedon that is pachic. Lickskillet soils are lithic.

Typical pedon (fig. 17) of Tannahill cobbly loam in an area of Tannahill-Lickskillet complex, about 2 miles south of White Bird, about 400 feet south and 350 feet west of the northeast corner of sec. 27, T. 28 N., R. 1 E.

A11—0 to 3 inches; dark brown (7.5YR 4/2) cobbly loam, very dark brown (7.5YR 2/2) moist; moderate fine and very fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; many fine interstitial pores; about 15 percent cobbles and 20 percent gravel; mildly alkaline; clear wavy boundary.

A12—3 to 10 inches; dark brown (7.5YR 3/2) gravelly silty clay loam, dark brown (7.5YR 3/2) moist; strong fine and very fine subangular blocky structure; very hard, friable, sticky and plastic; many fine roots; many fine tubular pores; about 25 percent gravel and 5 percent cobbles; mildly alkaline; clear wavy boundary.

B2t—10 to 19 inches; brown (7.5YR 5/3) very gravelly silty clay loam, dark brown (10YR 3/3) moist; strong fine subangular blocky structure; extremely hard, very firm, sticky and plastic; common fine roots; many fine tubular pores; about 40 percent gravel and 5 percent cobbles; few thin clay films on peds and in pores; mildly alkaline; clear wavy boundary.

C1ca—19 to 26 inches; pale brown (10YR 6/3) very gravelly loam, dark brown (10YR 4/3) moist; moderate fine subangular blocky structure; slightly hard, friable, sticky and plastic; common fine roots; many fine tubular pores; about 50 percent gravel and 5 percent cobbles; strongly calcareous, common fine



Figure 17.—Profile of Tannahill cobbly loam. Calcium carbonate has accumulated in the light-colored layer between depths of 19 and 38 inches (5 to 9 1/2 dm). (Scale in decimeters)

veins and soft masses of lime; moderately alkaline; clear irregular boundary.

C2ca—26 to 38 inches; very pale brown (10YR 7/3) very gravelly loam, dark brown (10YR 4/3) moist; moder-



ate fine and very fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; many fine tubular pores; about 60 percent gravel and 5 percent cobbles; greatest concentration of lime in pedon, common fine veins and soft masses of lime; strongly calcareous strongly alkaline; clear wavy boundary.

C3—38 to 52 inches; pale brown (10YR 6/3) very gravelly loam, dark brown (10YR 4/3) moist; moderate fine and very fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; many fine tubular pores; about 60 percent gravel and 5 percent cobbles; strongly calcareous; strongly alkaline; abrupt wavy boundary.

R—52 inches; basalt bedrock, few roots in cracks.

The solum is 15 to 30 inches thick. Rock fragments make up 35 to 65 percent of the B2t horizon. Reaction is neutral or mildly alkaline in the A horizon and mildly alkaline to strongly alkaline in the B horizon. Depth to lime is 15 to 30 inches. Depth to bedrock is 40 to 60 inches.

### Telcher series

The Telcher series consists of very deep, well drained soils. They formed in loess and residuum from Columbia River Basalt or Seven Devils Volcanics. Telcher soils are on high plateaus, mountainsides, and higher north-facing canyonsides. Slopes are 3 to 40 percent. Average annual precipitation is about 28 inches, and the average annual air temperature is about 42 degrees F.

Telcher soils are similar to Ericson and Wapshilla soils and are near Brody, Klickson, Suloaf, Uptmor, and Wapshilla soils. Ericson soils formed in granitic residuum and colluvium and have moist color value of 4 or more in the upper 7 inches when mixed. Wapshilla soils have a loamy-skeletal argillic horizon. Brody soils have a B2ir horizon and have a loamy-skeletal control section. Klickson soils have a mollic epipedon and have a loamy-skeletal control section. Suloaf and Uptmor soils have a mollic epipedon. Uptmor soils have a clayey control section.

Typical pedon of Telcher silt loam, 7 to 25 percent slopes, about 5.2 miles northwest of Keuterville, about 22 feet east of gravel road, 1,720 feet north and 2,640 feet west of the southeast corner of sec. 29 T. 32 N., R. 1 W.

O1—3 inches to 1 inch; decomposed organic litter.

O2—1 inch to 0; partially decomposed organic litter; abrupt broken boundary.

A11—0 to 6 inches; yellowish brown (10YR 5/4) silt loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure parting to moderate very fine and fine granular; slightly hard, very friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; about 5 percent gravel and cobbles; neutral; gradual wavy boundary.

A12—6 to 12 inches; yellowish brown (10YR 5/4) silt loam, dark yellowish brown (10YR 4/4) moist; weak fine, medium, and coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and common medium roots; many very fine tubular pores; few thin clay films on peds and in pores; about 5 percent gravel and cobbles; slightly acid; gradual wavy boundary.

A2—12 to 20 inches; light yellowish brown (10YR 6/4) silt loam, dark yellowish brown (10YR 4/4) moist; weak coarse subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine and fine and common medium roots; many very fine tubular pores; few thin clay films on peds and in pores; about 5 percent gravel and cobbles; slightly acid; clear wavy boundary.

B21—20 to 28 inches; light yellowish brown (10YR 6/4) silty clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium and coarse subangular blocky structure; very hard, firm, sticky and plastic; few very fine and fine roots; many fine and very fine tubular pores; common moderately thick clay films on faces of peds and in pores; many uncoated silt grains on faces of peds; weak horizontal clay bands 0.5 to 1 centimeter thick; about 5 percent gravel and cobbles; slightly acid; gradual wavy boundary.

B22t—28 to 44 inches; yellow (10YR 7/6) silty clay loam, yellowish brown (10YR 5/6) moist; moderate medium and coarse angular blocky structure; very hard, firm, sticky and plastic; few very fine roots; many very fine and common fine tubular pores; common moderately thick yellowish brown (10YR 5/6 dry) clay films on peds and in pores; weak horizontal clay bands 0.5 to 1 centimeter thick; about 5 percent gravel and cobbles; slightly acid; gradual wavy boundary.

B3t—44 to 60 inches; very pale brown (10YR 7/4) gravelly clay loam, yellowish brown (10YR 5/4) moist; moderate medium and coarse subangular blocky structure; hard, firm, sticky and plastic; many very fine tubular pores; few moderately thick clay films on peds and in pores; about 20 percent gravel and 5 percent cobbles; slightly acid.

The solum is 60 inches or more thick. Rock fragments make up 5 to 15 percent of the B2t horizon. Reaction is medium acid to neutral.

The A horizon is yellowish brown or brown silt loam. The Bt horizon is yellowish brown, light yellowish brown, very pale brown, or yellow clay loam, silty clay loam, or gravelly clay loam.

### Uhlorn series

The Uhlorn series consists of very deep, well drained soils. They formed in loess. Uhlorn soils are on north-facing side slopes on the prairie on a plateau north and west of Grangeville. Slopes are 2 to 65 percent. Average annual precipitation is about 22 inches, and the average annual air temperature is about 46 degrees F.



Uhlorn soils are similar to Brownlee and Meland soils and are near Chicane, Meland, and Nez Perce soils. Brownlee and Meland soils have a fine-loamy argillic horizon. Chicane and Nez Perce soils have a clayey argillic horizon and have an A2 horizon.

Typical pedon of Uhlorn silt loam, 12 to 25 percent slopes, about 2 miles south of Ferdinand, about 1,360 feet north and 1,480 feet west of the southeast corner of sec. 12, T. 32 N., R. 1 W.

- Ap—0 to 6 inches; dark gray (10YR 4/1) silt loam, black (10YR 2/1) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; many fine interstitial pores; neutral; abrupt smooth boundary.
- A12—6 to 13 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; weak medium and coarse prismatic structure parting to weak fine subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; common fine roots; common fine tubular pores; few worm holes and krotovinas filled with browner soil material; slightly acid; clear smooth boundary.
- B1t—13 to 18 inches; brown (10YR 5/3) silt loam, dark brown (10YR 3/3) moist; moderate fine subangular blocky structure; hard, friable, slightly sticky and plastic; common fine roots; common fine tubular pores; few thin clay films; few uncoated silt grains mostly on vertical faces of peds; slightly acid; clear smooth boundary.
- B21t—18 to 42 inches; yellowish brown (10YR 5/4) silty clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium and fine subangular blocky structure; very hard, firm, slightly sticky and plastic; common fine roots; common fine tubular pores; continuous moderately thick clay films; common uncoated silt grains coating most vertical faces of peds; slightly acid; gradual smooth boundary.
- B22t—42 to 60 inches; brown (7.5YR 5/3) silty clay loam, dark brown (7.5YR 3/4) moist; moderate fine angular blocky structure; very hard, very firm, sticky and plastic, slightly brittle; few fine roots; few fine tubular pores; continuous thick clay films; few fine black iron-manganese concretions; neutral.

The solum is 60 inches or more thick. Reaction is slightly acid or neutral.

The A horizon is dark gray, dark grayish brown, or very dark gray. The B2t horizon is brown, yellowish brown, or dark yellowish brown silty clay loam or clay loam. Rock fragments make up as much as 15 percent of the B22 horizon.

### Uptmor series

The Uptmor series consists of very deep, well drained soils. They formed in loess and residuum from Columbia River Basalt. Uptmor soils are on plateaus and mountain foot slopes. Slopes are 3 to 40 percent. Average annual

precipitation is about 26 inches, and the average annual air temperature is about 42 degrees F.

Uptmor soils are similar to Boles, Jacket, and Suloaf soils and are near Boles, De Masters, Suloaf, and Telcher soils. Boles soils have an A2 horizon. Jacket and De Masters soils have a mollic epipedon that is pachic. De Masters soils have a fine-loamy argillic horizon. Telcher soils do not have a mollic epipedon. Suloaf soils are fine-loamy.

Typical pedon of Uptmor silt loam, 7 to 25 percent slopes, about 4 miles west-northwest of Keuterville, about 1,080 feet west and 120 feet south of the center of sec. 6, T. 31 N., R. 1 W.

- O1—0.5 inch to 0; slightly to moderately decomposed organic material.
- A11—0 to 2 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; moderate thin and medium platy and moderate fine granular structure; slightly hard; very friable, slightly sticky and slightly plastic; many very fine and common fine and medium roots; many very fine interstitial pores; slightly acid; abrupt smooth boundary.
- A12—2 to 4 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; weak medium platy structure parting to weak fine subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; many very fine and few fine and medium roots; common very fine tubular pores; peds thinly coated with clean very fine sand and silt grains; medium acid; clear wavy boundary.
- B1t—4 to 12 inches; brown (10YR 4/3) light silty clay loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to moderate medium and fine subangular blocky; very hard, friable, slightly sticky and plastic; common fine and very fine and few medium and coarse roots; many very fine, common fine, and few medium tubular pores; many thin clay films on peds and in pores; peds thinly coated with clean very fine sand and silt grains; common krotovinas filled with A1 material; slightly acid; gradual wavy boundary.
- B21t—12 to 22 inches; light brown (7.5YR 6/3) silty clay loam, dark brown (7.5YR 4/3) moist; moderate medium prismatic structure parting to weak medium subangular blocky; very hard, friable, slightly sticky and plastic; very few and few fine and medium roots; many very fine and few fine and medium tubular pores; many thin clay films on peds and in pores; peds thinly coated with clean very fine sand and silt grains; common fine iron-manganese concretions; few krotovinas; medium acid; clear wavy boundary.
- B22t—22 to 25 inches; brown (7.5YR 4/4) light silty clay, dark brown (7.5YR 4/3) moist; strong fine and very fine angular blocky structure; very hard, firm, very sticky and very plastic; common very fine and few fine and medium roots; many very fine and few fine tubular pores; continuous thick clay films on surfaces of peds and pores; common iron-manganese

concretions; about 5 percent gravel and cobbles; peds thinly coated with clean very fine sand and silt grains; medium acid; clear wavy boundary.

B23t—25 to 46 inches; strong brown (7.5YR 4/6) cobbly silty clay, reddish brown (5YR 4/4) moist; strong fine and very fine angular blocky structure; very hard, firm, very sticky and very plastic; common very fine and few fine and medium roots; common very fine and few fine tubular pores; continuous thick clay films on surfaces of peds and pores; some slickensides; common iron-manganese concretions; about 10 percent gravel and 10 percent cobbles; neutral; clear wavy boundary.

C—46 to 61 inches; brownish yellow (10YR 6/6) very gravelly clay loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; very hard, friable, sticky and plastic; few fine roots; about 35 percent gravel and 10 percent cobbles; neutral.

The solum is 40 inches or more thick. Rock fragments make up as much as 30 percent of the B2t horizon. Reaction is medium acid to slightly acid in the A horizon and medium acid to neutral in the Bt horizon.

The B2t horizon is dark grayish brown, brown, light brown, or strong brown silty clay loam, silty clay, or cobbly silty clay.

### Wapshilla series

The Wapshilla series consists of very deep, well drained soils. They formed in loess and colluvium and residuum weathered from Columbia River Basalt or Seven Devils Volcanics. Wapshilla soils are on high plateaus, steep mountainsides, and higher north-facing, steep canyonsides. Slopes are 7 to 90 percent. Average annual precipitation is about 28 inches, and the average annual air temperature is about 42 degrees F.

Wapshilla soils are similar to Brody, Klickson, and Telcher soils and are near Brody, Klickson, Nazaton, Suloaf, Telcher, and Zaza soils. Brody soils have a B2ir horizon and do not have an argillic horizon. Klickson, Nazaton, and Suloaf soils have a mollic epipedon. Suloaf and Telcher soils have a fine-loamy argillic horizon. Zaza soils are lithic.

Typical pedon of Wapshilla loam in an area of Brody Wapshilla association, about 20 miles south of Riggins, about 340 feet south and 1,730 feet west of the northeast corner of sec. 35, T. 21 N., R. 1 E.

O1—1 to 0.5 inch; slightly decomposed organic material; slightly acid.

O2—0.5 inch to 0; well decomposed organic material; slightly acid.

A1—0 to 4 inches; brown (7.5YR 5/3) loam, dark brown (7.5YR 3/3) moist; moderate fine and very fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; about 5

percent gravel; medium acid; clear smooth boundary.

A3—4 to 14 inches; brown (7.5YR 5/4) loam, dark brown (7.5YR 3/4) moist; moderate fine and very fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; about 5 percent gravel; slightly acid; clear smooth boundary.

B1t—14 to 22 inches; light brown (7.5YR 6/4) gravelly loam, dark brown (7.5YR 4/4) moist; moderate fine and very fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few thin clay films; common fine roots; about 20 percent gravel and 5 percent cobbles; slightly acid; gradual smooth boundary.

B21t—22 to 36 inches; light yellowish brown (10YR 6/4) very gravelly loam, dark brown (7.5YR 4/4) moist; moderate medium and fine subangular blocky structure; very hard, firm, slightly sticky and slightly plastic; common medium clay films; few fine and medium roots; about 30 percent gravel and 10 percent cobbles; neutral; gradual smooth boundary.

B22t—36 to 50 inches; light yellowish brown (10YR 6/4) very gravelly loam, dark brown (7.5YR 4/4) moist; moderate medium and fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common thin clay films; few medium roots; about 50 percent gravel and 10 percent cobbles; slightly acid; gradual smooth boundary.

B3t—50 to 60 inches; light yellowish brown (10YR 6/4) very gravelly loam, dark yellowish brown (10YR 4/4) moist; weak medium and fine subangular blocky structure; hard, very friable, nonsticky and nonplastic; few fine and medium roots; about 50 percent gravel and 10 percent cobbles; neutral.

The solum is 60 inches or more thick. Rock fragments make up 35 to 60 percent of the upper 20 inches of the B2t horizon. Reaction ranges from medium acid to neutral.

The A1 horizon is brown and dark brown loam, silt loam, cobbly loam, and gravelly loam. The B2t horizon is brown, yellowish brown, light brown, and light yellowish brown very gravelly loam or very gravelly light clay loam.

### Westlake series

The Westlake series consists of very deep, somewhat poorly drained soils. They formed in alluvium derived primarily from loess. Westlake soils are on bottom lands and in drainageways. Slopes are 0 to 3 percent. Average annual precipitation is about 22 inches, and the average annual air temperature is about 44 degrees F.

Westlake soils are similar to Nicodemus and Nicodemus Variant soils and are near Meland, Nez Perce, Nicodemus, and Wilkins soils. Nicodemus soils are moderately well drained and have a loamy-skeletal control section. Nicodemus Variant soils are moderately well drained and



have a coarse-loamy control section. Meland soils are well drained upland soils and have a fine-loamy argillic horizon. Nez Perce soils are moderately well drained upland soils and have a clayey argillic horizon. Wilkins soils have an A2 horizon and a clayey argillic horizon.

Typical pedon of Westlake silt loam, about 8 miles northwest of Grangeville, about 300 feet west and 100 feet south of the northeast corner of the SW1/4SW1/4 sec. 20, T. 31 N., R. 2 E.

- Ap—0 to 8 inches; dark gray (10YR 4/1) silt loam, black (10YR 2/1) moist; few medium faint mottles; moderate fine and medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and few medium roots; many fine interstitial pores; neutral; clear smooth boundary.
- A12—8 to 19 inches; dark gray (10YR 4/1) silt loam, black (10YR 2/1) moist; few medium faint mottles; weak fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and few fine roots; many very fine and fine tubular pores; neutral; gradual wavy boundary.
- A13—19 to 25 inches; gray (10YR 5/1) silt loam, very dark gray (10YR 3/1) moist; few medium faint mottles; moderate medium and coarse subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and fine roots; many very fine, fine, and medium tubular pores; neutral; gradual wavy boundary.
- C1g—25 to 48 inches; gray (10YR 5/1) silt, loam, black (10YR 2/1) moist; common medium distinct mottles; weak medium and coarse subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots; many very fine, fine, and medium tubular pores; neutral; gradual wavy boundary.
- C2g—48 to 60 inches; gray (10YR 5/1) clay loam, very dark gray (10YR 3/1) moist; common medium distinct mottles; massive; hard, firm, sticky and plastic; few very fine roots; common very fine tubular pores; some thin stratified sandy lenses; neutral.

The solum is 20 to 35 inches thick. Reaction is slightly acid or neutral.

The C1g horizon is gray, dark gray, or light gray.

### Wilkins series

The Wilkins series consists of very deep, somewhat poorly drained soils. They formed in alluvium derived primarily from loess. Wilkins soils are on narrow bottom lands. Slopes are 0 to 3 percent. Average annual precipitation is about 21 inches, and the average annual air temperature is about 44 degrees F.

Wilkins soils are similar to Boles, Chicane, Nez Perce, and Shebang soils, and are near Chicane, Nez Perce, Shebang, and Westlake soils. Boles, Chicane, Nez Perce, and Shebang soils are moderately well drained

upland soils. Chicane, Nez Perce, and Shebang soils are mesic. Westlake soils do not have an A2 horizon and have a fine-silty control section.

Typical pedon of Wilkins silt loam, about 7 1/2 miles northeast of Cottonwood, about 2,360 feet north and 840 feet west of the southeast corner of sec. 17, T. 32 N., R. 2 E.

- Ap—0 to 10 inches; dark gray (10YR 4/1) silt loam, black (10YR 2/1) moist; moderate fine and very fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; many very fine and fine interstitial pores and common very fine and fine tubular pores; slightly acid; clear wavy boundary.
- A12—10 to 20 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure; hard, very friable, slightly sticky and slightly plastic; few very fine and fine roots; common very fine and fine and few medium tubular pores; pore surfaces coated with organic matter; slightly acid; abrupt smooth boundary.
- A2—20 to 27 inches; white (10YR 8/1) silt loam, grayish brown (10YR 5/2) moist; common prominent pale brown (10YR 6/3) mottles, moist; weak coarse prismatic structure parting to moderate fine subangular blocky; hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; few very fine, fine, and medium tubular pores; slightly acid; abrupt smooth boundary.
- B21gb—27 to 36 inches; gray (10YR 6/1) clay, dark gray (10YR 4/1) moist; weak coarse prismatic structure parting to weak medium subangular and angular blocky; extremely hard, firm, slightly sticky and very plastic; few very fine and fine roots; few very fine and fine tubular pores; very dark grayish brown (10YR 2/2) organic-stained coating on peds; many very fine dark brown soft manganese concretions; common medium lime veins and some pockets of lime; slightly acid; clear wavy boundary.
- B22gb—36 to 40 inches; gray (10YR 6/1) clay, dark gray (10YR 4/1) moist; massive; extremely hard, firm, sticky and very plastic; few fine roots; few very fine and fine tubular pores; many very fine dark brown soft manganese concretions; common medium lime veins and some pockets of lime; moderately alkaline; clear wavy boundary.
- Cg—40 to 60 inches; light brownish gray (2.5Y 6/2) clay, grayish brown (2.5Y 6/2) moist; common prominent light yellowish brown (2.5Y 6/3) mottles, light olive (2.5Y 5/3) moist; massive; extremely hard, very firm, very sticky and very plastic; few very fine and fine tubular pores; many very fine dark brown soft concretions; common medium lime veins and some pockets of lime; moderately alkaline.

The solum is 40 to 60 inches thick. Reaction of the A horizon is medium acid or slightly acid, and reaction of the B horizon is slightly acid to moderately alkaline.

The A1 horizon is gray, dark gray, dark grayish brown, grayish brown, and very dark gray. The B horizon is gray, grayish brown, dark grayish brown, and dark gray clay or silty clay.

## Zaza series

The Zaza series consists of shallow, well drained soils. They formed in residuum and colluvium from basalt with loess mixed into the upper part. Zaza soils are on south-facing canyonsides and mountainsides. Slopes are 7 to 40 percent. Average annual precipitation is about 26 inches, and the average annual air temperature is about 45 degrees F.

Zaza soils are similar to Flybow and Riggins soils and are near Brody, Klickson, and Wapshilla soils. Flybow soils are less than 10 inches deep to bedrock. Riggins soils have a mollic epipedon and are mesic. Brody soils are moderately deep and have a B2ir horizon. Klickson soils are very deep and have a mollic epipedon. Wapshilla soils are very deep and have an argillic horizon.

Typical pedon of Zaza loam, 7 to 40 percent slopes, about 8 miles southwest of Grangeville, about 2,300 feet south and 1,300 feet west of the northeast corner of sec. 27, R. 29 N., R. 2 E.

- O1—1 inch to 0; decomposed and partially decomposed needles, leaves, and twigs; medium acid.
- A11—0 to 3 inches; brown (7.5YR 5/4) loam, dark reddish brown (5YR 3/4) moist; moderate fine and medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; many fine interstitial pores; about 10 percent fine gravel; medium acid; abrupt smooth boundary.
- A12—3 to 7 inches; brown (7.5YR 5/4) very gravelly loam, dark reddish brown (5YR 3/4) moist; moderate very fine and fine subangular blocky and moderate very fine and fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and common coarse roots; many fine tubular pores; about 35 percent gravel; medium acid; clear wavy boundary.
- B2—7 to 12 inches; reddish brown (5YR 5/4) very gravelly loam, dark reddish brown (5YR 3/4) moist; moderate very fine and fine subangular blocky and moderate very fine and fine granular structure; slightly hard, friable, sticky and plastic; many fine and common coarse roots; many fine tubular pores; about 60 percent gravel; medium acid; abrupt wavy boundary.
- R—12 inches; fractured basalt bedrock; soil material in cracks.

Thickness of the solum and depth to bedrock are 10 to 20 inches. Rock fragments make up 35 to 75 percent of the B2 horizon. Reaction is slightly acid or medium acid.

The A horizon is brown, light brown, or reddish brown. The B2 horizon is reddish brown or brown.

## Formation of the soils

A soil is the result of the parent material from which it formed, the climate under which it existed, the plant and animal life in and on it, the relief or lay of the land, and the length of time these forces have acted. Differences between soils can be traced to differences in one or more of these factors.

## Parent material

Several contrasting parent materials exist in this area.

Ericson, Spokel, and Suttler soils, for example, developed from granite and schist. These are mostly in the southern part of the Area and around Elk City.

There are some small areas of limestone in the southern part of the Area. This parent material was not mapped separately because of the difficulty of accurately delineating these small outcroppings in very inaccessible areas.

Columbia River Basalt is a widespread formation in the Area. It formed the broad plateaus. Seven Devils Volcanics occur at lower elevations along the Snake and Salmon Rivers. The Seven Devils formation is an important source of parent material, especially where canyons cut through these very thick formations. Soils formed partially in residuum from basalt include Bluesprin, Klickson, Lawyer, Riggins, Tannahill, and Wapshilla soils.

Glaciers have never been in this area, but the effects of glaciation have been important. As huge valley glaciers slowly pushed southward into the United States from Canada they scoured the sides and bottoms of the valleys. The ground-up rock and debris were carried in the ice and later deposited as the ice melted. The melt water spread out over large areas in south-central Washington. Winds picked up the finer particles, mostly silt, and carried them into eastern Washington and northern Idaho, where they were deposited. These loess deposits accumulated on the Columbia River plateaus during each glaciation (5). The loess is commonly more than 100 feet deep in the area of greatest accumulation—the western part of Latah County, Idaho, and the eastern part of Whitman County, Washington.

The plateau in the survey area northward from Grangeville is a thousand feet higher than the Columbia River plateaus and is also to one side of the prevailing winds. For these reasons, the loess deposits are fewer and thinner. The total thickness of the loess is only a few feet in the southern part near Grangeville, increasing somewhat a few miles to the north. This has caused profound differences between soils in this area and those in Latah and Whitman Counties. Since the loess in this survey area is so much thinner and spring precipitation is so much higher, the weathering of the loess into clays has been more intense and has been confined to a thinner layer than where the loess is thicker.

Boles, Chicane, Fenn, Kooskia, Nez Perce, Shebang, and Uhlorn soils developed almost wholly in loess. All of these soils, except Uhlorn soils, have a fine textured



argillic horizon. The surface layer has about 10 percent more clay than soils that developed in loess in Latah and Whitman Counties because of faster weathering in the climate of western Idaho County.

In places the latest loess deposit covered old Vertisols. The present Fenn soils are Vertisols. These buried Vertisols are now the argillic horizon of Nez Perce and Shebang soils. Loess deposits less than about 5 to 7 inches thick were incorporated into these old Vertisols by self-mulching. At its present rate, accelerated erosion will make the Shebang and Nez Perce soils into Vertisols in a few hundred years.

Many other soils in the Area have at least some loess in the upper horizons. They are mostly moderately steep to very steep. Examples are De Masters, Jacket, Keuterville, and Suloaf soils.

Another effect of glaciation has been the development of patterned ground in this periglacial area. During ice advances this Area was considerably colder than now and the soils were frozen much of the time. In south facing areas, where bedrock was less than about 4 feet deep, the thawing of these frozen soils was uneven. This polygonal pattern of thawing allowed erosion to take place in the partially thawed areas. The result is a complex of mounds and intermounds. Large acreages of patterned ground occur in the Riggins-Meland, Ferdinand-Riggins, and Ferdinand-Flybow-Riggins complexes.

Volcanic ash in this Area originated from many once active volcanoes in western Washington and western Oregon, such as Mt. St. Helens, Mt. Rainier, and Glacier Peak. The greatest contribution of ash in this Area came from the eruption of Mount Mazama, the cone of which is now Crater Lake, in southwestern Oregon about 6,600 years ago. This ash fell over the entire area but was immediately eroded from landscapes which did not have a full cover of trees. Traces of ash protected by a cover of colluvium occur at the base of canyons in areas with no trees. Because the climate was significantly drier then, most areas were treeless. Only Brody and Jughandle soils formed in this material. They had a cover of Douglas-fir which was sufficient to retain the ash fall.

Alluvium from a variety of sources has been deposited in low-lying positions throughout the Area. Chard, Nicodemus, Westlake, and Wilkins soils formed in alluvium. These soils cover only about 2 percent of the survey area.

## Climate

Climate, both present and past, has been a strong influence on the development of soils in this area. It was directly and wholly responsible for the delivery by wind of loess. The development of patterned ground was also a result of climatic forces.

Leaching of soluble material, such as calcium carbonate, depends on the amount of rainfall available. Most of the soils in the Area receive enough moisture to remove all the calcium carbonate. However, soils in the drier

areas, such as Banner and Tannahill soils, have an accumulation of calcium carbonate in the lower part.

Weathering of rocks into clay and movement of clay into the subsoil has resulted in the development of an argillic horizon in most of the soils.

Climatic contrasts, which can occur within short distances, contribute to the complex pattern of soils. Elevation differences of as much as 3,000 feet within 2 miles are common. Higher elevations are cooler and have more precipitation than lower areas. Steep north-facing side slopes also are cooler than adjacent steep south-facing side slopes.

Climate indirectly affects soil development through its influence on the kind and amount of vegetation on the soil. This in turn affects the amount of organic matter in the soil. An area consisting of the survey area, Lewis County, the southern half of Nez Perce County, and the southeast corner of Washington and northeast corner of Oregon has a climatic pattern that contrasts with most areas of the Pacific Northwest. This area has high precipitation during May and June. The result is a good growth of grasses in spring and early summer. These grasses incorporate more organic matter into the soils than does the lighter vegetation of other areas. In the Camas Prairie north of Grangeville, the surface layer is 4 to 9 percent organic matter.

## Living organisms

Different types of vegetation absorb different kinds and amounts of nutrients from the soil, return different amounts of residue, and thus influence the kinds of soil that form.

Six general potential native plant communities grow in this area. Their differences result mainly from climatic differences. The lower elevations along the Snake and Salmon Rivers, with the lowest precipitation and warmest temperatures, support a community of bluebunch wheatgrass and Sandberg bluegrass, along with other plants. These areas include Lickskillet and Tannahill soils. With increasing elevation precipitation increases, temperature decreases, and the natural vegetation changes. Above the bluebunch wheatgrass-Sandberg bluegrass community is a community dominated by Idaho fescue and bluebunch wheatgrass; then a community of ponderosa pine and shrubs; Douglas-fir and shrubs; grand fir and queencup beadlily; and, at the highest elevations, subalpine fir and huckleberry.

The different plant communities differently influence the development of soils in the area, especially in the upper several inches. When plant roots die, they are incorporated into the soil as organic matter. Since there are more roots available for conversion to organic matter in the Idaho fescue-bluebunch wheatgrass plant community, soils that support this community, such as Chicane, Nez Perce, and Uhlorn soils, have the most organic matter and are the darkest. Soils supporting either drier or wetter plant communities have less organic matter

and are lighter colored. The wetter Brody soils, for example, are lighter in color and low in organic matter.

Animal activity also influences the development of soils. Worms, rodents, and other burrowing animals burrow deep in the soils, mixing material from the various parts of the soil.

## Relief

Relief influences the formation of soils by its effect on natural erosion, the colluvial movement of soil material, natural drainage, and the modification of climate caused by differences in aspect. The steeper the slope, the more rapid the runoff and the greater the possible erosion. On very steep slopes colluvial activity is common. Nearly level bottom lands, such as Nicodemus, Westlake, and Wilkins soils, have slow runoff and are moderately well drained and somewhat poorly drained. Steep south-facing soils are warmer and drier than steep north-facing soils.

The dominant topography in this Area is canyons and mountains (see fig. 1, page 2). Slopes of more than 40 percent occur on about 55 percent of the area. Most of the slopes are long. Slopes steeper than 100 percent are not uncommon. Many of the soils with these very steep slopes, especially north-facing soils, have a loamy-skeletal control section and are very deep to bedrock. Most of the rock fragments in these soils have moved down slope. Examples include Klickson, Lawyer, Nazaton, and Wapshilla soils.

## Time

The length of time that the parent material has been subjected to the effects of climate and living organisms is an important factor in the development of the soils.

Most of the soils in the area that have slopes of less than 25 percent, other than alluvial soils, have had a rather stable surface for a considerable time. They have a fine textured subsoil. Vertisols, which require a long time for development from loess in this area, were common over much of the Camas Prairie until the latest loess deposit. A clayey B horizon is less common in steep soils because they have been developing for less time on the less stable positions.

Soils such as Chard and Nicodemus soils, which formed in alluvium, have been developing for a relatively short time. These soils have accumulated organic matter in the surface horizon but have developed only a very weak B2 horizon or none at all.

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## Glossary

**Alluvium.** Material, such as sand, silt, or clay, deposited on land by streams.

**Area reclaim** (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

**Association, soil.** A group of soils 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 inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	<i>Inches</i>
Very low.....	0 to 3
Low.....	3 to 6
Moderate.....	6 to 9
High.....	9 to 12
Very high.....	More than 12

**Base saturation.** The degree to which material having cation exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation exchange capacity.

**Bedrock.** The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.



**Bottom land.** The normal flood plain of a stream, subject to flooding.

**Calcareous soil.** A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

**Clay.** As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

**Clay film.** A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

**Coarse fragments.** Mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter.

**Coarse textured soil.** Sand or loamy sand.

**Cobblestone (or cobble).** A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

**Colluvium.** Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

**Complex, soil.** A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

**Consistence, soil.** The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

*Loose.*—Noncoherent when dry or moist; does not hold together in a mass.

*Friable.*—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

*Firm.*—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

*Plastic.*—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

*Sticky.*—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

*Hard.*—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

*Soft.*—When dry, breaks into powder or individual grains under very slight pressure.

*Cemented.*—Hard; little affected by moistening.

**Cutbanks cave** (in tables). The walls of excavations tend to cave in or slough.

**Depth to rock** (in tables). Bedrock is too near the surface for the specified use.

**Drainage class** (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drain-

age, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

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

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

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

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

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

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

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

**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 the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

**Fine textured soil.** Sandy clay, silty clay, and clay.

**Frost action** (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

**Gravel.** Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

**Gravelly soil material.** Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

**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 upper case letter represents the major horizons. Numbers or lower case 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 at the surface of a mineral soil.

*A horizon.*—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

*B horizon.*—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

*C horizon.*—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from

that in the solum, the Roman numeral II precedes the letter C.

*R layer.*—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

**Large stones** (in tables). Rock fragments 3 inches (7.5 centimeters) or more across. Large stones adversely affect the specified use of the soil.

**Loam.** Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

**Loess.** Fine grained material, dominantly of silt-sized particles, deposited by wind.

**Low strength.** The soil is not strong enough to support loads.

**Medium textured soil.** Very fine sandy loam, loam, silt loam, or silt.

**Moderately coarse textured soil.** Sandy loam and fine sandy loam.

**Moderately fine textured soil.** Clay loam, sandy clay loam, and silty clay loam.

**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. Mottling generally indicates poor aeration and impeded drainage. 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).

**Munsell notation.** A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

**Organic matter.** Plant and animal residue in the soil in various stages of decomposition.

**Parent material.** The unconsolidated organic and mineral material in which soil forms.

**Ped.** An individual natural soil aggregate, such as a granule, a prism, or a block.

**Pedon.** The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10



square meters), depending on the variability of the soil.

**Percs slowly** (in tables). The slow movement of water through the soil adversely affecting the specified use.

**Permeability.** The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow.....	less than 0.06 inch
Slow.....	0.06 to 0.20 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

**pH value.** A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

**Plasticity Index.** The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

**Plastic limit.** The moisture content at which a soil changes from semisolid to plastic.

**Profile, soil.** A vertical section of the soil extending through all its horizons and into the parent material.

**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.

**Range condition.** The present composition of the plant community on a range site in relation to the potential natural plant community for that site. Range condition is expressed as excellent, good, fair, or poor, on the basis of how much the present plant community has departed from the potential.

**Range site.** An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other range sites in kind or proportion of species or total production.

**Reaction, soil.** A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid.....	Below 4.5
Very strongly acid.....	4.5 to 5.0
Strongly acid.....	5.1 to 5.5
Medium acid.....	5.6 to 6.0
Slightly acid.....	6.1 to 6.5
Neutral.....	6.6 to 7.3
Mildly 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

**Residuum (residual soil material).** Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

**Rooting depth** (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts 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 groundwater runoff or seepage flow from ground water.

**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.

**Seepage** (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

**Series, soil.** A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

**Shrink-swell.** 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.

**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.

**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 feet.

**Slickensides.** Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

**Slope.** The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

**Slow refill** (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

**Small stones** (in tables). Rock fragments less than 3 inches (7.5 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

**Soil.** A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

**Soil separates.** Mineral particles less than 2 mm in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millime- ters
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 and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

**Steptoe.** An islandlike hill projecting through the lava flows.

**Stones.** Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

**Stony.** Refers to a soil containing stones in numbers that interfere with or prevent tillage.

**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).

**Subsoil.** Technically, the B horizon; roughly, the part of the solum below plow depth.

**Substratum.** The part of the soil below the solum.

**Subsurface layer.** Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

**Surface layer.** The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

**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 too thin for the specified use.

**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.

**Variant, soil.** A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.





## TABLES



TABLE 1.--TEMPERATURE AND PRECIPITATION  
[Recorded in the period 1951-75 at Grangeville, Idaho]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have--		Average number of growing degree days*	Average	2 years in 10 will have--		Average number of days with 0.10 inch or more	Average snowfall
				Maximum temperature higher than--	Minimum temperature lower than--			Less than--	More than--		
	<u>°F</u>	<u>°F</u>	<u>°F</u>	<u>°F</u>	<u>°F</u>		<u>In</u>	<u>In</u>	<u>In</u>		<u>In</u>
January----	36.9	20.4	28.7	58	-14	30	1.80	0.93	2.50	7	12.6
February----	42.1	24.2	33.2	60	-1	36	1.16	.53	1.66	5	6.6
March-----	46.3	25.7	36.1	68	6	37	2.05	1.30	2.72	8	11.3
April-----	54.4	31.7	43.1	78	19	133	2.72	1.63	3.69	8	5.0
May-----	63.8	38.4	51.1	86	24	351	3.30	1.95	4.49	9	.9
June-----	71.5	45.0	58.3	92	33	549	3.12	1.89	4.21	8	.0
July-----	82.7	50.0	66.4	99	36	818	.80	.16	1.31	3	.0
August-----	81.7	48.6	65.2	99	36	781	1.30	.16	2.15	3	.0
September--	71.9	41.3	56.6	92	25	498	1.75	.57	2.68	4	.0
October----	59.0	34.0	46.5	81	18	219	2.13	1.02	3.02	6	3.3
November---	45.0	26.9	36.0	64	4	39	1.82	.98	2.51	7	6.6
December---	38.6	22.5	30.6	56	-7	15	1.62	.90	2.19	6	10.9
Yearly-----	57.8	34.1	46.0	101**	-20**	3,506	23.57	19.85	27.28	74	57.2

\* 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 (40°F).

\*\* Extremes.

TABLE 2.--TEMPERATURE AND PRECIPITATION  
[Recorded in the period 1951-75 at Riggins, Idaho]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have--		Average number of growing degree days*	Average	2 years in 10 will have--		Average number of days with 0.10 inch or more	Average snowfall
				Maximum temperature higher than--	Minimum temperature lower than--			Less than--	More than--		
	<u>°F</u>	<u>°F</u>	<u>°F</u>	<u>°F</u>	<u>°F</u>		<u>In</u>	<u>In</u>	<u>In</u>		<u>In</u>
January----	42.0	28.3	35.2	58	0	70	1.56	0.81	2.16	7	3.4
February----	49.5	31.2	40.4	66	11	118	1.15	.70	1.55	5	.9
March-----	55.9	33.6	44.7	76	19	180	1.70	1.06	2.27	6	.9
April-----	64.7	38.5	51.6	86	25	355	1.63	.87	2.24	6	.1
May-----	74.0	45.8	59.9	95	32	617	2.01	1.10	2.75	7	.0
June-----	82.1	52.6	67.4	101	39	822	1.90	1.04	2.59	6	.0
July-----	93.6	59.0	76.3	107	45	1,125	.56	.11	.90	2	.0
August-----	93.0	58.4	75.7	110	44	1,107	.84	.20	1.36	3	.0
September--	82.2	50.5	66.4	102	35	792	.96	.23	1.52	3	.0
October----	67.3	42.2	54.8	88	26	459	1.41	1.51	2.11	4	.0
November---	51.1	34.7	42.9	68	17	144	1.42	.77	1.95	5	.5
December---	43.1	30.1	36.7	59	7	43	1.58	.70	2.28	6	2.5
Yearly-----	66.5	42.1	54.3	113**	-1**	5,832	16.72	14.57	18.79	60	8.3

\* 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 (40°F).

\*\* Extremes.



TABLE 3.--FREEZE DATES IN SPRING AND FALL  
[Recorded in the period 1951-75 at Grangeville, Idaho]

Probability	Temperature		
	24°F or lower	28°F or lower	32°F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	May 4	May 23	June 10
2 years in 10 later than--	April 27	May 17	June 4
5 years in 10 later than--	April 14	May 7	May 24
First freezing temperature in fall:			
1 year in 10 earlier than--	September 29	September 13	September 5
2 years in 10 earlier than--	October 6	September 19	September 10
5 years in 10 earlier than--	October 18	October 3	September 19

TABLE 4.--FREEZE DATES IN SPRING AND FALL  
[Recorded in the period 1951-75 at Riggins, Idaho]

Probability	Temperature		
	24°F or lower	28°F or lower	32°F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	April 7	April 20	May 14
2 years in 10 later than--	March 26	April 14	May 7
5 years in 10 later than--	March 3	April 5	April 24
First freezing temperature in fall:			
1 year in 10 earlier than--	October 29	October 12	September 29
2 years in 10 earlier than--	November 8	October 22	October 6
5 years in 10 earlier than--	November 27	November 9	October 20

TABLE 5.--GROWING SEASON  
 [Recorded in the period 1951-75  
 at Grangeville, Idaho]

Probability	Daily minimum temperature during growing season		
	Higher than 24°F	Higher than 28°F	Higher than 32°F
	<u>Days</u>	<u>Days</u>	<u>Days</u>
9 years in 10	155	122	94
8 years in 10	166	131	102
5 years in 10	187	148	118
2 years in 10	208	165	134
1 year in 10	219	174	142

TABLE 6.--GROWING SEASON  
 [Recorded in the period 1951-75  
 at Riggins, Idaho]

Probability	Daily minimum temperature during growing season		
	Higher than 24°F	Higher than 28°F	Higher than 32°F
	<u>Days</u>	<u>Days</u>	<u>Days</u>
9 years in 10	221	188	153
8 years in 10	238	198	161
5 years in 10	268	218	178
2 years in 10	299	237	194
1 year in 10	315	248	203



TABLE 7.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
1	Banner silt loam, 3 to 7 percent slopes-----	280	*
2	Banner silt loam, 7 to 12 percent slopes-----	890	0.1
3	Banner silt loam, 12 to 25 percent slopes-----	1,380	0.2
4	Bluesprin-Keuterville association-----	1,990	0.3
5	Bluesprin-Klickson association-----	28,400	3.8
6	Bluesprin-Lawyer association-----	4,340	0.6
7	Bluesprin-Rock outcrop complex-----	32,600	4.4
8	Boles silt loam, 3 to 7 percent slopes-----	6,400	0.9
9	Boles silt loam, 7 to 25 percent slopes-----	5,300	0.7
10	Brody cobbly loam, cool, 12 to 40 percent slopes-----	9,700	1.3
11	Brody-Telcher complex-----	2,060	0.3
12	Brody-Wapshilla association-----	8,100	1.1
13	Brower very gravelly loam, 40 to 90 percent slopes-----	18,400	2.5
14	Brower-Brownlee complex-----	1,630	0.2
15	Brower-Rock outcrop complex-----	5,500	0.7
16	Brownlee loam, 2 to 7 percent slopes-----	210	*
17	Brownlee loam, 7 to 12 percent slopes-----	400	0.1
18	Brownlee loam, 12 to 25 percent slopes-----	1,850	0.2
19	Brownlee loam, 25 to 40 percent slopes-----	620	0.1
20	Chard sandy loam, 3 to 7 percent slopes-----	260	*
21	Chard sandy loam, 7 to 12 percent slopes-----	340	*
22	Chard sandy loam, 12 to 25 percent slopes-----	2,310	0.3
23	Chard sandy loam, 25 to 40 percent slopes-----	480	0.1
24	Chard Variant loamy fine sand, 2 to 7 percent slopes-----	580	0.1
25	Chard Variant loamy fine sand, 7 to 25 percent slopes-----	310	*
26	Chicane silt loam, 2 to 7 percent slopes-----	1,990	0.3
27	Chicane silt loam, 7 to 12 percent slopes-----	5,100	0.7
28	Chicane silt loam, 12 to 25 percent slopes-----	2,350	0.3
29	Chicane silt loam, 25 to 40 percent slopes-----	560	0.1
30	De Masters silt loam, 7 to 25 percent slopes-----	2,550	0.3
31	De Masters silt loam, 25 to 40 percent slopes-----	580	0.1
32	De Masters-Riggins complex-----	5,700	0.8
33	De Masters-Suloaf silt loams-----	3,450	0.5
34	Ericson loam, 4 to 25 percent slopes-----	2,080	0.3
35	Ericson loam, 25 to 40 percent slopes-----	1,620	0.2
36	Ericson-Rock outcrop complex-----	1,110	0.1
37	Fenn silty clay, 2 to 7 percent slopes-----	6,440	0.9
38	Fenn silty clay, 7 to 25 percent slopes-----	220	*
39	Fenn very stony silty clay, 2 to 25 percent slopes-----	3,050	0.4
40	Fenn Variant silty clay, 0 to 7 percent slopes-----	570	0.1
41	Ferdinand silt loam, 2 to 7 percent slopes-----	4,750	0.6
42	Ferdinand silt loam, 7 to 25 percent slopes-----	7,400	1.0
43	Ferdinand silt loam, 25 to 40 percent slopes-----	640	0.1
44	Ferdinand-Bluesprin very cobbly loams-----	45,600	6.1
45	Ferdinand-Flybow-Riggins complex-----	29,100	3.9
46	Ferdinand-Riggins complex-----	13,900	1.9
47	Jacket silt loam, 3 to 7 percent slopes-----	260	*
48	Jacket silt loam, 7 to 12 percent slopes-----	1,250	0.2
49	Jacket silt loam, 12 to 25 percent slopes-----	2,600	0.3
50	Jacket silt loam, 25 to 40 percent slopes-----	1,800	0.2
51	Jacket Variant silt loam, 7 to 12 percent slopes-----	390	0.1
52	Jacket Variant silt loam, 12 to 25 percent slopes-----	250	*
53	Jacket Variant silt loam, 25 to 40 percent slopes-----	210	*
54	Johnson loam, 7 to 25 percent slopes-----	1,530	0.2
55	Johnson loam, 25 to 40 percent slopes-----	870	0.1
56	Jughandle loam, cool, 7 to 40 percent slopes-----	2,950	0.4
57	Jughandle loam, cool, 40 to 90 percent slopes-----	11,300	1.5
58	Jughandle-Ericson association-----	3,300	0.4
59	Jughandle-Suttler association-----	7,500	1.0
60	Jughandle Variant silt loam-----	870	0.1
61	Keuterville gravelly loam, 7 to 25 percent slopes-----	1,020	0.1
62	Keuterville gravelly loam, 25 to 40 percent slopes-----	1,580	0.2
63	Keuterville-Bluesprin complex-----	1,640	0.2
64	Keuterville-Bluesprin association-----	3,300	0.4
65	Keuterville-Klickson association-----	730	0.1
66	Klickson-Rock outcrop complex-----	11,600	1.6
67	Klickson-Suloaf complex-----	20,900	2.8
68	Klickson-Bluesprin association-----	28,100	3.8

See footnote at end of table.

TABLE 7.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
69	Klickson-Wapshilla association-----	4,300	0.6
70	Kooskia silt loam, low rainfall, 3 to 7 percent slopes-----	2,050	0.3
71	Kooskia silt loam, low rainfall, 7 to 12 percent slopes-----	1,450	0.2
72	Kooskia silt loam, low rainfall, 12 to 25 percent slopes-----	820	0.1
73	Lawyer-Rock outcrop complex-----	5,100	0.7
74	Lawyer-Bluesprin association-----	11,300	1.5
75	Lawyer-Tannahill association-----	10,400	1.4
76	Lickskillet-Tannahill complex-----	1,730	0.2
77	Meland silt loam, 3 to 7 percent slopes-----	2,150	0.3
78	Meland silt loam, 7 to 25 percent slopes-----	7,300	1.0
79	Meland silt loam, 25 to 40 percent slopes-----	420	0.1
80	Naz sandy loam, 25 to 40 percent slopes-----	670	0.1
81	Nazaton-Naz complex-----	10,200	1.4
82	Nazaton-Suttler association-----	8,800	1.2
83	Nez Perce silt loam, 2 to 7 percent slopes-----	64,800	8.6
84	Nez Perce silt loam, 7 to 12 percent slopes-----	17,800	2.4
85	Nez Perce silt loam, 12 to 25 percent slopes-----	3,500	0.5
86	Nicodemus loam-----	210	*
87	Nicodemus Variant loam-----	410	0.1
88	Nicodemus Variant cobbly loam-----	220	*
89	Oland silt loam, 10 to 40 percent slopes-----	750	0.1
90	Oland silt loam, 40 to 90 percent slopes-----	6,900	0.9
91	Oland Variant loam, 10 to 30 percent slopes-----	980	0.1
92	Riggins-Meland complex-----	3,800	0.5
93	Rock outcrop-----	9,600	1.3
94	Rock outcrop-Bluesprin complex-----	19,800	2.7
95	Rock outcrop-Brower complex-----	4,850	0.6
96	Rock outcrop-Klickson complex-----	2,800	0.4
97	Rock outcrop-Nazaton complex-----	1,980	0.3
98	Rock outcrop-Suttler complex-----	510	0.1
99	Rock outcrop-Tannahill complex-----	14,100	1.9
100	Shebang silt loam, 2 to 7 percent slopes-----	13,200	1.8
101	Shebang silt loam, 7 to 12 percent slopes-----	850	0.1
102	Shebang silt loam, 12 to 25 percent slopes-----	220	*
103	Spokel very stony loam, 40 to 90 percent slopes-----	1,590	0.2
104	Spokel-Brower association-----	5,200	0.7
105	Spokel-Nazaton association-----	2,150	0.3
106	Spokel-Suttler association-----	740	0.1
107	Suloaf silt loam, 3 to 7 percent slopes-----	340	*
108	Suloaf silt loam, 7 to 25 percent slopes-----	5,600	0.7
109	Suloaf silt loam, 25 to 40 percent slopes-----	1,660	0.2
110	Suloaf cobbly silt loam, 7 to 40 percent slopes-----	12,500	1.7
111	Suloaf-Meland silt loams-----	3,850	0.5
112	Tannahill loam, 7 to 40 percent slopes-----	3,400	0.5
113	Tannahill-Lickskillet complex-----	23,300	3.1
114	Tannahill-Rock outcrop complex-----	12,600	1.7
115	Telcher silt loam, 3 to 7 percent slopes-----	1,090	0.1
116	Telcher silt loam, 7 to 25 percent slopes-----	5,450	0.7
117	Telcher silt loam, 25 to 40 percent slopes-----	3,200	0.4
118	Telcher-Suloaf silt loams-----	4,150	0.6
119	Typic Xerofluvents, cobbly-----	4,500	0.6
120	Uhlorn silt loam, 2 to 7 percent slopes-----	1,440	0.2
121	Uhlorn silt loam, 7 to 12 percent slopes-----	9,900	1.3
122	Uhlorn silt loam, 12 to 25 percent slopes-----	8,300	1.1
123	Uhlorn silt loam, 25 to 40 percent slopes-----	1,400	0.2
124	Uhlorn silt loam, 40 to 65 percent slopes-----	450	0.1
125	Uptmor silt loam, 3 to 7 percent slopes-----	1,310	0.2
126	Uptmor silt loam, 7 to 25 percent slopes-----	6,050	0.8
127	Uptmor silt loam, 25 to 40 percent slopes-----	390	0.1
128	Wapshilla loam, 7 to 25 percent slopes-----	720	0.1
129	Westlake silt loam-----	5,000	0.7
130	Wilkins silt loam-----	4,750	0.6
131	Zaza loam, 7 to 40 percent slopes-----	2,550	0.3
	Water-----	2,450	0.3
	Total-----	747,040	100.0

\* Less than 0.1 percent.



TABLE 8.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES

[Only the soils that support rangeland vegetation suitable for grazing are listed]

Soil name and map symbol	Range site and precipitation zone	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight Lb/acre		
1, 2, 3----- Banner	Loamy, 12-16" PZ-----	Favorable Normal Unfavorable	1,700 1,500 1,300	Bluebunch wheatgrass----- Idaho fescue----- Sandberg bluegrass----- Big bluegrass----- Arrowleaf balsamroot----- Lupine-----	55 5 5 5 5 5
4*: Bluesprin-----	South Slope, 16-22" PZ-----	Favorable Normal Unfavorable	2,200 1,700 1,300	Bluebunch wheatgrass----- Idaho fescue----- Big bluegrass----- Arrowleaf balsamroot----- Lupine-----	35 25 5 5 5
Keuterville.					
5*: Bluesprin-----	South Slope, 16-22" PZ-----	Favorable Normal Unfavorable	2,200 1,700 1,300	Bluebunch wheatgrass----- Idaho fescue----- Big bluegrass----- Arrowleaf balsamroot----- Lupine-----	35 25 5 5 5
Klickson.					
6*: Bluesprin-----	South Slope, 16-22" PZ-----	Favorable Normal Unfavorable	2,200 1,700 1,300	Bluebunch wheatgrass----- Idaho fescue----- Big bluegrass----- Arrowleaf balsamroot----- Lupine-----	35 25 5 5 5
Lawyer-----	North Slope, 22"+ PZ-----	Favorable Normal Unfavorable	3,000 2,600 2,000	Idaho fescue----- Bluebunch wheatgrass----- Sedge----- Arrowleaf balsamroot----- Biscuitroot----- Sticky geranium----- Lupine----- Common snowberry----- Douglas hawthorn-----	30 8 7 5 5 5 5 5 5
7*: Bluesprin-----	South Slope, 16-22" PZ-----	Favorable Normal Unfavorable	2,200 1,700 1,300	Bluebunch wheatgrass----- Idaho fescue----- Big bluegrass----- Arrowleaf balsamroot----- Lupine-----	35 25 5 5 5
Rock outcrop.					
13----- Brower	Schist Slope South, 16-22" PZ	Favorable Normal Unfavorable	1,800 1,500 1,000	Bluebunch wheatgrass----- Idaho fescue----- Arrowleaf balsamroot----- Biscuitroot----- Lupine----- Tapertip hawksbeard----- White hawkweed-----	25 20 8 7 7 5 5

See footnote at end of table.

TABLE 8.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site and precipitation zone	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight Lb/acre		
14*: Brower-----	Schist Slope South, 16-22" PZ	Favorable	1,800	Bluebunch wheatgrass-----	25
		Normal	1,500	Idaho fescue-----	20
		Unfavorable	1,000	Arrowleaf balsamroot-----	8
				Biscuitroot-----	7
				Lupine-----	7
				Tapertip hawksbeard-----	5
				White hawkweed-----	5
Brownlee-----	Schist, 16-22" PZ-----	Favorable	2,200	Bluebunch wheatgrass-----	30
		Normal	1,800	Idaho fescue-----	15
		Unfavorable	1,000	Arrowleaf balsamroot-----	10
				Lupine-----	5
				Prairie junegrass-----	5
				Tapertip hawksbeard-----	5
				Sandberg bluegrass-----	5
				Common snowberry-----	5
15*: Brower-----	Schist Slope South, 16-22" PZ	Favorable	1,800	Bluebunch wheatgrass-----	25
		Normal	1,500	Idaho fescue-----	20
		Unfavorable	1,000	Arrowleaf balsamroot-----	8
				Biscuitroot-----	7
				Lupine-----	7
				Tapertip hawksbeard-----	5
				White hawkweed-----	5
Rock outcrop.					
16, 17, 18, 19----- Brownlee	Schist, 16-22" PZ-----	Favorable	2,200	Bluebunch wheatgrass-----	30
		Normal	1,800	Idaho fescue-----	15
		Unfavorable	1,000	Arrowleaf balsamroot-----	10
				Lupine-----	10
				Sandberg bluegrass-----	5
				Common snowberry-----	5
				Tapertip hawksbeard-----	5
20, 21, 22, 23----- Chard	Loamy, 12-16" PZ-----	Favorable	1,400	Bluebunch wheatgrass-----	60
		Normal	1,050	Arrowleaf balsamroot-----	5
		Unfavorable	700	Sandberg bluegrass-----	5
				Smooth sumac-----	5
				Sand dropseed-----	5
24, 25----- Chard Variant	Loamy, 12-16" PZ-----	Favorable	1,400	Bluebunch wheatgrass-----	60
		Normal	1,200	Sandberg bluegrass-----	5
		Unfavorable	1,000	Arrowleaf balsamroot-----	5
				Biscuitroot-----	5
				Lupine-----	5
32*: De Masters.					
Riggins-----	Shallow Stony, 16-22" PZ-----	Favorable	1,000	Bluebunch wheatgrass-----	40
		Normal	750	Sandberg bluegrass-----	5
		Unfavorable	600	Idaho fescue-----	5
				Balsamroot-----	5
39----- Fenn	Dense Stony Clay, 22"+ PZ-----	Favorable	1,800	California danthonia-----	20
		Normal	1,700	Ovalhead sedge-----	15
		Unfavorable	1,600	Idaho fescue-----	10
				Baltic rush-----	5
				Gland cinquefoil-----	5
				Cous biscuitroot-----	5
				American bistort-----	5
				Common camas-----	5

See footnote at end of table.



TABLE 8.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site and precipitation zone	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight Lb/acre		
41, 42, 43----- Ferdinand	Loamy, 22"+ PZ-----	Favorable	2,400	Idaho fescue-----	30
		Normal	2,000	Bluebunch wheatgrass-----	25
		Unfavorable	1,800	Arrowleaf balsamroot-----	5
				Sticky geranium-----	5
				Lupine-----	5
44*: Ferdinand-----	South Slope, 16-22" PZ-----	Favorable	2,400	Bluebunch wheatgrass-----	35
		Normal	1,500	Idaho fescue-----	15
		Unfavorable	1,300	Lupine-----	6
				Prairie junegrass-----	5
				Tapertip hawksbeard-----	5
				Arrowleaf balsamroot-----	5
				Penstemon-----	5
Bluesprin-----	South Slope, 16-22" PZ-----	Favorable	2,200	Bluebunch wheatgrass-----	35
		Normal	1,700	Idaho fescue-----	25
		Unfavorable	1,300	Big bluegrass-----	5
				Arrowleaf balsamroot-----	5
				Lupine-----	5
45*: Ferdinand-----	Loamy, 22"+ PZ-----	Favorable	2,400	Idaho fescue-----	30
		Normal	2,000	Bluebunch wheatgrass-----	25
		Unfavorable	1,800	Arrowleaf balsamroot-----	5
				Sticky geranium-----	5
				Lupine-----	5
Flybow-----	Very Shallow, 12-22" PZ-----	Favorable	600	Bluebunch wheatgrass-----	20
		Normal	400	Sandberg bluegrass-----	15
		Unfavorable	300	Cutleaf balsamroot-----	10
				Eriogonum-----	10
				Biscuitroot-----	8
				Idaho fescue-----	6
				Lupine-----	5
Riggins-----	Shallow Stony, 16-22" PZ-----	Favorable	1,000	Bluebunch wheatgrass-----	40
		Normal	750	Sandberg bluegrass-----	5
		Unfavorable	600	Idaho fescue-----	5
				Balsamroot-----	5
46*: Ferdinand-----	Loamy, 22"+ PZ-----	Favorable	2,400	Idaho fescue-----	30
		Normal	2,000	Bluebunch wheatgrass-----	25
		Unfavorable	1,800	Arrowleaf balsamroot-----	5
				Sticky geranium-----	5
				Lupine-----	5
Riggins-----	Shallow Stony, 16-22" PZ-----	Favorable	1,000	Bluebunch wheatgrass-----	40
		Normal	750	Sandberg bluegrass-----	5
		Unfavorable	600	Idaho fescue-----	5
				Balsamroot-----	5
47, 48, 49, 50----- Jacket	North Slope, 22"+ PZ-----	Favorable	3,000	Idaho fescue-----	20
		Normal	2,600	Common snowberry-----	5
		Unfavorable	2,000	Black hawthorn-----	5
				Blue wildrye-----	5
				Cinquefoil-----	5
				Sticky geranium-----	5
				Catchweed bedstraw-----	5
				Rose-----	5
				White spirea-----	5
				Saskatoon serviceberry-----	5

See footnote at end of table.

TABLE 8.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site and precipitation zone	Kind of year	Total production		Characteristic vegetation	Compo- sition
			Dry weight Lb/acre			
51, 52, 53----- Jacket Variant	North Slope, 22"+ PZ-----	Favorable	2,800	Idaho fescue-----	20	
		Normal	2,500	Black hawthorn-----	5	
		Unfavorable	1,800	Blue wildrye-----	5	
				Sticky geranium-----	5	
				Catchweed bedstraw-----	5	
				Cinquefoil-----	5	
				Mallow ninebark-----	5	
				Common snowberry-----	5	
				Rose-----	5	
				White spirea-----	5	
				Saskatoon serviceberry-----	5	
60----- Jughandle Variant	Semi-Wet Meadow-----	Favorable	3,000	Sedge-----	40	
		Normal	2,500	Tufted hairgrass-----	25	
		Unfavorable	1,700	Rush-----	5	
				Sitka alder-----	5	
				Willow-----	5	
63*: Keuterville.						
Bluesprin-----	South Slope, 16-22" PZ-----	Favorable	2,200	Bluebunch wheatgrass-----	35	
		Normal	1,700	Idaho fescue-----	25	
		Unfavorable	1,300	Big bluegrass-----	5	
				Arrowleaf balsamroot-----	5	
				Lupine-----	5	
64*: Keuterville.						
Bluesprin-----	South Slope, 16-22" PZ-----	Favorable	2,200	Bluebunch wheatgrass-----	35	
		Normal	1,700	Idaho fescue-----	25	
		Unfavorable	1,300	Big bluegrass-----	5	
				Arrowleaf balsamroot-----	5	
				Lupine-----	5	
68*: Klickson.						
Bluesprin-----	South Slope, 16-22" PZ-----	Favorable	2,200	Bluebunch wheatgrass-----	35	
		Normal	1,700	Idaho fescue-----	25	
		Unfavorable	1,300	Big bluegrass-----	5	
				Arrowleaf balsamroot-----	5	
				Lupine-----	5	
73*: Lawyer-----	North Slope, 22"+ PZ-----	Favorable	3,000	Idaho fescue-----	30	
Normal		2,600	Bluebunch wheatgrass-----	8		
Unfavorable		2,000	Sedge-----	7		
			Arrowleaf balsamroot-----	5		
			Biscuitroot-----	5		
			Sticky geranium-----	5		
			Lupine-----	5		
			Common snowberry-----	5		
			Douglas hawthorn-----	5		
Rock outcrop.						

See footnote at end of table.



TABLE 8.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site and precipitation zone	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight Lb/acre		
74*: Lawyer-----	North Slope, 22"+ PZ-----	Favorable	3,000	Idaho fescue-----	30
		Normal	2,600	Bluebunch wheatgrass-----	8
		Unfavorable	2,000	Sedge-----	7
				Arrowleaf balsamroot-----	5
				Biscuitroot-----	5
				Sticky geranium-----	5
				Lupine-----	5
				Common snowberry-----	5
				Douglas hawthorn-----	5
Bluesprin-----	South Slope, 16-22" PZ-----	Favorable	2,200	Bluebunch wheatgrass-----	35
		Normal	1,700	Idaho fescue-----	25
		Unfavorable	1,300	Big bluegrass-----	5
				Arrowleaf balsamroot-----	5
				Lupine-----	5
75*: Lawyer-----	North Slope, 22"+ PZ-----	Favorable	3,000	Idaho fescue-----	30
		Normal	2,600	Bluebunch wheatgrass-----	8
		Unfavorable	2,000	Sedge-----	7
				Arrowleaf balsamroot-----	5
				Biscuitroot-----	5
				Sticky geranium-----	5
				Lupine-----	5
				Common snowberry-----	5
				Douglas hawthorn-----	5
Tannahill-----	Loamy, 12-16" PZ-----	Favorable	1,200	Bluebunch wheatgrass-----	50
		Normal	1,000	Arrowleaf balsamroot-----	7
		Unfavorable	800	Sandberg bluegrass-----	5
76*: Lickskillet-----	Shallow Stony, 12-16" PZ-----	Favorable	800	Bluebunch wheatgrass-----	45
		Normal	600	Sandberg bluegrass-----	10
		Unfavorable	300	Cutleaf balsamroot-----	5
				Lomatium-----	5
				Penstemon-----	5
				Lupine-----	5
				Western yarrow-----	5
Tannahill-----	Loamy, 12-16" PZ-----	Favorable	1,600	Bluebunch wheatgrass-----	55
		Normal	1,500	Sandberg bluegrass-----	5
		Unfavorable	1,300	Arrowleaf balsamroot-----	5
89----- Oland	Schist, 16-22" PZ-----	Favorable	2,600	Idaho fescue-----	20
		Normal	2,000	Bluebunch wheatgrass-----	15
		Unfavorable	1,700	Big bluegrass-----	10
				Douglas hawthorn-----	7
				Sedge-----	5
				Geranium-----	5
				Cinquefoil-----	5
				Lupine-----	5
				Common snowberry-----	5
90----- Oland	Schist Slope North, 16-22" PZ	Favorable	2,600	Idaho fescue-----	20
		Normal	2,000	Bluebunch wheatgrass-----	15
		Unfavorable	1,700	Big bluegrass-----	10
				Sedge-----	10
				Douglas hawthorn-----	7
				Geranium-----	5
				Cinquefoil-----	5
				Lupine-----	5
				Common snowberry-----	5

See footnote at end of table.

TABLE 8.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site and precipitation zone	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight Lb/acre		
91----- Oland Variant	Schist, 16-22" PZ-----	Favorable	2,400	Idaho fescue-----	15
		Normal	1,900	Bluebunch wheatgrass-----	20
		Unfavorable	1,600	Prairie junegrass-----	5
				Arrowleaf balsamroot-----	5
				Geranium-----	5
				Lupine-----	5
				Cinquefoil-----	5
92*: Riggins-----	Shallow Stony, 16-22" PZ-----	Favorable	1,000	Bluebunch wheatgrass-----	40
		Normal	750	Sandberg bluegrass-----	5
		Unfavorable	600	Idaho fescue-----	5
				Balsamroot-----	5
Meland-----	Loamy, 16-22" PZ-----	Favorable	2,400	Idaho fescue-----	30
		Normal	1,800	Bluebunch wheatgrass-----	25
		Unfavorable	1,500	Arrowleaf balsamroot-----	7
				Big bluegrass-----	5
94*: Rock outcrop.					
Bluesprin-----	South Slope, 16-22" PZ-----	Favorable	2,200	Bluebunch wheatgrass-----	35
		Normal	1,700	Idaho fescue-----	25
		Unfavorable	1,300	Big bluegrass-----	5
				Arrowleaf balsamroot-----	5
				Lupine-----	5
95*: Rock outcrop.					
Brower-----	Schist Slope South, 16-22" PZ	Favorable	1,800	Bluebunch wheatgrass-----	25
		Normal	1,500	Idaho fescue-----	20
		Unfavorable	1,000	Arrowleaf balsamroot-----	8
				Biscuitroot-----	7
				Lupine-----	7
				Tapertip hawksbeard-----	5
				White hawkweed-----	5
99*: Rock outcrop.					
Tannahill-----	Loamy, 12-16" PZ-----	Favorable	1,300	Bluebunch wheatgrass-----	50
		Normal	1,100	Arrowleaf balsamroot-----	7
		Unfavorable	800	Sandberg bluegrass-----	5
104*: Spokel.					
Brower-----	Schist Slope South, 16-22" PZ	Favorable	1,800	Bluebunch wheatgrass-----	25
		Normal	1,500	Idaho fescue-----	20
		Unfavorable	1,000	Arrowleaf balsamroot-----	8
				Biscuitroot-----	7
				Lupine-----	7
				Tapertip hawksbeard-----	5
				White hawkweed-----	5
112----- Tannahill	Loamy, 12-16" PZ-----	Favorable	1,600	Bluebunch wheatgrass-----	55
		Normal	1,500	Sandberg bluegrass-----	5
		Unfavorable	1,300	Arrowleaf balsamroot-----	5
113*: Tannahill-----	Loamy, 12-16" PZ-----	Favorable	1,300	Bluebunch wheatgrass-----	50
		Normal	1,100	Arrowleaf balsamroot-----	7
		Unfavorable	800	Sandberg bluegrass-----	5

See footnote at end of table.



TABLE 8.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site and precipitation zone	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight Lb/acre		
113*: Lickskillet-----	Shallow Stony, 12-16" PZ-----	Favorable	800	Bluebunch wheatgrass-----	45
		Normal	600	Sandberg bluegrass-----	10
		Unfavorable	300	Cutleaf balsamroot-----	5
				Lomatium-----	5
				Penstemon-----	5
				Lupine-----	5
				Western yarrow-----	5
114*: Tannahill-----	Loamy, 12-16" PZ-----	Favorable	1,300	Bluebunch wheatgrass-----	50
		Normal	1,100	Arrowleaf balsamroot-----	7
		Unfavorable	800	Sandberg bluegrass-----	5
Rock outcrop.					
124----- Uhlorn	Loamy, 22"+ PZ-----	Favorable	2,600	Idaho fescue-----	35
		Normal	2,100	Bluebunch wheatgrass-----	20
		Unfavorable	1,800	Big bluegrass-----	5
				Arrowleaf balsamroot-----	5
				Lupine-----	5

\* See map unit description for the composition and behavior of the map unit.

TABLE 9.--YIELDS PER ACRE OF CROPS AND PASTURE

[All yields were estimated for a high level of management. Absence of a yield figure indicates the crop is seldom grown or is not suited]

Soil name and map symbol	Winter wheat	Barley	Grass- legume hay	Pasture	Dry peas	Clover seed
	<u>Bu</u>	<u>Bu</u>	<u>Ton</u>	<u>AUM*</u>	<u>Lb</u>	<u>Lb</u>
1, 2, 3----- Banner	---	---	1.5	3	---	---
8, 9----- Boles	50	52	3.5	7	---	---
11----- Brody-Telcher	---	---	2	4	---	---
16----- Brownlee	40	45	1.7	4	---	---
17----- Brownlee	35	35	1.5	3	---	---
18----- Brownlee	30	30	1.3	3	---	---
19----- Brownlee	28	26	1.2	3	---	---
20, 21----- Chard	---	---	1	2	---	---
22, 23----- Chard	---	---	---	2	---	---
24----- Chard Variant	---	---	---	2	---	---
26----- Chicane	85	50	3.5	7	2,000	450
27, 28----- Chicane	80	45	3.5	7	1,800	450
29----- Chicane	60	35	3.5	7	---	---
30, 31----- De Masters	---	---	2	4	---	---
32----- De Masters-Riggins	---	---	2	4	---	---
33----- De Masters-Suloaf	---	---	2	4	---	---
34, 35----- Ericson	---	---	2	4	---	---
37----- Fenn	65	50	3	6	1,800	400
38----- Fenn	65	50	3	6	1,600	400
40----- Fenn Variant	---	---	3	6	---	---

See footnote at end of table.



TABLE 9.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Winter wheat	Barley	Grass- legume hay	Pasture	Dry peas	Clover seed
	<u>Bu</u>	<u>Bu</u>	<u>Ton</u>	<u>AUM*</u>	<u>Lb</u>	<u>Lb</u>
41, 42----- Ferdinand	50	35	2	4	1,200	---
43----- Ferdinand	---	---	2	4	---	---
46----- Ferdinand-Riggins	---	---	2	4	---	---
47, 48, 49----- Jacket	50	35	1.5	3	---	---
50----- Jacket	40	30	1.5	3	---	---
51, 52----- Jacket Variant	50	40	2	4	---	---
53----- Jacket Variant	---	---	1.5	3	---	---
54, 55----- Johnson	---	---	2	4	---	---
60----- Jughandle Variant	---	---	2	4	---	---
61, 62----- Keuterville	---	---	2	4	---	---
63----- Keuterville-Bluesprin	---	---	2	4	---	---
70, 71----- Kooskia	60	42	3	6	1,800	---
72----- Kooskia	50	35	3	6	1,500	---
77, 78----- Meland	50	35	1.5	3	1,500	---
79----- Meland	40	30	1.5	3	---	---
80----- Naz	---	---	2	4	---	---
83, 84, 85----- Nez Perce	70	52	3	6	2,000	400
86----- Nicodemus	---	---	2	4	---	---
87----- Nicodemus Variant	---	---	3	6	---	---
88----- Nicodemus Variant	---	---	---	6	---	---
89----- Oland	---	---	1.5	4	---	---
91----- Oland Variant	---	---	2	4	---	---

See footnote at end of table.

TABLE 9.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Winter wheat	Barley	Grass- legume hay	Pasture	Dry peas	Clover seed
	<u>Bu</u>	<u>Bu</u>	<u>Ton</u>	<u>AUM*</u>	<u>Lb</u>	<u>Lb</u>
92----- Riggins-Meland	---	---	1.5	3	---	---
100, 101, 102----- Shebang	70	40	3	6	1,300	350
107, 108, 109----- Suloaf	---	---	2	4	---	---
111----- Suloaf-Meland	---	---	2	4	---	---
112----- Tannahill	---	---	1.5	3	---	---
115, 116, 117----- Telcher	---	---	2	4	---	---
118----- Telcher-Suloaf	---	---	2	4	---	---
120----- Uhlorn	80	40	3	6	2,000	450
121, 122----- Uhlorn	75	40	3	6	2,000	450
123----- Uhlorn	60	35	3	6	---	---
125----- Uptmor	40	38	3	6	---	---
126----- Uptmor	35	35	3	6	---	---
127----- Uptmor	---	---	3	6	---	---
128----- Wapshilla	---	---	1.5	3	---	---
129----- Westlake	---	---	2	4	---	---
130----- Wilkins	---	---	2	4	---	---

\* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for a period of 30 days.



TABLE 10.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available]

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Equipment limitation	Seedling mortality	Wind-throw hazard	Plant competition	Common trees	Site index	
4*: Bluesprin.								
Keuterville-----	3f	Severe	Moderate	Slight	Slight	Ponderosa pine-----	90	Ponderosa pine.
5*: Bluesprin.								
Klickson-----	2f	Severe	Moderate	Slight	Severe	Douglas-fir----- Ponderosa pine-----	100 ---	Ponderosa pine.
8, 9----- Boles	4o	Slight	Moderate	Slight	Moderate	Ponderosa pine-----	80	Ponderosa pine.
10----- Brody	2f	Severe	Slight	Slight	Moderate	Engelmann spruce---- Grand fir----- Western larch----- Douglas-fir-----	--- 56 --- ---	Grand fir, Douglas-fir.
11*: Brody-----	2f	Severe	Slight	Slight	Moderate	Engelmann spruce---- Grand fir----- Western larch----- Douglas-fir-----	--- 56 --- ---	Grand fir, Douglas-fir.
Telcher-----	2o	Moderate	Moderate	Slight	Severe	Ponderosa pine----- Douglas-fir----- Grand fir-----	101 --- ---	Ponderosa pine, Douglas-fir.
12*: Brody-----	2f	Severe	Slight	Slight	Moderate	Engelmann spruce---- Grand fir----- Western larch----- Douglas-fir-----	--- 56 --- ---	Grand fir, Douglas-fir.
Wapshilla-----	2f	Severe	Moderate	Slight	Severe	Grand fir----- Douglas-fir----- Ponderosa pine----- Western larch-----	56 101 --- ---	Douglas-fir, ponderosa pine, grand fir.
30----- De Masters	4o	Moderate	Moderate	Slight	Slight	Ponderosa pine-----	84	Ponderosa pine.
31----- De Masters	4r	Severe	Moderate	Slight	Slight	Ponderosa pine-----	84	Ponderosa pine.
32*: De Masters----- Riggins.	4o	Moderate	Moderate	Slight	Slight	Ponderosa pine-----	84	Ponderosa pine.
33*: De Masters----- Suloaf-----	4o 3o	Moderate Moderate	Moderate Moderate	Slight Slight	Slight Severe	Ponderosa pine----- Douglas-fir----- Ponderosa pine-----	84 --- 93	Ponderosa pine. Douglas-fir, ponderosa pine.

.See footnote at end of table.

TABLE 10.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Equipment limitation	Seedling mortality	Wind-throw hazard	Plant competition	Common trees	Site index	
34----- Ericson	3o	Slight	Slight	Slight	Slight	Grand fir----- Subalpine fir----- Englemann spruce----- Douglas-fir----- Lodgepole pine----- Western larch-----	50 --- --- --- --- ---	Grand fir, Douglas-fir.
35----- Ericson	3r	Severe	Slight	Slight	Slight	Grand fir----- Subalpine fir----- Englemann spruce----- Douglas-fir----- Lodgepole pine----- Western larch-----	50 --- --- --- --- ---	Grand fir, Douglas-fir.
36*: Ericson-----	3r	Severe	Slight	Slight	Slight	Grand fir----- Subalpine fir----- Englemann spruce----- Douglas-fir----- Lodgepole pine----- Western larch-----	50 --- --- --- --- ---	Grand fir, Douglas-fir.
Rock outcrop.								
54----- Johnson	3o	Moderate	Moderate	Moderate	Slight	Ponderosa pine-----	85	Ponderosa pine.
55----- Johnson	3r	Severe	Moderate	Moderate	Slight	Ponderosa pine-----	85	Ponderosa pine.
56----- Jughandle	3o	Moderate	Slight	Slight	Severe	Subalpine fir----- Engelmann spruce----- Grand fir----- Douglas-fir----- Lodgepole pine----- Western larch-----	--- 50 --- --- --- ---	Grand fir, Douglas-fir.
57----- Jughandle	3r	Severe	Slight	Slight	Severe	Subalpine fir----- Engelmann spruce----- Grand fir----- Douglas-fir----- Lodgepole pine----- Western larch-----	--- 50 --- --- --- ---	Grand fir, Douglas-fir.
58*: Jughandle-----	3r	Severe	Slight	Slight	Severe	Subalpine fir----- Engelmann spruce----- Grand fir----- Douglas-fir----- Lodgepole pine----- Western larch-----	--- 50 --- --- --- ---	Grand fir, Douglas-fir.
Ericson-----	3r	Severe	Slight	Slight	Slight	Subalpine fir----- Engelmann spruce----- Grand fir----- Douglas-fir----- Lodgepole pine----- Western larch-----	--- --- --- --- --- ---	Grand fir, Douglas-fir.
59*: Jughandle-----	3r	Severe	Slight	Slight	Severe	Subalpine fir----- Engelmann spruce----- Grand fir----- Douglas-fir----- Lodgepole pine----- Western larch-----	--- 50 --- --- --- ---	Grand fir, Douglas-fir.

See footnote at end of table.



TABLE 10.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Equipment limitation	Seedling mortality	Wind-throw hazard	Plant competition	Common trees	Site index	
59*: Suttler-----	2r	Severe	Moderate	Slight	Severe	Grand fir----- Douglas-fir----- Ponderosa pine----- Western larch-----	60 --- --- ---	Douglas-fir, ponderosa pine.
61----- Keuterville	3f	Slight	Moderate	Slight	Slight	Ponderosa pine-----	90	Ponderosa pine.
62----- Keuterville	3f	Moderate	Moderate	Slight	Slight	Ponderosa pine-----	90	Ponderosa pine.
63*: Keuterville----- Bluesprin.	3f	Moderate	Moderate	Slight	Slight	Ponderosa pine-----	90	Ponderosa pine.
64*: Keuterville----- Bluesprin.	3f	Severe	Moderate	Slight	Slight	Ponderosa pine-----	90	Ponderosa pine.
65*: Keuterville----- Klickson-----	3f 2f	Severe Severe	Moderate Moderate	Slight Slight	Slight Severe	Ponderosa pine----- Douglas-fir----- Ponderosa pine-----	90 100 ---	Ponderosa pine.
66*: Klickson-----  Rock outcrop.	2f	Severe	Moderate	Slight	Severe	Douglas-fir----- Ponderosa pine-----	100 ---	
67*: Klickson-----  Suloaf-----	2f 3r	Severe Severe	Moderate Moderate	Slight Slight	Severe Severe	Douglas-fir----- Ponderosa pine----- Douglas-fir----- Ponderosa pine-----	100 --- --- 93	Douglas-fir, ponderosa pine.
68*: Klickson-----  Bluesprin.	2f	Severe	Moderate	Slight	Severe	Douglas-fir----- Ponderosa pine-----	100 ---	
69*: Klickson-----  Wapshilla-----	2f 2f	Severe Severe	Moderate Moderate	Slight Slight	Severe Severe	Douglas-fir----- Ponderosa pine----- Grand fir----- Douglas-fir----- Ponderosa pine----- Western larch-----	100 --- 56 101 --- ---	Douglas-fir, ponderosa pine, grand fir.
70, 71, 72----- Kooskia	4o	Slight	Moderate	Slight	Moderate	Ponderosa pine-----	80	Ponderosa pine.
80----- Naz	2o	Moderate	Moderate	Slight	Severe	Douglas-fir----- Ponderosa pine-----	100 ---	Douglas-fir, ponderosa pine.
81*: Nazaton-----	2f	Severe	Slight	Slight	Severe	Douglas-fir----- Ponderosa pine-----	100 ---	Douglas-fir, ponderosa pine.

See footnote at end of table.

TABLE 10.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Equipment limitation	Seedling mortality	Wind-throw hazard	Plant competition	Common trees	Site index	
81*: Naz-----	2r	Severe	Moderate	Slight	Severe	Douglas-fir----- Ponderosa pine-----	100 ---	Douglas-fir, ponderosa pine.
82*: Nazaton-----	2f	Severe	Slight	Slight	Severe	Douglas-fir----- Ponderosa pine-----	100 ---	Douglas-fir, ponderosa pine.
Suttler-----	2r	Severe	Moderate	Slight	Severe	Grand fir----- Douglas-fir----- Ponderosa pine----- Western larch-----	60 --- --- ---	Douglas-fir, ponderosa pine.
96*: Rock outcrop.								
Klickson-----	2f	Severe	Moderate	Slight	Severe	Douglas-fir----- Ponderosa pine-----	100 ---	Ponderosa pine.
97*: Rock outcrop.								
Nazaton-----	2f	Severe	Slight	Slight	Severe	Douglas-fir----- Ponderosa pine-----	100 ---	Douglas-fir, ponderosa pine.
98*: Rock outcrop.								
Suttler-----	2r	Severe	Moderate	Slight	Severe	Grand fir----- Douglas-fir----- Ponderosa pine----- Western larch-----	60 --- --- ---	Douglas-fir, ponderosa pine.
103----- Spokel	3x	Severe	Moderate	Moderate	Slight	Ponderosa pine-----	85	Ponderosa pine.
104*: Spokel----- Brower.	3f	Severe	Moderate	Moderate	Slight	Ponderosa pine-----	85	Ponderosa pine.
105*: Spokel-----	3f	Severe	Moderate	Moderate	Slight	Ponderosa pine-----	85	Ponderosa pine.
Nazaton-----	2f	Severe	Slight	Slight	Severe	Douglas-fir----- Ponderosa pine-----	100 ---	Douglas-fir, ponderosa pine.
106*: Spokel-----	3f	Severe	Moderate	Moderate	Slight	Ponderosa pine-----	85	Ponderosa pine.
Suttler-----	2r	Severe	Moderate	Slight	Severe	Grand fir----- Douglas-fir----- Ponderosa pine----- Western larch-----	60 --- --- ---	Douglas-fir, ponderosa pine.
107----- Suloaf	3o	Slight	Moderate	Slight	Severe	Douglas-fir----- Ponderosa pine-----	--- 93	Douglas-fir, ponderosa pine.
108, 109, 110----- Suloaf	3o	Moderate	Moderate	Slight	Severe	Douglas-fir----- Ponderosa pine-----	--- 93	Douglas-fir, ponderosa pine.
111*: Suloaf----- Meland.	3o	Moderate	Moderate	Slight	Severe	Douglas-fir----- Ponderosa pine-----	--- 93	Douglas-fir, ponderosa pine.

See footnote at end of table.



TABLE 10.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Equipment limitation	Seedling mortality	Wind-throw hazard	Plant competition	Common trees	Site index	
115, 116----- Telcher	2o	Slight	Moderate	Slight	Severe	Ponderosa pine----- Douglas-fir----- Grand fir----- Western larch-----	101 --- --- ---	Ponderosa pine, Douglas-fir.
117----- Telcher	2o	Moderate	Moderate	Slight	Severe	Ponderosa pine----- Douglas-fir----- Grand fir----- Western larch-----	101 --- --- ---	Ponderosa pine, Douglas-fir.
118*: Telcher-----	2o	Moderate	Moderate	Slight	Severe	Ponderosa pine----- Douglas-fir----- Grand fir----- Western larch-----	101 --- --- ---	Ponderosa pine, Douglas-fir.
Suloaf-----	3o	Moderate	Moderate	Slight	Severe	Douglas-fir----- Ponderosa pine-----	--- 93	Douglas-fir, ponderosa pine.
125----- Uptmor	3o	Slight	Moderate	Slight	Moderate	Ponderosa pine----- Douglas-fir-----	93 ---	Douglas-fir, ponderosa pine.
126----- Uptmor	3o	Slight	Moderate	Slight	Moderate	Ponderosa pine----- Douglas-fir-----	93 ---	Douglas-fir, ponderosa pine.
127----- Uptmor	3o	Moderate	Moderate	Slight	Moderate	Ponderosa pine----- Douglas-fir-----	93 ---	Douglas-fir, ponderosa pine.
128----- Wapshilla	2o	Moderate	Moderate	Slight	Severe	Grand fir----- Douglas-fir----- Ponderosa pine----- Western larch-----	56 101 --- ---	Douglas-fir, ponderosa pine, grand fir.
131----- Zaza	3d	Severe	Moderate	Severe	Slight	Douglas-fir----- Ponderosa pine-----	85 ---	Douglas-fir, ponderosa pine.

\* See map unit description for the composition and behavior of the map unit.

TABLE 11.--WOODLAND UNDERSTORY VEGETATION

[Only the soils suitable for production of commercial trees are listed]

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		<u>Lb/acre</u>		<u>Pct</u>
4*: Bluesprin.				
Keuterville-----	Favorable	1,000	Common snowberry-----	15
	Normal	900	Bluebunch wheatgrass-----	12
	Unfavorable	700	Pine reedgrass-----	10
			White spirea-----	10
			Elk sedge-----	8
			Idaho fescue-----	5
			Vetch-----	5
			Lupine-----	5
			Sticky geranium-----	5
			Rose-----	5
5*: Bluesprin.				
Klickson-----	Favorable	1,200	Creambush oceanspray-----	15
	Normal	900	Mallow ninebark-----	15
	Unfavorable	700	Pine reedgrass-----	7
			Largeleaf sandwort-----	7
			Rose-----	6
			Common snowberry-----	6
			Columbia brome-----	5
			Sedge-----	5
			White spirea-----	5
8, 9-----	Favorable	1,800	Bluebunch wheatgrass-----	15
Boles	Normal	1,500	Common snowberry-----	9
	Unfavorable	1,200	Idaho fescue-----	9
			Rose-----	7
			Arrowleaf balsamroot-----	7
			Blue wildrye-----	6
			Saskatoon serviceberry-----	5
			Tall trisetum-----	5
			White spirea-----	5
			Common yampa-----	5
10-----	Favorable	500	Common beargrass-----	15
Brody	Normal	400	Sedge-----	12
	Unfavorable	300	Pine reedgrass-----	8
			Mountain blueberry-----	8
			Pachystima-----	6
			Longtube twinflower-----	5
			Pyrola-----	5
			Bearberry-----	5
11*: Brody-----	Favorable	500	Common beargrass-----	15
	Normal	400	Sedge-----	12
	Unfavorable	300	Pine reedgrass-----	8
			Mountain blueberry-----	8
			Pachystima-----	6
			Longtube twinflower-----	5
			Pyrola-----	5
			Bearberry-----	5

See footnote at end of table.



TABLE 11.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		<u>Lb/acre</u>		<u>Pct</u>
11*: Telcher-----	Favorable	250	Queencup beadleily-----	10
	Normal	200	Common snowberry-----	10
	Unfavorable	150	Sedge-----	8
			Columbia brome-----	7
			Pachystima-----	5
			Baldhip rose-----	5
			Longtube twinflower-----	5
			Goldthread-----	5
			Piper anemone-----	5
12*: Brody-----	Favorable	500	Common beargrass-----	15
	Normal	400	Sedge-----	12
	Unfavorable	300	Pine reedgrass-----	8
			Mountain blueberry-----	8
			Pachystima-----	6
			Longtube twinflower-----	5
			Pyrola-----	5
			Bearberry-----	5
Wapshilla-----	Favorable	300	Pachystima-----	15
	Normal	200	Swordfern-----	15
	Unfavorable	100	False-Solomons-seal-----	15
			Northern twinflower-----	10
			Baldhip rose-----	10
			Goldthread-----	5
			Sweetroot-----	5
30, 31----- De Masters	Favorable	1,400	Bluebunch wheatgrass-----	15
	Normal	1,100	Idaho fescue-----	10
	Unfavorable	900	Common snowberry-----	8
			Rose-----	6
			Pine reedgrass-----	5
			Tall trisetum-----	5
			Arrowleaf balsamroot-----	5
			Tapertip hawksbeard-----	5
			Lupine-----	5
32*: De Masters-----	Favorable	1,400	Bluebunch wheatgrass-----	15
	Normal	1,100	Idaho fescue-----	10
	Unfavorable	900	Common snowberry-----	8
			Rose-----	6
			Pine reedgrass-----	5
			Tall trisetum-----	5
			Arrowleaf balsamroot-----	5
			Tapertip hawksbeard-----	5
			Lupine-----	5
Riggins.				
33*: De Masters-----	Favorable	1,400	Bluebunch wheatgrass-----	15
	Normal	1,100	Idaho fescue-----	10
	Unfavorable	900	Common snowberry-----	8
			Rose-----	6
			Pine reedgrass-----	5
			Tall trisetum-----	5
			Arrowleaf balsamroot-----	5
			Tapertip hawksbeard-----	5
			Lupine-----	5

See footnote at end of table.

TABLE 11.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		<u>Lb/acre</u>		<u>Pct</u>
33*: Suloaf-----	Favorable	1,200	Creambush oceanspray-----	10
	Normal	1,000	Mallow ninebark-----	8
	Unfavorable	700	Elk sedge-----	8
			Pine reedgrass-----	8
			Rose-----	6
			Columbia brome-----	6
			Heartleaf arnica-----	6
			Saskatoon serviceberry-----	5
			Common snowberry-----	5
			White spirea-----	5
			Lupine-----	5
			Largeleaf sandwort-----	5
34, 35----- Ericson	Favorable	300	Common beargrass-----	15
	Normal	200	Grouse blueberry-----	12
	Unfavorable	100	Queencup beadlily-----	8
			American trailplant-----	6
			Princes pine-----	6
			Columbia brome-----	5
			Sedge-----	5
			Pine reedgrass-----	5
			Pyrola-----	5
			Longtube twinflower-----	5
36*: Ericson-----	Favorable	300	Common beargrass-----	15
	Normal	200	Grouse blueberry-----	12
	Unfavorable	100	Queencup beadlily-----	8
			American trailplant-----	6
			Princes pine-----	6
			Columbia brome-----	5
			Sedge-----	5
			Pine reedgrass-----	5
			Pyrola-----	5
			Longtube twinflower-----	5
Rock outcrop.				
54, 55----- Johnson	Favorable	1,250	Idaho fescue-----	25
	Normal	900	Bluebunch wheatgrass-----	12
	Unfavorable	700	Arrowleaf balsamroot-----	8
			Common snowberry-----	6
			Lupine-----	5
			White hawkweed-----	5
			Vetch-----	5
			Rose-----	5
			White spirea-----	5
56, 57----- Jughandle	Favorable	600	Common beargrass-----	20
	Normal	500	Pine reedgrass-----	15
	Unfavorable	300	Elk sedge-----	10
			Columbia brome-----	5
			Pachystima-----	5
			Blueberry-----	5
58*: Jughandle-----	Favorable	600	Common beargrass-----	20
	Normal	500	Pine reedgrass-----	15
	Unfavorable	300	Blueberry-----	15
			Elk sedge-----	10
			Columbia brome-----	5
			Pachystima-----	5

See footnote at end of table.



TABLE 11.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		<u>Lb/acre</u>		<u>Pct</u>
58*: Ericson-----	Favorable	300	Common beargrass-----	15
	Normal	200	Grouse blueberry-----	12
	Unfavorable	100	Queencup beadlily-----	8
			American trailplant-----	6
			Princes pine-----	6
			Columbia brome-----	5
			Sedge-----	5
			Pine reedgrass-----	5
			Pyrola-----	5
			Longtube twinflower-----	5
59*: Jughandle-----	Favorable	600	Common beargrass-----	20
	Normal	500	Pine reedgrass-----	15
	Unfavorable	300	Elk sedge-----	10
			Blueberry-----	5
			Pachystima-----	5
Suttler-----	Favorable	550	Elk sedge-----	10
	Normal	425	Pine reedgrass-----	10
	Unfavorable	350	Mallow ninebark-----	10
			Creambush oceanspray-----	10
			Baldhip rose-----	10
			Columbia brome-----	5
			Blue wildrye-----	5
			Queencup beadlily-----	5
			American trailplant-----	5
			Longtube twinflower-----	5
			Bearberry-----	5
			Redstem ceanothus-----	5
61, 62----- Keuterville	Favorable	1,000	Common snowberry-----	15
	Normal	900	Bluebunch wheatgrass-----	12
	Unfavorable	700	Pine reedgrass-----	10
			White spirea-----	10
			Elk sedge-----	8
			Idaho fescue-----	5
			Vetch-----	5
			Lupine-----	5
			Sticky geranium-----	5
			Rose-----	5
63*, 64*: Keuterville-----	Favorable	1,000	Common snowberry-----	15
	Normal	900	Bluebunch wheatgrass-----	12
	Unfavorable	700	Pine reedgrass-----	10
			White spirea-----	10
			Elk sedge-----	8
			Idaho fescue-----	5
			Vetch-----	5
			Lupine-----	5
			Sticky geranium-----	5
			Rose-----	5
Bluesprin.				
65*: Keuterville-----	Favorable	1,000	Common snowberry-----	15
	Normal	900	Bluebunch wheatgrass-----	12
	Unfavorable	700	Pine reedgrass-----	10
			White spirea-----	10
			Elk sedge-----	8
			Idaho fescue-----	5
			Vetch-----	5
			Lupine-----	5
			Sticky geranium-----	5
			Rose-----	5

See footnote at end of table.

TABLE 11.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		<u>Lb/acre</u>		<u>Pct</u>
65*: Klickson-----	Favorable	1,200	Creambush oceanspray-----	15
	Normal	900	Mallow ninebark-----	15
	Unfavorable	700	Pine reedgrass-----	7
			Largeleaf sandwort-----	7
			Rose-----	6
			Common snowberry-----	6
			Columbia brome-----	5
			Sedge-----	5
			White spirea-----	5
66*: Klickson-----	Favorable	1,200	Creambush oceanspray-----	15
	Normal	900	Mallow ninebark-----	15
	Unfavorable	700	Pine reedgrass-----	7
			Largeleaf sandwort-----	7
			Rose-----	6
			Common snowberry-----	6
			Columbia brome-----	5
			Sedge-----	5
			White spirea-----	5
Rock outcrop.				
67*: Klickson-----	Favorable	1,200	Creambush oceanspray-----	15
	Normal	900	Mallow ninebark-----	15
	Unfavorable	700	Pine reedgrass-----	7
			Largeleaf sandwort-----	7
			Rose-----	6
			Common snowberry-----	6
			Columbia brome-----	5
			Sedge-----	5
			White spirea-----	5
Suloaf-----	Favorable	1,200	Creambush oceanspray-----	10
	Normal	1,000	Mallow ninebark-----	8
	Unfavorable	700	Elk sedge-----	8
			Pine reedgrass-----	8
			Rose-----	6
			Columbia brome-----	6
			Heartleaf arnica-----	6
			Saskatoon serviceberry-----	5
			Common snowberry-----	5
			White spirea-----	5
			Lupine-----	5
			Largeleaf sandwort-----	5
68*: Klickson-----	Favorable	1,200	Creambush oceanspray-----	15
	Normal	900	Mallow ninebark-----	15
	Unfavorable	700	Pine reedgrass-----	7
			Largeleaf sandwort-----	7
			Rose-----	6
			Common snowberry-----	6
			Columbia brome-----	5
			Sedge-----	5
			White spirea-----	5
Bluesprin.				

See footnote at end of table.



TABLE 11.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		<u>Lb/acre</u>		<u>Pct</u>
69*: Klickson-----	Favorable	1,200	Creambush oceanspray-----	15
	Normal	900	Mallow ninebark-----	15
	Unfavorable	700	Pine reedgrass-----	7
			Largeleaf sandwort-----	7
			Rose-----	6
			Common snowberry-----	6
			Columbia brome-----	5
			Sedge-----	5
			White spirea-----	5
Wapshilla-----	Favorable	300	Pachystima-----	15
	Normal	200	Swordfern-----	15
	Unfavorable	100	False-Solomons-seal-----	15
			Northern twinflower-----	10
			Baldhip rose-----	10
			Goldthread-----	5
			Sweetroot-----	5
70, 71, 72----- Kooskia	Favorable	1,800	Bluebunch wheatgrass-----	20
	Normal	1,500	Common snowberry-----	10
	Unfavorable	1,200	Pine reedgrass-----	10
			Idaho fescue-----	10
			White spirea-----	5
			Saskatoon serviceberry-----	5
			Rose-----	5
80----- Naz	Favorable	850	Pine reedgrass-----	10
	Normal	725	Mallow ninebark-----	10
	Unfavorable	600	Creambush oceanspray-----	10
			Columbia brome-----	5
			Elk sedge-----	5
			Lupine-----	5
			White hawkweed-----	5
			Sticky geranium-----	5
			Cinquefoil-----	5
81*: Nazaton-----	Favorable	1,000	Pine reedgrass-----	15
	Normal	800	Columbia brome-----	10
	Unfavorable	600	Elk sedge-----	8
			Mallow ninebark-----	8
			Creambush oceanspray-----	8
			Lupine-----	5
			Common snowberry-----	5
			Redstem ceanothus-----	5
			Willow-----	5
			Rose-----	5
Naz-----	Favorable	850	Pine reedgrass-----	10
	Normal	725	Mallow ninebark-----	10
	Unfavorable	600	Creambush oceanspray-----	10
			Columbia brome-----	5
			Elk sedge-----	5
			Lupine-----	5
			White hawkweed-----	5
			Sticky geranium-----	5
			Cinquefoil-----	5

See footnote at end of table.

TABLE 11.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		<u>Lb/acre</u>		<u>Pct</u>
82*: Nazaton-----	Favorable	1,000	Pine reedgrass-----	15
	Normal	800	Columbia brome-----	10
	Unfavorable	600	Elk sedge-----	8
			Mallow ninebark-----	8
			Creambush oceanspray-----	8
			Lupine-----	5
			Common snowberry-----	5
			Redstem ceanothus-----	5
			Willow-----	5
			Rose-----	5
Suttler-----	Favorable	550	Elk sedge-----	10
	Normal	425	Pine reedgrass-----	10
	Unfavorable	350	Mallow ninebark-----	10
			Creambush oceanspray-----	10
			Baldhip rose-----	10
			Columbia brome-----	5
			Blue wildrye-----	5
			Queencup beadrily-----	5
			American trailplant-----	5
			Longtube twinflower-----	5
			Bearberry-----	5
			Redstem ceanothus-----	5
96*: Rock outcrop.				
96*: Klickson-----	Favorable	1,200	Creambush oceanspray-----	15
	Normal	900	Mallow ninebark-----	15
	Unfavorable	700	Pine reedgrass-----	7
			Largeleaf sandwort-----	7
			Rose-----	6
			Common snowberry-----	6
			Columbia brome-----	5
			Sedge-----	5
			White spirea-----	5
97*: Rock outcrop.				
Nazaton-----	Favorable	1,000	Pine reedgrass-----	15
	Normal	800	Columbia brome-----	10
	Unfavorable	600	Elk sedge-----	8
			Mallow ninebark-----	8
			Creambush oceanspray-----	8
			Lupine-----	5
			Common snowberry-----	5
			Redstem ceanothus-----	5
			Willow-----	5
			Rose-----	5
98*: Rock outcrop.				
Suttler-----	Favorable	550	Elk sedge-----	10
	Normal	425	Pine reedgrass-----	10
	Unfavorable	350	Mallow ninebark-----	10
			Creambush oceanspray-----	10
			Baldhip rose-----	10
			Columbia brome-----	5
			Blue wildrye-----	5
			Queencup beadrily-----	5
			American trailplant-----	5
			Longtube twinflower-----	5
			Bearberry-----	5
			Redstem ceanothus-----	5

See footnote at end of table.



TABLE 11.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		<u>Lb/acre</u>		<u>Pct</u>
103----- Spokel	Favorable	1,100	Bluebunch wheatgrass-----	15
	Normal	1,025	Blue wildrye-----	10
	Unfavorable	750	Idaho fescue-----	8
			Sedge-----	7
			Arrowleaf balsamroot-----	7
			Common snowberry-----	7
			Tall trisetum-----	5
			Rose-----	5
			White spirea-----	5
104*: Spokel-----	Favorable	1,100	Bluebunch wheatgrass-----	15
	Normal	1,025	Blue wildrye-----	10
	Unfavorable	750	Idaho fescue-----	8
			Sedge-----	7
			Arrowleaf balsamroot-----	7
			Common snowberry-----	7
			Tall trisetum-----	5
			Rose-----	5
			White spirea-----	5
Brower.				
105*: Spokel-----	Favorable	1,100	Bluebunch wheatgrass-----	15
	Normal	1,025	Blue wildrye-----	10
	Unfavorable	750	Idaho fescue-----	8
			Sedge-----	7
			Arrowleaf balsamroot-----	7
			Common snowberry-----	7
			Tall trisetum-----	5
			Rose-----	5
			White spirea-----	5
Nazaton-----	Favorable	1,000	Pine reedgrass-----	15
	Normal	800	Columbia brome-----	10
	Unfavorable	600	Elk sedge-----	8
			Mallow ninebark-----	8
			Creambush oceanspray-----	8
			Lupine-----	5
			Common snowberry-----	5
			Redstem ceanothus-----	5
			Willow-----	5
106*: Spokel-----	Favorable	1,100	Bluebunch wheatgrass-----	15
	Normal	1,025	Blue wildrye-----	10
	Unfavorable	750	Idaho fescue-----	8
			Sedge-----	7
			Arrowleaf balsamroot-----	7
			Common snowberry-----	7
			Tall trisetum-----	5
			Rose-----	5
			White spirea-----	5
Suttler-----	Favorable	550	Elk sedge-----	10
	Normal	425	Pine reedgrass-----	10
	Unfavorable	350	Mallow ninebark-----	10
			Creambush oceanspray-----	10
			Baldhip rose-----	10
			Columbia brome-----	5
			Blue wildrye-----	5
			Queencup beadlily-----	5
			American trailplant-----	5
			Longtube twinflower-----	5
			Bearberry-----	5
			Redstem ceanothus-----	5

See footnote at end of table.

TABLE 11.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		<u>Lb/acre</u>		<u>Pct</u>
107, 108, 109, 110- Suloaf	Favorable	1,200	Creambush oceanspray-----	10
	Normal	1,000	Mallow ninebark-----	8
	Unfavorable	700	Elk sedge-----	8
			Pine reedgrass-----	8
			Rose-----	6
			Columbia brome-----	6
			Heartleaf arnica-----	6
			Saskatoon serviceberry-----	5
			Common snowberry-----	5
			White spirea-----	5
			Lupine-----	5
			Largeleaf sandwort-----	5
111*: Suloaf-----	Favorable	1,200	Creambush oceanspray-----	10
	Normal	1,000	Mallow ninebark-----	8
	Unfavorable	700	Elk sedge-----	8
			Pine reedgrass-----	8
			Rose-----	6
			Columbia brome-----	6
			Heartleaf arnica-----	6
			Saskatoon serviceberry-----	5
			Common snowberry-----	5
			White spirea-----	5
			Lupine-----	5
			Largeleaf sandwort-----	5
Meland. 115, 116, 117----- Telcher	Favorable	250	Queencup beadleily-----	10
	Normal	200	Common snowberry-----	10
	Unfavorable	150	Sedge-----	8
			Columbia brome-----	7
			Pachystima-----	5
			Baldhip rose-----	5
			Longtube twinflower-----	5
			Goldthread-----	5
			Piper anemone-----	5
118*: Telcher-----	Favorable	250	Queencup beadleily-----	10
	Normal	200	Common snowberry-----	10
	Unfavorable	150	Sedge-----	8
			Columbia brome-----	7
			Pachystima-----	5
			Baldhip rose-----	5
			Longtube twinflower-----	5
			Goldthread-----	5
			Piper anemone-----	5
Suloaf-----	Favorable	1,200	Creambush oceanspray-----	10
	Normal	1,000	Mallow ninebark-----	8
	Unfavorable	700	Elk sedge-----	8
			Pine reedgrass-----	8
			Rose-----	6
			Columbia brome-----	6
			Heartleaf arnica-----	6
			Saskatoon serviceberry-----	5
			Common snowberry-----	5
			White spirea-----	5
			Lupine-----	5
			Largeleaf sandwort-----	5

See footnote at end of table.



TABLE 11.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		<u>Lb/acre</u>		<u>Pct</u>
125, 126, 127----- Uptmor	Favorable	900	Mallow ninebark-----	10
	Normal	650	Elk sedge-----	10
	Unfavorable	500	Creambush oceanspray-----	10
			Pine reedgrass-----	10
			Heartleaf arnica-----	5
			Common snowberry-----	5
			Rose-----	5
			Columbia brome-----	5
			White spirea-----	5
128----- Wapshilla	Favorable	300	Saskatoon serviceberry-----	5
	Normal	200	Pachystima-----	15
	Unfavorable	100	Swordfern-----	15
			False-Solomons-seal-----	15
			Northern twinflower-----	10
			Baldhip rose-----	10
			Goldthread-----	5
			Sweetroot-----	5
131----- Zaza	Favorable	700	Bluebunch wheatgrass-----	15
	Normal	600	Common snowberry-----	12
	Unfavorable	400	Idaho fescue-----	8
			White spirea-----	8
			Sedge-----	6
			Western fescue-----	6
			Pine reedgrass-----	5
			Rose-----	5
			Silky lupine-----	5

\* See map unit description for the composition and behavior of the map unit.

TABLE 12.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS

[The symbol < means less than; > means more than. Absence of an entry indicates that trees generally do not grow to the given height on that soil]

Soil name and map symbol	Trees having predicted 20-year average heights, in feet, of--			
	<8	8-15	16-25	26-35
1, 2, 3----- Banner	Siberian peashrub, lilac, Amur honeysuckle.	Siberian elm, Russian-olive, black locust, ponderosa pine.	---	---
4*: Bluesprin-----	---	Siberian peashrub, Russian-olive, ponderosa pine, black locust, Siberian elm.	---	---
Keuterville-----	---	Siberian peashrub, lilac, Rocky Mt. juniper.	Russian-olive, Siberian elm, black locust, ponderosa pine, Austrian pine.	---
5*: Bluesprin-----	---	Siberian peashrub, Russian-olive, ponderosa pine, black locust, Siberian elm.	---	---
Klickson-----	---	Siberian peashrub, Russian-olive, lilac, Amur honeysuckle, golden willow.	Siberian elm, black locust, ponderosa pine, Austrian pine.	---
6*: Bluesprin-----	---	Siberian peashrub, Russian-olive, ponderosa pine, black locust, Siberian elm.	---	---
Lawyer-----	---	Siberian peashrub, Russian-olive, lilac, Amur honeysuckle.	Siberian elm, black locust, ponderosa pine, Austrian pine.	---
7*: Bluesprin. Rock outcrop.				
8, 9----- Boles	---	Lilac, Austrian pine, Siberian peashrub, Russian-olive.	Siberian elm, Douglas-fir, black locust, ponderosa pine.	---
10----- Brody	---	Siberian peashrub, lilac, Amur honeysuckle.	Russian-olive, Austrian pine, golden willow.	Ponderosa pine, Douglas-fir, Norway spruce.
11*: Brody-----	---	Siberian peashrub, lilac, Amur honeysuckle.	Russian-olive, Austrian pine, golden willow.	Ponderosa pine, Douglas-fir, Norway spruce.
Telcher-----	---	Siberian peashrub, Russian-olive, lilac, Amur honeysuckle.	Siberian elm, black locust, ponderosa pine, Austrian pine.	---
12*: Brody-----	---	Siberian peashrub, lilac, Amur honeysuckle.	Russian-olive, Austrian pine, golden willow.	Ponderosa pine, Douglas-fir, Norway spruce.

See footnote at end of table.



TABLE 12.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average heights, in feet, of--			
	<8	8-15	16-25	26-35
12*: Wapshilla-----	---	Siberian peashrub, Russian-olive, lilac, Amur honeysuckle.	Siberian elm, black locust, ponderosa pine, Austrian pine.	---
13----- Brower	---	Siberian peashrub, Russian-olive, Austrian pine, lilac, Amur honeysuckle.	Siberian elm, ponderosa pine, black locust.	---
14*: Brower-----	---	Siberian peashrub, Russian-olive, Austrian pine, lilac, Amur honeysuckle.	Siberian elm, ponderosa pine, black locust.	---
Brownlee-----	---	Siberian peashrub, Russian-olive, Austrian pine.	Siberian elm, black locust, ponderosa pine.	---
15*: Brower-----	---	Siberian peashrub, Russian-olive, Austrian pine, lilac, Amur honeysuckle.	Siberian elm, ponderosa pine, black locust.	---
Rock outcrop.				
16, 17, 18, 19---- Brownlee	---	Siberian peashrub, Russian-olive, Austrian pine.	Siberian elm, black locust, ponderosa pine.	---
20, 21, 22, 23---- Chard	Nanking cherry, lilac	Green ash, Russian- olive, ponderosa pine, Austrian pine, Rocky Mt. juniper.	Black locust-----	---
24, 25----- Chard Variant	Siberian peashrub, lilac, Amur honeysuckle.	Russian-olive, Siberian elm, ponderosa pine, black locust.	---	---
26, 27, 28, 29---- Chicane	---	Siberian peashrub, lilac, Russian-olive, Amur honeysuckle.	Siberian elm, Austrian pine, ponderosa pine, black locust.	---
30, 31----- De Masters	---	Siberian peashrub, Russian-olive, lilac, Amur honeysuckle.	Siberian elm, black locust, ponderosa pine, Austrian pine.	---
32*: De Masters-----	---	Siberian peashrub, Russian-olive, lilac, Amur honeysuckle.	Siberian elm, black locust, ponderosa pine, Austrian pine.	---
Riggins-----	---	Siberian peashrub, Russian-olive, ponderosa pine, black locust, Siberian elm.	---	---
33*: De Masters-----	---	Siberian peashrub, Russian-olive, lilac, Amur honeysuckle.	Siberian elm, black locust, ponderosa pine, Austrian pine.	---

See footnote at end of table.

TABLE 12.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average heights, in feet, of--			
	<8	8-15	16-25	26-35
33*: Suloaf-----	---	Siberian peashrub, Russian-olive, lilac, Amur honeysuckle, golden willow.	Siberian elm, black locust, ponderosa pine, Austrian pine.	---
34, 35----- Ericson	---	Siberian peashrub, lilac, blue spruce, Amur honeysuckle.	Golden willow, ponderosa pine, Norway spruce.	Idahybrid poplar.
36*: Ericson-----	---	Siberian peashrub, lilac, blue spruce, Amur honeysuckle.	Golden willow, ponderosa pine, Norway spruce.	Idahybrid poplar.
Rock outcrop.				
37, 38, 39----- Fenn	---	Lilac, golden willow, Siberian peashrub, Amur honeysuckle, Russian-olive.	Siberian elm, black locust, ponderosa pine, Austrian pine.	---
40. Fenn Variant				
41, 42, 43----- Ferdinand	---	Siberian peashrub, Russian-olive, lilac, Amur honeysuckle.	Siberian elm, black locust, ponderosa pine, Austrian pine.	---
44*: Ferdinand-----	---	Siberian peashrub, Russian-olive, lilac, Amur honeysuckle.	Siberian elm, black locust, ponderosa pine, Austrian pine.	---
Bluesprin.				
45*: Ferdinand-----	---	Siberian peashrub, Russian-olive, lilac, Amur honeysuckle.	Siberian elm, black locust, ponderosa pine, Austrian pine.	---
Flybow.				
Riggins-----	---	Siberian peashrub, Russian-olive, ponderosa pine, black locust, Siberian elm.	---	---
46*: Ferdinand-----	---	Siberian peashrub, Russian-olive, lilac, Amur honeysuckle.	Siberian elm, black locust, ponderosa pine, Austrian pine.	---
Riggins-----	---	Siberian peashrub, Russian-olive, ponderosa pine, black locust, Siberian elm.	---	---
47, 48, 49, 50---- Jacket	---	Siberian peashrub, Russian-olive, Austrian pine, Amur honeysuckle, lilac, Rocky Mt. juniper.	Siberian elm, black locust, ponderosa pine.	---
51, 52, 53----- Jacket Variant	---	Siberian peashrub, Russian-olive, Austrian pine, lilac.	Siberian elm, black locust, ponderosa pine.	---

See footnote at end of table.



TABLE 12.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average heights, in feet, of--			
	<8	8-15	16-25	26-35
54, 55----- Johnson	---	Siberian peashrub, Russian-olive, lilac, Amur honeysuckle.	Siberian elm, black locust, ponderosa pine.	---
56, 57----- Jughandle	---	Siberian peashrub, lilac, Amur honeysuckle, Rocky Mt. juniper.	Russian-olive, blue spruce, Austrian pine.	Norway spruce, Douglas-fir, ponderosa pine, black locust.
58*: Jughandle-----	---	Siberian peashrub, lilac, Amur honeysuckle, Rocky Mt. juniper.	Russian-olive, blue spruce, Austrian pine.	Norway spruce, Douglas-fir, ponderosa pine, black locust.
Ericson-----	---	Siberian peashrub, lilac, blue spruce, Amur honeysuckle.	Golden willow, ponderosa pine, Norway spruce.	Idahybrid poplar.
59*: Jughandle-----	---	Siberian peashrub, lilac, Amur honeysuckle, Rocky Mt. juniper.	Russian-olive, blue spruce, Austrian pine.	Norway spruce, Douglas-fir, ponderosa pine, black locust.
Suttler-----	---	Lilac, Siberian peashrub.	Golden willow, Austrian pine.	Douglas-fir, ponderosa pine, Norway spruce.
60. Jughandle Variant				
61, 62----- Keuterville	---	Siberian peashrub, lilac, Rocky Mt. juniper.	Russian-olive, Siberian elm, black locust, ponderosa pine, Austrian pine.	---
63*, 64*: Keuterville-----	---	Siberian peashrub, lilac, Rocky Mt. juniper.	Russian-olive, Siberian elm, black locust, ponderosa pine, Austrian pine.	---
Bluesprin-----	---	Siberian peashrub, Russian-olive, ponderosa pine, black locust, Siberian elm.	---	---
65*: Keuterville-----	---	Siberian peashrub, lilac, Rocky Mt. juniper.	Russian-olive, Siberian elm, black locust, ponderosa pine, Austrian pine.	---
Klickson-----	---	Siberian peashrub, Russian-olive, lilac, Amur honeysuckle, golden willow.	Siberian elm, black locust, ponderosa pine, Austrian pine.	---
66*: Klickson-----	---	Siberian peashrub, Russian-olive, lilac, Amur honeysuckle, golden willow.	Siberian elm, black locust, ponderosa pine, Austrian pine.	---
Rock outcrop.				

See footnote at end of table.

TABLE 12.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average heights, in feet, of--			
	<8	8-15	16-25	26-35
67*: Klickson-----	---	Siberian peashrub, Russian-olive, lilac, Amur honeysuckle, golden willow.	Siberian elm, black locust, ponderosa pine, Austrian pine.	---
Suloaf-----	---	Siberian peashrub, Russian-olive, lilac, Amur honeysuckle, golden willow.	Siberian elm, black locust, ponderosa pine, Austrian pine.	---
68*: Klickson-----	---	Siberian peashrub, Russian-olive, lilac, Amur honeysuckle, golden willow.	Siberian elm, black locust, ponderosa pine, Austrian pine.	---
Bluesprin-----	---	Siberian peashrub, Russian-olive, ponderosa pine, black locust, Siberian elm.	---	---
69*: Klickson-----	---	Siberian peashrub, Russian-olive, lilac, Amur honeysuckle, golden willow.	---	---
Wapshilla-----	---	Siberian peashrub, Russian-olive, lilac, Amur honeysuckle.	Siberian elm, black locust, ponderosa pine, Austrian pine.	---
70, 71, 72----- Kooskia	---	Lilac, Austrian pine, Siberian peashrub, Russian-olive.	Siberian elm, Douglas- fir, black locust, ponderosa pine.	---
73*: Lawyer-----	---	Siberian peashrub, Russian-olive, lilac, Amur honeysuckle.	Siberian elm, black locust, ponderosa pine, Austrian pine.	---
Rock outcrop.				
74*: Lawyer-----	---	Siberian peashrub, Russian-olive, lilac, Amur honeysuckle.	Siberian elm, black locust, ponderosa pine, Austrian pine.	---
Bluesprin-----	---	Siberian peashrub, Russian-olive, ponderosa pine, black locust, Siberian elm.	---	---
75*: Lawyer-----	---	Siberian peashrub, Russian-olive, lilac, Amur honeysuckle.	Siberian elm, black locust, ponderosa pine, Austrian pine.	---
Tannahill-----	Siberian peashrub, lilac, Amur honeysuckle.	Russian-olive, Siberian elm, black locust, ponderosa pine.	---	---
76*: Licksillet-----	Siberian peashrub, lilac, Amur honeysuckle.	Russian-olive, ponderosa pine, black locust, Siberian elm.	---	---

See footnote at end of table.



TABLE 12.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average heights, in feet, of--			
	<8	8-15	16-25	26-35
76*: Tannahill-----	Siberian peashrub, lilac, Amur honeysuckle.	Russian-olive, Siberian elm, black locust, ponderosa pine.	---	---
77, 78, 79----- Meland	---	Siberian peashrub, Russian-olive, Austrian pine.	Siberian elm, black locust, ponderosa pine.	---
80----- Naz	---	Lilac, Siberian peashrub.	Golden willow, Austrian pine.	Douglas-fir, ponderosa pine, Norway spruce.
81*: Nazaton-----	---	Siberian peashrub, lilac, Amur honeysuckle.	Russian-olive, golden willow, green ash, Siberian elm, Austrian pine, ponderosa pine, black locust.	---
Naz-----	---	Lilac, Siberian peashrub.	Golden willow, Austrian pine.	Douglas-fir, ponderosa pine, Norway spruce.
82*: Nazaton-----	---	Siberian peashrub, lilac, Amur honeysuckle.	Russian-olive, golden willow, green ash, Siberian elm, Austrian pine, ponderosa pine, black locust.	---
Suttler-----	---	Lilac, Siberian peashrub.	Golden willow, Austrian pine.	Douglas-fir, ponderosa pine, Norway spruce.
83, 84, 85----- Nez Perce	---	Siberian peashrub, Russian-olive, lilac, Amur honeysuckle.	Ponderosa pine, Austrian pine, black locust, Siberian elm.	---
86----- Nicodemus	---	Siberian peashrub, lilac, Russian-olive, Rocky Mt. juniper, Amur honeysuckle, golden willow, Austrian pine.	Siberian elm, black locust, ponderosa pine.	---
87, 88----- Nicodemus Variant	---	Siberian peashrub, lilac, Amur honeysuckle.	Russian-olive, golden willow, green ash, Siberian elm, Norway spruce, Austrian pine, ponderosa pine, black locust.	---
89, 90----- Oland	---	Siberian peashrub, lilac, Amur honeysuckle, Russian-olive, Amur honeysuckle.	Black locust, ponderosa pine, Siberian elm.	---
91----- Oland Variant	---	Siberian peashrub, lilac, Amur honeysuckle, Russian-olive, Amur honeysuckle.	Black locust, ponderosa pine, Siberian elm.	---

See footnote at end of table.

TABLE 12.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average heights, in feet, of--			
	<8	8-15	16-25	26-35
92*: Riggins-----	---	Siberian peashrub, Russian-olive, ponderosa pine, black locust, Siberian elm.	---	---
Meland-----	---	Siberian peashrub, Russian-olive, Austrian pine.	Siberian elm, black locust, ponderosa pine.	---
93*: Rock outcrop				
94*: Rock outcrop.				
Bluesprin-----	---	Siberian peashrub, Russian-olive, ponderosa pine, black locust, Siberian elm.	---	---
95*: Rock outcrop.				
Brower-----	---	Siberian peashrub, Russian-olive, Austrian pine, lilac, Amur honeysuckle.	Siberian elm, ponderosa pine, black locust.	---
96*: Rock outcrop.				
Klickson-----	---	Siberian peashrub, Russian-olive, lilac, Amur honeysuckle, golden willow.	Siberian elm, black locust, ponderosa pine, Austrian pine.	---
97*: Rock outcrop.				
Nazaton-----	---	Siberian peashrub, lilac, Amur honeysuckle.	Russian-olive, golden willow, green ash, Siberian elm, Austrian pine, ponderosa pine, black locust.	---
98*: Rock outcrop.				
Suttler-----	---	Lilac, Siberian peashrub.	Golden willow, Austrian pine.	Douglas-fir, ponderosa pine, Norway spruce.
99*: Rock outcrop.				
Tannahill-----	Siberian peashrub, lilac, Amur honeysuckle.	Russian-olive, Siberian elm, black locust, ponderosa pine.	---	---
100, 101, 102----- Shebang	---	Siberian peashrub, Russian-olive, lilac, Amur honeysuckle.	Siberian elm, black locust, ponderosa pine, Austrian pine.	---

See footnote at end of table.



TABLE 12.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average heights, in feet, of--			
	<8	8-15	16-25	26-35
103----- Spokel	---	Siberian peashrub, Russian-olive, lilac, Amur honeysuckle.	Siberian elm, black locust, ponderosa pine.	---
104*: Spokel-----	---	Siberian peashrub, Russian-olive, lilac, Amur honeysuckle.	Siberian elm, black locust, ponderosa pine.	---
Brower-----	---	Siberian peashrub, Russian-olive, Austrian pine, lilac, Amur honeysuckle.	Siberian elm, ponderosa pine, black locust.	---
105*: Spokel-----	---	Siberian peashrub, Russian-olive, lilac, Amur honeysuckle.	Siberian elm, black locust, ponderosa pine.	---
Nazaton-----	---	Siberian peashrub, lilac, Amur honeysuckle.	Russian-olive, golden willow, green ash, Siberian elm, Austrian pine, ponderosa pine, black locust.	---
106*: Spokel-----	---	Siberian peashrub, Russian-olive, lilac, Amur honeysuckle.	Siberian elm, black locust, ponderosa pine.	---
Suttler-----	---	Lilac, Siberian peashrub.	Golden willow, Austrian pine.	Douglas-fir, ponderosa pine, Norway spruce.
107, 108, 109, 110----- Suloaf	---	Siberian peashrub, Russian-olive, lilac, Amur honeysuckle, golden willow.	Siberian elm, black locust, ponderosa pine, Austrian pine.	---
111*: Suloaf-----	---	Siberian peashrub, Russian-olive, lilac, Amur honeysuckle, golden willow.	Siberian elm, black locust, ponderosa pine, Austrian pine.	---
Meland-----	---	Siberian peashrub, Russian-olive, Austrian pine.	Siberian elm, black locust, ponderosa pine.	---
112----- Tannahill	Siberian peashrub, lilac, Amur honeysuckle.	Russian-olive, Siberian elm, black locust, ponderosa pine.	---	---
113*: Tannahill-----	Siberian peashrub, lilac, Amur honeysuckle.	Russian-olive, Siberian elm, black locust, ponderosa pine.	---	---
Lickskillet-----	Siberian peashrub, lilac, Amur honeysuckle.	Russian-olive, ponderosa pine, black locust, Siberian elm.	---	---

See footnote at end of table.

TABLE 12.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average heights, in feet, of--			
	<8	8-15	16-25	26-35
114*: Tannahill-----  Rock outcrop.	Siberian peashrub, lilac, Amur honeysuckle.	Russian-olive, Siberian elm, black locust, ponderosa pine.	---	---
115, 116, 117----- Telcher	---	Siberian peashrub, Russian-olive, lilac, Amur honeysuckle.	Siberian elm, black locust, ponderosa pine, Austrian pine.	---
118*: Telcher-----	---	Siberian peashrub, Russian-olive, lilac, Amur honeysuckle.	Siberian elm, black locust, ponderosa pine, Austrian pine.	---
Suloaf-----	---	Siberian peashrub, Russian-olive, lilac, Amur honeysuckle, golden willow.	Siberian elm, black locust, ponderosa pine, Austrian pine.	---
119*. Typic Xerofluvents.				
120, 121, 122, 123, 124----- Unhorn	---	Siberian peashrub, Russian-olive, lilac, Amur honeysuckle.	Siberian elm, black locust, ponderosa pine, Austrian pine.	---
125, 126, 127----- Uptmor	---	Lilac, Amur honeysuckle.	Siberian peashrub, Russian-olive, green ash, Siberian elm, ponderosa pine, Douglas-fir, Austrian pine.	Idahybrid poplar.
128----- Wapshilla	---	Siberian peashrub, Russian-olive, lilac, Amur honeysuckle.	Siberian elm, black locust, Austrian pine, ponderosa pine.	---
129. Westlake				
130. Wilkins				
131----- Zaza	---	Siberian peashrub, Russian-olive, lilac, Amur honeysuckle.	Siberian elm, black locust, ponderosa pine, Austrian pine.	---

\* See map unit description for the composition and behavior of the map unit.



TABLE 13.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
1----- Banner	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Moderate: dusty.
2----- Banner	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Moderate: dusty.
3----- Banner	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, dusty.
4*: Bluesprin-----	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Keuterville-----	Severe: slope.	Severe: slope.	Severe: slope, large stones, small stones.	Severe: large stones, slope.
5*: Bluesprin-----	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Klickson-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
6*: Bluesprin-----	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Lawyer-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
7*: Bluesprin-----	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Rock outcrop.				
8----- Boles	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Moderate: dusty.
9----- Boles	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, dusty.
10----- Brody	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
11*: Brody-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Telcher-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 13.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
12*: Brody-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Wapshilla-----	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
13----- Brower	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
14*: Brower-----	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Brownlee-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
15*: Brower-----	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Rock outcrop.				
16----- Brownlee	Slight-----	Slight-----	Moderate: slope.	Slight.
17----- Brownlee	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
18----- Brownlee	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
19----- Brownlee	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
20----- Chard	Slight-----	Slight-----	Moderate: slope.	Slight.
21----- Chard	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
22----- Chard	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
23----- Chard	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
24----- Chard Variant	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.
25----- Chard Variant	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, too sandy.
26----- Chicane	Moderate: dusty, wetness.	Moderate: dusty, wetness.	Moderate: slope, dusty, wetness.	Moderate: dusty.

See footnote at end of table.



TABLE 13.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
27----- Chicane	Moderate: slope, dusty, wetness.	Moderate: slope, dusty, wetness.	Severe: slope.	Moderate: dusty.
28----- Chicane	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, dusty.
29----- Chicane	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
30----- De Masters	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, dusty.
31----- De Masters	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
32*: De Masters-----	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, dusty.
Riggins-----	Severe: slope.	Severe: slope.	Severe: slope, depth to rock, small stones.	Moderate: slope, small stones.
33*: De Masters-----	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, dusty.
Suloaf-----	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: dusty.
34----- Ericson	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
35----- Ericson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
36*: Ericson-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.				
37----- Fenn	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.
38----- Fenn	Severe: slope, too clayey.	Severe: slope, too clayey.	Severe: slope, too clayey.	Severe: too clayey.
39----- Fenn	Severe: slope, too clayey.	Severe: slope, too clayey.	Severe: slope, large stones, too clayey.	Severe: too clayey.
40----- Fenn Variant	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.

See footnote at end of table.

TABLE 13.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
41----- Ferdinand	Moderate: dusty, percs slowly.	Moderate: dusty.	Moderate: slope, dusty, depth to rock.	Moderate: dusty.
42----- Ferdinand	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, dusty.
43----- Ferdinand	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
44*: Ferdinand-----	Severe: slope.	Severe: slope.	Severe: slope, large stones.	Severe: slope, large stones.
Bluesprin-----	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
45*: Ferdinand-----	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, dusty.
Flybow-----	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, large stones, depth to rock.	Severe: large stones.
Riggins-----	Severe: slope.	Severe: slope.	Severe: slope, depth to rock, small stones.	Moderate: slope, small stones.
46*: Ferdinand-----	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, dusty.
Riggins-----	Severe: slope.	Severe: slope.	Severe: slope, depth to rock, small stones.	Moderate: slope, small stones.
47----- Jacket	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Moderate: dusty.
48----- Jacket	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Moderate: dusty.
49----- Jacket	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, dusty.
50----- Jacket	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
51----- Jacket Variant	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Moderate: dusty.
52----- Jacket Variant	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, dusty.

See footnote at end of table.



TABLE 13.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
53----- Jacket Variant	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
54----- Johnson	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, dusty.
55----- Johnson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
56----- Jughandle	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
57----- Jughandle	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
58*: Jughandle-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Ericson-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
59*: Jughandle-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Suttler-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
60----- Jughandle Variant	Severe: wetness, floods.	Severe: wetness.	Severe: floods, wetness.	Moderate: wetness.
61----- Keuterville	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, small stones.
62----- Keuterville	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
63*: Keuterville-----	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, small stones.
Bluesprin-----	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, dusty.
64*: Keuterville-----	Severe: slope.	Severe: slope.	Severe: slope, large stones, small stones.	Severe: large stones, slope.
Bluesprin-----	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
65*: Keuterville-----	Severe: slope.	Severe: slope.	Severe: slope, large stones, small stones.	Severe: large stones, slope.

See footnote at end of table.

TABLE 13.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
65*: Klickson-----	Severe: slope.	Severe: slope.	Severe: slope, large stones.	Severe: slope.
66*: Klickson-----	Severe: slope.	Severe: slope.	Severe: slope, large stones.	Severe: slope.
Rock outcrop.				
67*: Klickson-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Suloaf-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
68*: Klickson-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Bluesprin-----	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
69*: Klickson-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Wapshilla-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
70----- Kooskia	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Moderate: dusty.
71----- Kooskia	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Moderate: dusty.
72----- Kooskia	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, dusty.
73*: Lawyer-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.				
74*: Lawyer-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Bluesprin-----	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
75*: Lawyer-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Tannahill-----	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.

See footnote at end of table.



TABLE 13.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
76*: Lickskillet-----	Severe: slope.	Severe: slope.	Severe: slope, small stones, depth to rock.	Moderate: slope, small stones.
Tannahill-----	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
77----- Meland	Moderate: dusty.	Moderate: dusty.	Moderate: slope, depth to rock, dusty.	Moderate: dusty.
78----- Meland	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, dusty.
79----- Meland	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
80----- Naz	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
81*: Nazaton-----	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Naz-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
82*: Nazaton-----	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Suttler-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
83----- Nez Perce	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Moderate: dusty.
84----- Nez Perce	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Moderate: dusty.
85----- Nez Perce	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, dusty.
86----- Nicodemus	Severe: floods.	Slight-----	Slight-----	Slight.
87----- Nicodemus Variant	Severe: floods.	Slight-----	Slight-----	Slight.
88----- Nicodemus Variant	Severe: floods.	Slight-----	Moderate: large stones.	Slight.
89, 90----- Oland	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 13.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
91----- Oland Variant	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
92*: Riggins-----	Severe: slope.	Severe: slope.	Severe: slope, depth to rock, small stones.	Moderate: slope, small stones.
Meland-----	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, dusty.
93*. Rock outcrop				
94*: Rock outcrop.				
Bluesprin-----	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
95*: Rock outcrop.				
Brower-----	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
96*: Rock outcrop.				
Klickson-----	Severe: slope.	Severe: slope.	Severe: slope, large stones.	Severe: slope.
97*: Rock outcrop.				
Nazaton-----	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
98*: Rock outcrop.				
Suttler-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
99*: Rock outcrop.				
Tannahill-----	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
100----- Shebang	Moderate: dusty.	Moderate: dusty.	Severe: wetness.	Moderate: dusty.
101----- Shebang	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope, wetness.	Moderate: dusty.
102----- Shebang	Severe: slope.	Severe: slope.	Severe: slope, wetness.	Moderate: slope, dusty.

See footnote at end of table.



TABLE 13.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
103----- Spokel	Severe: slope.	Severe: slope, small stones.	Severe: slope, large stones, small stones.	Severe: slope, large stones.
104*: Spokel-----	Severe: slope.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope.
Brower-----	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
105*: Spokel-----	Severe: slope.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope.
Nazaton-----	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
106*: Spokel-----	Severe: slope.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope.
Suttler-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
107----- Suloaf	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Moderate: dusty.
108----- Suloaf	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: dusty.
109----- Suloaf	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
110----- Suloaf	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, large stones.
111*: Suloaf-----	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: dusty.
Meland-----	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, dusty.
112----- Tannahill	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
113*: Tannahill-----	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Lickskillet-----	Severe: slope.	Severe: slope.	Severe: slope, small stones, depth to rock.	Severe: slope.

See footnote at end of table.

TABLE 13.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
114*: Tannahill-----  Rock outcrop.	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
115----- Telcher	Moderate: dusty.	Moderate: dusty.	Moderate: slope, small stones, dusty.	Moderate: dusty.
116----- Telcher	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, dusty.
117----- Telcher	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
118*: Telcher-----	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, dusty.
Suloaf-----	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: dusty.
119*. Typic Xerofluvents.				
120----- Uhlorn	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Moderate: dusty.
121----- Uhlorn	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Moderate: dusty.
122----- Uhlorn	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, dusty.
123, 124----- Uhlorn	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
125----- Uptmor	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Moderate: dusty.
126----- Uptmor	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, dusty.
127----- Uptmor	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
128----- Wapshilla	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, dusty.
129----- Westlake	Severe: wetness, floods.	Moderate: wetness.	Severe: wetness, floods.	Moderate: dusty.
130----- Wilkins	Severe: floods, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.

See footnote at end of table.



TABLE 13.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
131----- Zaza	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Moderate: slope.

\* See map unit description for the composition and behavior of the map unit.

TABLE 14 .--WILDLIFE HABITAT POTENTIALS

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Conif- erous plants	Shrubs	Wetland plants	Shallow water areas	Open- land wild- life	Wood- land wild- life	Wetland wild- life	Range- land wild- life
1----- Banner	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	---	Very poor.	Good.
2, 3----- Banner	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	---	Very poor.	Good.
4*: Bluesprin-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	---	Very poor.	Good.
Keuterville-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
5*: Bluesprin-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	---	Very poor.	Good.
Klickson-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
6*: Bluesprin-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	---	Very poor.	Good.
Lawyer-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	---	Very poor.	Good.
7*: Bluesprin-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	---	Very poor.	Good.
Rock outcrop.											
8----- Boles	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.	---
9----- Boles	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	---
10----- Brody	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
11*: Brody-----	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
Telcher-----	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
12*: Brody-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
Wapshilla-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
13----- Brower	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	---	Very poor.	Good.
14*: Brower-----	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	---	Very poor.	Good.

See footnote at end of table.



TABLE 14.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Conif- erous plants	Shrubs	Wetland plants	Shallow water areas	Open- land wild- life	Wood- land wild- life	Wetland wild- life	Range- land wild- life
14*: Brownlee-----	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	---	Very poor.	Good.
15*: Brower-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	---	Very poor.	Good.
Rock outcrop.											
16----- Brownlee	Good	Good	Good	Good	Good	Poor	Very poor.	Good	---	Very poor.	Good.
17, 18----- Brownlee	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	---	Very poor.	Good.
19----- Brownlee	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	---	Very poor.	Good.
20----- Chard	Good	Good	Good	Good	Good	Poor	Very poor.	Good	---	Very poor.	Good.
21, 22----- Chard	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	---	Very poor.	Good.
23----- Chard	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	---	Very poor.	Good.
24----- Chard Variant	Poor	Poor	Fair	Fair	Good	Poor	Very poor.	Poor	---	Very poor.	Fair.
25----- Chard Variant	Poor	Poor	Fair	Fair	Good	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
26----- Chicane	Good	Good	Good	Good	Good	Poor	Very poor.	Good	---	Very poor.	Good.
27, 28----- Chicane	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	---	Very poor.	Good.
29----- Chicane	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	---	Very poor.	Good.
30, 31----- De Masters	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	---
32*: De Masters-----	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	---
Riggins-----	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
33*: De Masters-----	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	---
Suloaf-----	Poor	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	---
34----- Ericson	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	---
35----- Ericson	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---

See footnote at end of table.

TABLE 14.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Conif- erous plants	Shrubs	Wetland plants	Shallow water areas	Open- land wild- life	Wood- land wild- life	Wetland wild- life	Range- land wild- life
36*: Ericson----- Rock outcrop.	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
37----- Fenn	Good	Good	Poor	Good	Poor	Poor	Very poor.	Fair	---	Very poor.	Poor.
38----- Fenn	Fair	Good	Poor	Good	Poor	Very poor.	Very poor.	Fair	---	Very poor.	Poor.
39----- Fenn	Poor	Poor	Poor	Good	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
40----- Fenn Variant	Good	Good	Poor	Good	Poor	Poor	Fair	Fair	---	Poor	Poor.
41, 42----- Ferdinand	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	---	Very poor.	Good.
43----- Ferdinand	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	---	Very poor.	Good.
44*: Ferdinand----- Bluesprin-----	Very poor. Very poor.	Very poor. Very poor.	Good Good	Good Good	Good Good	Very poor. Very poor.	Very poor. Very poor.	Poor Poor	--- ---	Very poor. Very poor.	Good. Good.
45*: Ferdinand----- Flybow----- Riggins-----	Fair Poor Poor	Good Poor Poor	Good Poor Poor	Good Very poor. Poor	Good Poor Poor	Very poor. Very poor. Very poor.	Very poor. Very poor. Very poor.	Good Poor Poor	--- --- ---	Very poor. Very poor. Very poor.	Good. Poor. Poor.
46*: Ferdinand----- Riggins-----	Fair Poor	Good Poor	Good Poor	Good Poor	Good Poor	Very poor. Very poor.	Very poor. Very poor.	Good Poor	--- ---	Very poor. Very poor.	Good. Poor.
47----- Jacket	Good	Good	Good	Good	Good	Poor	Very poor.	Good	---	Very poor.	Good.
48, 49----- Jacket	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	---	Very poor.	Good.
50----- Jacket	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	---	Very poor.	Good.
51, 52, 53----- Jacket Variant	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	---	Very poor.	Good.
54----- Johnson	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	---
55----- Johnson	Poor	Poor	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---

See footnote at end of table.



TABLE 14.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Conif- erous plants	Shrubs	Wetland plants	Shallow water areas	Open- land wild- life	Wood- land wild- life	Wetland wild- life	Range- land wild- life
56----- Jughandle	Fair	Good	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.	---
57----- Jughandle	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	---
58*: Jughandle-----	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	---
Ericson-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
59*: Jughandle-----	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	---
Suttler-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
60----- Jughandle Variant	Poor	Fair	Good	Good	Good	Fair	Poor	Fair	---	Poor	Good.
61----- Keuterville	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	---
62----- Keuterville	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
63*: Keuterville-----	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	---
Bluesprin-----	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	---	Very poor.	Good.
64*: Keuterville-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
Bluesprin-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	---	Very poor.	Good.
65*: Keuterville-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
Klickson-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
66*: Klickson-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
Rock outcrop.											
67*: Klickson-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
Suloaf-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---

See footnote at end of table.

TABLE 14.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Conif- erous plants	Shrubs	Wetland plants	Shallow water areas	Open- land wild- life	Wood- land wild- life	Wetland wild- life	Range- land wild- life
68*: Klickson-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
Bluesprin-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	---	Very poor.	Good.
69*: Klickson-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
Wapshilla-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
70----- Kooskia	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.	---
71, 72----- Kooskia	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	---
73*: Lawyer-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	---	Very poor.	Good.
Rock outcrop.											
74*: Lawyer-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	---	Very poor.	Good.
Bluesprin-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	---	Very poor.	Good.
75*: Lawyer-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	---	Very poor.	Good.
Tannahill-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	---	Very poor.	Good.
76*: Licksillet-----	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
Tannahill-----	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	---	Very poor.	Good.
77----- Meland	Good	Good	Good	Good	Good	Poor	Very poor.	Good	---	Very poor.	Good.
78----- Meland	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	---	Very poor.	Good.
79----- Meland	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	---	Very poor.	Good.
80----- Naz	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	---
81*: Nazaton-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
Naz-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---

See footnote at end of table.



TABLE 14.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Conif- erous plants	Shrubs	Wetland plants	Shallow water areas	Open- land wild- life	Wood- land wild- life	Wetland wild- life	Range- land wild- life
82*: Nazaton-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
Suttler-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
83----- Nez Perce	Good	Good	Good	Good	Good	Poor	Very poor.	Good	---	Very poor.	Good.
84, 85----- Nez Perce	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	---	Very poor.	Good.
86----- Nicodemus	Poor	Poor	Good	Good	Good	Poor	Very poor.	Fair	---	Very poor.	Good.
87----- Nicodemus Variant	Good	Good	Good	Good	Good	Good	Fair	Good	---	Fair	Good
88----- Nicodemus Variant	Poor	Poor	Good	Good	Good	Good	Fair	Fair	---	Fair	Good.
89----- Oland	Poor	Poor	Good	Good	Good	Very poor.	Very poor.	Fair	---	Very poor.	Good.
90----- Oland	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	---	Very poor.	Good.
91----- Oland Variant	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	---	Very poor.	Good.
92*: Riggins-----	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
Meland-----	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	---	Very poor.	Good.
93*. Rock outcrop											
94*: Rock outcrop.											
Bluesprin-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	---	Very poor.	Good.
95*: Rock outcrop.											
Brower-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	---	Very poor.	Good.
96*: Rock outcrop.											
Klickson-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
97*: Rock outcrop.											
Nazaton-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---

See footnote at end of table.

TABLE 14.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Conif- erous plants	Shrubs	Wetland plants	Shallow water areas	Open- land wild- life	Wood- land wild- life	Wetland wild- life	Range- land wild- life
98*: Rock outcrop.											
Suttler-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
99*: Rock outcrop.											
Tannahill-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	---	Very poor.	Good.
100----- Shebang	Good	Good	Good	Good	Good	Poor	Very poor.	Good	---	Very poor.	Good.
101----- Shebang	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	---	Very poor.	Good.
102----- Shebang	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	---	Very poor.	Good.
103----- Spokel	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
104*: Spokel-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
Brower-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	---	Very poor.	Good.
105*: Spokel-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
Nazaton.											
106*: Spokel-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
Suttler-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
107----- Suloaf	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.	---
108----- Suloaf	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	---
109----- Suloaf	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
110----- Suloaf	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	---
111*: Suloaf-----	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
Meland-----	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	---	Very poor.	Good.
112----- Tannahill	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	---	Very poor.	Good.

See footnote at end of table.



TABLE 14.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Conif- erous plants	Shrubs	Wetland plants	Shallow water areas	Open- land wild- life	Wood- land wild- life	Wetland wild- life	Range- land wild- life
113*: Tannahill-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	---	Very poor.	Good.
Licksillet-----	Very poor.	Very poor.	Fair	Poor	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
114*: Tannahill-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	---	Very poor.	Good.
Rock outcrop.											
115----- Telcher	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.	---
116----- Telcher	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	---
117----- Telcher	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
118*: Telcher-----	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
Suloaf-----	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	---
119*. Typic Xerofluvents											
120----- Uhlorn	Good	Good	Good	Good	Good	Poor	Very poor.	Good	---	Very poor.	Good.
121, 122----- Uhlorn	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	---	Very poor.	Good.
123----- Uhlorn	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	---	Very poor.	Good.
124----- Uhlorn	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	---	Very poor.	Good.
125----- Uptmor	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.	---
126----- Uptmor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	---
127----- Uptmor	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
128----- Wapshilla	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	---
129----- Westlake	Poor	Fair	Good	Good	Good	Good	Fair	Fair	---	Fair	Good.
130----- Wilkins	Poor	Fair	Good	Good	Good	Good	Good	Fair	---	Good	Good.
131----- Zaza	Poor	Poor	Poor	Very poor.	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.	---

\* See map unit description for the composition and behavior of the map unit.

TABLE 15.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
1----- Banner	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
2----- Banner	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: slope, shrink-swell, low strength.	Severe: shrink-swell, low strength.
3----- Banner	Severe: slope, too clayey.	Severe: slope, shrink-swell, low strength.	Severe: slope, shrink-swell, low strength.	Severe: slope, shrink-swell, low strength.	Severe: slope, shrink-swell, low strength.
4*: Bluesprin-----	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, low strength.
Keuterville-----	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
5*: Bluesprin-----	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, low strength.
Klickson-----	Severe: slope, small stones.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
6*: Bluesprin-----	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, low strength.
Lawyer-----	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
7*: Bluesprin-----	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, low strength.
Rock outcrop.					
8----- Boles	Severe: too clayey, wetness.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell, wetness.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.
9----- Boles	Severe: slope, too clayey, wetness.	Severe: slope, low strength, shrink-swell.	Severe: slope, wetness, shrink-swell.	Severe: slope, low strength.	Severe: slope, shrink-swell, low strength.
10----- Brody	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.

See footnote at end of table.



TABLE 15.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
11*: Brody-----	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.
Telcher-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
12*: Brody-----	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.
Wapshilla-----	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
13----- Brower	Severe: slope, small stones, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
14*: Brower-----	Severe: slope, small stones, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Brownlee-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.
15*: Brower-----	Severe: slope, small stones, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.					
16----- Brownlee	Moderate: too clayey.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, slope, low strength.	Severe: low strength.
17----- Brownlee	Moderate: slope, too clayey.	Moderate: shrink-swell, slope, low strength.	Moderate: shrink-swell, slope, low strength.	Severe: slope.	Severe: low strength.
18, 19----- Brownlee	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.
20----- Chard	Severe: cutbanks cave.	Slight-----	Slight-----	Moderate: slope.	Moderate: frost action, low strength.
21----- Chard	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action, low strength.
22, 23----- Chard	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 15.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
24----- Chard Variant	Severe: cutbanks cave.	Slight-----	Slight-----	Moderate: slope.	Slight.
25----- Chard Variant	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
26----- Chicane	Severe: too clayey.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.
27----- Chicane	Severe: too clayey.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: slope, low strength, shrink-swell.	Severe: low strength, shrink-swell.
28, 29----- Chicane	Severe: slope, too clayey.	Severe: slope, low strength, shrink-swell.	Severe: slope, low strength, shrink-swell.	Severe: slope, low strength, shrink-swell.	Severe: slope, low strength, shrink-swell.
30, 31----- De Masters	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
32*: De Masters-----	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Riggins-----	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
33*: De Masters-----	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Suloaf-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
34----- Ericson	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action, low strength.
35----- Ericson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
36*: Ericson-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.					
37----- Fenn	Severe: too clayey.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: shrink-swell, low strength.
38----- Fenn	Severe: slope, too clayey.	Severe: slope, low strength, shrink-swell.	Severe: slope, low strength, shrink-swell.	Severe: slope, low strength, shrink-swell.	Severe: slope, shrink-swell, low strength.

See footnote at end of table.



TABLE 15.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
39----- Fenn	Severe: slope, too clayey.	Severe: slope, low strength, shrink-swell.	Severe: slope, low strength, shrink-swell.	Severe: slope, shrink-swell, low strength.	Severe: slope, shrink-swell, low strength.
40----- Fenn Variant	Severe: too clayey, wetness.	Severe: shrink-swell, low strength.	Severe: shrink-swell, wetness, low strength.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.
41----- Ferdinand	Severe: too clayey, depth to rock.	Severe: low strength.	Severe: depth to rock, low strength.	Severe: low strength.	Severe: low strength.
42, 43----- Ferdinand	Severe: slope, too clayey, depth to rock.	Severe: slope, low strength.	Severe: slope, depth to rock, low strength.	Severe: slope, low strength.	Severe: slope, low strength.
44*: Ferdinand-----	Severe: slope, too clayey, depth to rock.	Severe: slope, low strength.	Severe: slope, depth to rock, low strength.	Severe: slope, low strength.	Severe: slope, low strength.
Bluesprin-----	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, low strength.
45*: Ferdinand-----	Severe: slope, too clayey, depth to rock.	Severe: slope, low strength.	Severe: slope, depth to rock, low strength.	Severe: slope, low strength.	Severe: slope, low strength.
Flybow-----	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
Riggins-----	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
46*: Ferdinand-----	Severe: slope, too clayey, depth to rock.	Severe: slope, low strength.	Severe: slope, depth to rock, low strength.	Severe: slope, low strength.	Severe: slope, low strength.
Riggins-----	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
47----- Jacket	Severe: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
48----- Jacket	Severe: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: slope, shrink-swell.	Severe: shrink-swell, low strength.
49, 50----- Jacket	Severe: slope, too clayey.	Severe: slope, shrink-swell.	Severe: slope, shrink-swell.	Severe: slope, shrink-swell.	Severe: slope, shrink-swell, low strength.

See footnote at end of table.

TABLE 15.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
51----- Jacket Variant	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: frost action.
52, 53----- Jacket Variant	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.
54, 55----- Johnson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
56, 57----- Jughandle	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
58*: Jughandle-----	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Ericson-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
59*: Jughandle-----	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Suttler-----	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
60----- Jughandle Variant	Severe: floods, wetness, cutbanks cave.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, frost action, wetness.
61, 62----- Keuterville	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
63*, 64*: Keuterville-----	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Bluesprin-----	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, low strength.
65*: Keuterville-----	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Klickson-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
66*: Klickson-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.					
67*: Klickson-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 15.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
67*: Suloaf-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
68*: Klickson-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Bluesprin-----	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, low strength.
69*: Klickson-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Wapshilla-----	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
70----- Kooskia	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: low strength, shrink-swell.
71----- Kooskia	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: slope, shrink-swell.	Severe: shrink-swell, low strength.
72----- Kooskia	Severe: slope, too clayey.	Severe: slope, shrink-swell, low strength.	Severe: slope, shrink-swell, low strength.	Severe: slope, shrink-swell.	Severe: slope, shrink-swell, low strength.
73*: Lawyer-----	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.					
74*: Lawyer-----	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Bluesprin-----	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, low strength.
75*: Lawyer-----	Severe: slope, cutbands cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Tannahill-----	Severe: slope, cutbands cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
76*: Licksillet-----	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
Tannahill-----	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.



TABLE 15.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
77----- Meland	Severe: depth to rock.	Moderate: shrink-swell, low strength, depth to rock.	Severe: depth to rock.	Moderate: slope, shrink-swell, low strength.	Moderate: depth to rock, low strength, frost action.
78, 79----- Meland	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.
80----- Naz	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
81*: Nazaton-----	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Naz-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
82*: Nazaton-----	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Suttler-----	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
83----- Nez Perce	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength, wetness.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
84----- Nez Perce	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength, wetness.	Severe: slope, shrink-swell, low strength.	Severe: shrink-swell, low strength.
85----- Nez Perce	Severe: slope, too clayey.	Severe: slope, shrink-swell, low strength.	Severe: slope, shrink-swell, low strength.	Severe: slope, shrink-swell, low strength.	Severe: slope, shrink-swell, low strength.
86----- Nicodemus	Severe: cutbanks cave.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: frost action, floods.
87----- Nicodemus Variant	Moderate: floods, wetness.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: low strength, floods, frost action.
88----- Nicodemus Variant	Moderate: floods, wetness.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: low strength, floods, frost action.
89, 90----- Oland	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
91----- Oland Variant	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 15.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
92*: Riggins-----	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
Meland-----	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.
93*: Rock outcrop					
94*: Rock outcrop.					
Bluesprin-----	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, low strength.
95*: Rock outcrop.					
Brower-----	Severe: slope, small stones, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
96*: Rock outcrop.					
Klickson-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
97*: Rock outcrop.					
Nazaton-----	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
98*: Rock outcrop.					
Suttler-----	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
99*: Rock outcrop.					
Tannahill-----	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
100----- Shebang	Severe: too clayey, wetness.	Severe: shrink-swell, low strength, wetness.	Severe: shrink-swell, low strength, wetness.	Severe: shrink-swell, low strength, wetness.	Severe: shrink-swell, low strength.
101----- Shebang	Severe: too clayey, wetness.	Severe: shrink-swell, low strength, wetness.	Severe: shrink-swell, low strength, wetness.	Severe: slope, shrink-swell, wetness.	Severe: shrink-swell, low strength.
102----- Shebang	Severe: slope, too clayey, wetness.	Severe: slope, shrink-swell, wetness.	Severe: slope, shrink-swell, wetness.	Severe: slope, shrink-swell, wetness.	Severe: slope, shrink-swell, low strength.

See footnote at end of table.

TABLE 15.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
103----- Spokel	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
104*: Spokel-----	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Brower-----	Severe: slope, small stones, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
105*: Spokel-----	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Nazaton-----	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
106*: Spokel-----	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Suttler-----	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
107----- Suloaf	Moderate: too clayey, depth to rock.	Moderate: shrink-swell, low strength.	Moderate: depth to rock, shrink-swell, low strength.	Moderate: slope, shrink-swell, low strength.	Moderate: low strength, frost action, shrink-swell.
108, 109, 110----- Suloaf	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
111*: Suloaf-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Meland-----	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.
112----- Tannahill	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
113*: Tannahill-----	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
113*: Lickskillet-----	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
114*: Tannahill-----	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.					

See footnote at end of table.



TABLE 15.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
115----- Telcher	Moderate: too clayey.	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: shrink-swell, slope, low strength.	Severe: low strength.
116, 117----- Telcher	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
118*: Telcher-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
Suloaf-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
119*. Typic Xerofluvents.					
120----- Uhlorn	Moderate: too clayey.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: slope, shrink-swell, low strength.	Severe: frost action, low strength.
121----- Uhlorn	Moderate: slope, too clayey.	Moderate: slope, shrink-swell, low strength.	Moderate: slope, shrink-swell, low strength.	Severe: slope.	Severe: frost action, low strength.
122, 123, 124----- Uhlorn	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength, frost action.
125----- Uptmor	Severe: too clayey.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.
126, 127----- Uptmor	Severe: slope, too clayey.	Severe: low strength, slope, shrink-swell.	Severe: slope, shrink-swell, low strength.	Severe: slope, low strength, shrink-swell.	Severe: slope, low strength, shrink-swell.
128----- Wapshilla	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
129----- Westlake	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, frost action.
130----- Wilkins	Severe: too clayey.	Severe: floods, shrink-swell, low strength.	Severe: floods, wetness, shrink-swell.	Severe: floods, low strength, shrink-swell.	Severe: low strength, shrink-swell.
131----- Zaza	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.

\* See map unit description for the composition and behavior of the map unit.

TABLE 16.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated.]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
1----- Banner	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight-----	Poor: too clayey.
2----- Banner	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.
3----- Banner	Severe: slope, percs slowly.	Severe: slope.	Severe: too clayey.	Severe: slope.	Poor: slope, too clayey.
4*: Bluesprin-----	Severe: slope, percs slowly, depth to rock.	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, area reclaim, thin layer.
Keuterville-----	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, small stones.
5*: Bluesprin-----	Severe: slope, percs slowly, depth to rock.	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, area reclaim, thin layer.
Klickson-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, small stones.
6*: Bluesprin-----	Severe: slope, percs slowly, depth to rock.	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, area reclaim, thin layer.
Lawyer-----	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
7*: Bluesprin-----	Severe: slope, percs slowly, depth to rock.	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, area reclaim, depth to rock.
Rock outcrop.					
8----- Boles	Severe: percs slowly, wetness.	Moderate: slope.	Severe: too clayey, wetness.	Severe: wetness.	Poor: too clayey.
9----- Boles	Severe: slope, percs slowly, wetness.	Severe: slope.	Severe: too clayey, wetness.	Severe: slope, wetness.	Poor: slope, too clayey.
10----- Brody	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, area reclaim, depth to rock.

See footnote at end of table.

TABLE 16.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
11*: Brody-----	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, area reclaim, thin layer.
Telcher-----	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
12*: Brody-----	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, area reclaim, thin layer.
Wapshilla-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
13----- Brower	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.	Poor: slope, small stones.
14*: Brower-----	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.	Poor: slope, small stones.
Brownlee-----	Severe: percs slowly, depth to rock, slope.	Severe: slope, seepage.	Severe: slope, depth to rock, seepage.	Severe: seepage, slope.	Poor: slope.
15*: Brower-----	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.	Poor: slope, small stones.
Rock outcrop.					
16----- Brownlee	Severe: percs slowly, depth to rock.	Severe: seepage.	Severe: depth to rock, seepage.	Severe: seepage.	Fair: thin layer, small stones, area reclaim.
17----- Brownlee	Severe: percs slowly, depth to rock.	Severe: slope, seepage.	Severe: depth to rock, seepage.	Severe: seepage.	Fair: thin layer, slope, small stones.
18----- Brownlee	Severe: percs slowly, depth to rock, slope.	Severe: slope, seepage.	Severe: depth to rock, seepage.	Severe: seepage, slope.	Poor: slope.
19----- Brownlee	Severe: percs slowly, depth to rock, slope.	Severe: slope, seepage.	Severe: slope, depth to rock, seepage.	Severe: seepage, slope.	Poor: slope.
20----- Chard	Slight-----	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too sandy.
21----- Chard	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: slope, too sandy.

See footnote at end of table.



TABLE 16.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
22----- Chard	Severe: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage, slope.	Poor: slope.
23----- Chard	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
24----- Chard Variant	Slight-----	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy.
25----- Chard Variant	Severe: slope.	Severe: slope, seepage.	Severe: seepage, too sandy.	Severe: slope, seepage.	Poor: slope, too sandy.
26----- Chicane	Severe: percs slowly, wetness.	Moderate: slope.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey.
27----- Chicane	Severe: percs slowly, wetness.	Severe: slope.	Severe: too clayey.	Moderate: wetness, slope.	Poor: too clayey.
28----- Chicane	Severe: slope, percs slowly, wetness.	Severe: slope.	Severe: too clayey.	Severe: slope.	Poor: slope, too clayey.
29----- Chicane	Severe: slope, percs slowly, wetness.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: slope, too clayey.
30----- De Masters	Severe: slope.	Severe: slope.	Severe: depth to rock.	Severe: slope.	Poor: slope.
31----- De Masters	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope.
32*: De Masters-----	Severe: slope.	Severe: slope.	Severe: depth to rock.	Severe: slope.	Poor: slope.
Riggins-----	Severe: slope, depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Poor: slope, thin layer, area reclaim.
33*: De Masters-----	Severe: slope.	Severe: slope.	Severe: depth to rock.	Severe: slope.	Poor: slope.
Suloaf-----	Severe: slope.	Severe: seepage, slope.	Severe: seepage, depth to rock.	Severe: seepage, slope.	Poor: slope.
34----- Ericson	Severe: percs slowly.	Severe: slope.	Slight-----	Moderate: slope.	Fair: slope, small stones.
35----- Ericson	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.

See footnote at end of table.

TABLE 16.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
36*: Ericson-----	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Rock outcrop.					
37----- Fenn	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight-----	Poor: too clayey.
38----- Fenn	Severe: slope, percs slowly.	Severe: slope.	Severe: too clayey.	Severe: slope.	Poor: slope, too clayey.
39----- Fenn	Severe: slope, percs slowly.	Severe: slope.	Severe: too clayey.	Severe: slope.	Poor: slope, too clayey.
40----- Fenn Variant	Severe: percs slowly, wetness.	Moderate: slope.	Severe: too clayey, wetness.	Severe: wetness.	Poor: too clayey.
41----- Ferdinand	Severe: percs slowly, depth to rock.	Severe: depth to rock.	Severe: too clayey, depth to rock.	Slight-----	Poor: too clayey, thin layer, area reclaim.
42----- Ferdinand	Severe: slope, percs slowly, depth to rock.	Severe: slope, depth to rock.	Severe: too clayey, depth to rock.	Severe: slope.	Poor: slope, too clayey, large stones.
43----- Ferdinand	Severe: slope, percs slowly, depth to rock.	Severe: slope, depth to rock.	Severe: slope, too clayey, depth to rock.	Severe: slope.	Poor: slope, too clayey, large stones.
44*: Ferdinand-----	Severe: slope, percs slowly, depth to rock.	Severe: slope, depth to rock.	Severe: slope, too clayey, depth to rock.	Severe: slope.	Poor: slope, too clayey, large stones.
Bluesprin-----	Severe: slope, percs slowly, depth to rock.	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, area reclaim.
45*: Ferdinand-----	Severe: slope, percs slowly, depth to rock.	Severe: slope, depth to rock.	Severe: too clayey, depth to rock.	Severe: slope.	Poor: slope, too clayey, large stones.
Flybow-----	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Poor: slope, thin layer, area reclaim.
Riggins-----	Severe: slope, depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Poor: slope, thin layer, area reclaim.

See footnote at end of table.

TABLE 16.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
46*: Ferdinand-----	Severe: slope, percs slowly, depth to rock.	Severe: slope, depth to rock.	Severe: too clayey, depth to rock.	Severe: slope.	Poor: slope, too clayey, large stones.
Riggins-----	Severe: slope, depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Poor: slope, thin layer, area reclaim.
47----- Jacket	Severe: percs slowly.	Moderate: slope, seepage.	Severe: too clayey.	Slight-----	Poor: too clayey.
48----- Jacket	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.
49----- Jacket	Severe: slope, percs slowly.	Severe: slope.	Severe: too clayey.	Severe: slope.	Poor: slope, too clayey.
50----- Jacket	Severe: slope, percs slowly.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: slope, too clayey.
51----- Jacket Variant	Moderate: slope, percs slowly.	Severe: slope.	Slight-----	Moderate: slope.	Fair: slope.
52----- Jacket Variant	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.	Poor: slope.
53----- Jacket Variant	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
54----- Johnson	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.	Poor: slope.
55----- Johnson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
56----- Jughandle	Severe: slope, depth to rock.	Severe: slope, seepage.	Severe: seepage.	Severe: slope, seepage.	Poor: slope.
57----- Jughandle	Severe: slope, depth to rock.	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope.
58*: Jughandle-----	Severe: slope, depth to rock.	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope.
Ericson-----	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
59*: Jughandle-----	Severe: slope, depth to rock.	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope.
Suttler-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.

See footnote at end of table.



TABLE 16.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
60----- Jughandle Variant	Severe: floods, wetness.	Severe: wetness, seepage.	Severe: floods, seepage.	Severe: floods, wetness, seepage.	Poor: wetness.
61----- Keuterville	Severe: slope, percs slowly.	Severe: slope.	Moderate: slope.	Severe: slope.	Poor: slope, small stones.
62----- Keuterville	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, small stones.
63*: Keuterville-----	Severe: slope, percs slowly.	Severe: slope.	Moderate: slope.	Severe: slope.	Poor: slope, small stones.
Bluesprin-----	Severe: slope, percs slowly, depth to rock.	Severe: slope, depth to rock, large stones.	Severe: depth to rock.	Severe: slope.	Poor: slope, area reclaim, thin layer.
64*: Keuterville-----	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, small stones.
Bluesprin-----	Severe: slope, percs slowly, depth to rock.	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, area reclaim, thin layer.
65*: Keuterville-----	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, small stones.
Klickson-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
66*: Klickson-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Rock outcrop.					
67*: Klickson-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Suloaf-----	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope.	Poor: slope.
68*: Klickson-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Bluesprin-----	Severe: slope, percs slowly, depth to rock.	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, area reclaim, thin layer.

See footnote at end of table.

TABLE 16.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
69*: Klickson-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Wapshilla-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, small stones.
70----- Kooskia	Severe: percs slowly, wetness.	Moderate: slope.	Severe: too clayey. too clayey.	Moderate: wetness.	Poor: too clayey.
71----- Kooskia	Severe: percs slowly, wetness.	Severe: slope, wetness.	Severe: too clayey.	Moderate: wetness, slope.	Poor: too clayey.
72----- Kooskia	Severe: slope, percs slowly, wetness.	Severe: slope, wetness.	Severe: too clayey.	Severe: slope.	Poor: slope, too clayey.
73*: Lawyer-----	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Rock outcrop.					
74*: Lawyer-----	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Bluesprin-----	Severe: slope, percs slowly, depth to rock.	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, area reclaim, thin layer.
75*: Lawyer-----	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Tannahill-----	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
76*: Lickskillet-----	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Poor: slope, thin layer, small stones.
Tannahill-----	Severe: slope, percs slowly.	Severe: slope.	Moderate: depth to rock.	Severe: slope.	Poor: small stones, slope.
77----- Meland	Severe: percs slowly, depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight-----	Poor: thin layer, area reclaim.
78----- Meland	Severe: slope, percs slowly, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Poor: slope, thin layer, area reclaim.

See footnote at end of table.

TABLE 16.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
79----- Meland	Severe: slope, percs slowly, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, thin layer, area reclaim.
80----- Naz	Severe: slope.	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope.
81*: Nazaton-----	Severe: slope.	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope, small stones.
Naz-----	Severe: slope.	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope.
82*: Nazaton-----	Severe: slope.	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope, small stones.
Suttler-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
83----- Nez Perce	Severe: percs slowly, wetness.	Moderate: slope.	Severe: too clayey, wetness.	Moderate: wetness.	Poor: too clayey.
84----- Nez Perce	Severe: percs slowly, wetness.	Severe: slope.	Severe: too clayey, wetness.	Moderate: wetness, slope.	Poor: too clayey.
85----- Nez Perce	Severe: slope, percs slowly, wetness.	Severe: slope.	Severe: too clayey, wetness.	Severe: slope.	Poor: slope, too clayey.
86----- Nicodemus	Severe: wetness.	Severe: seepage.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: seepage.
87, 88----- Nicodemus Variant	Severe: wetness.	Moderate: wetness, seepage.	Severe: wetness.	Moderate: floods, wetness.	Good.
89, 90----- Oland	Severe: slope.	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope.
91----- Oland Variant	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.	Poor: slope.
92*: Riggins-----	Severe: slope, depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Poor: slope, thin layer, area reclaim.
Meland-----	Severe: slope, percs slowly, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Poor: slope, thin layer, area reclaim.
93*. Rock outcrop					

See footnote at end of table.



TABLE 16.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
94*: Rock outcrop.					
94*: Bluesprin-----	Severe: slope, percs slowly, depth to rock.	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, area reclaim, thin layer.
95*: Rock outcrop.					
Brower-----	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.	Poor: slope, small stones.
96*: Rock outcrop.					
Klickson-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
97*: Rock outcrop.					
Nazaton-----	Severe: slope.	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope, small stones.
98*: Rock outcrop.					
Suttler-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
99*: Rock outcrop.					
Tannahill-----	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
100----- Shebang	Severe: percs slowly, wetness.	Moderate: slope.	Severe: too clayey, wetness.	Severe: wetness.	Poor: too clayey.
101----- Shebang	Severe: percs slowly, wetness.	Severe: slope.	Severe: too clayey, wetness.	Severe: wetness.	Poor: too clayey.
102----- Shebang	Severe: slope, percs slowly, wetness.	Severe: slope.	Severe: too clayey, wetness.	Severe: slope, wetness.	Poor: slope, too clayey.
103----- Spokel	Severe: slope.	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope, small stones.
104*: Spokel-----	Severe: slope.	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope, small stones.
Brower-----	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.	Poor: slope, small stones.

See footnote at end of table.

TABLE 16.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
105*: Spokel-----	Severe: slope.	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope, small stones.
Nazaton-----	Severe: slope.	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope, small stones.
106*: Spokel-----	Severe: slope.	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope, small stones.
Suttler-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
107----- Suloaf	Moderate: percs slowly, depth to rock.	Severe: seepage.	Severe: seepage, depth to rock.	Severe: seepage.	Fair: too clayey, small stones, thin layer.
108----- Suloaf	Severe: slope.	Severe: seepage, slope.	Severe: seepage, depth to rock.	Severe: seepage, slope.	Poor: slope.
109----- Suloaf	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope.	Poor: slope.
110----- Suloaf	Severe: slope.	Severe: seepage, slope.	Severe: seepage, depth to rock.	Severe: seepage, slope.	Poor: slope.
111*: Suloaf-----	Severe: slope.	Severe: seepage, slope.	Severe: seepage, depth to rock.	Severe: seepage, slope.	Poor: slope, thin layer, area reclaim.
Meland-----	Severe: slope, percs slowly, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Poor: slope.
112----- Tannahill	Severe: slope, percs slowly.	Severe: slope.	Moderate: depth to rock.	Severe: slope.	Poor: small stones, slope.
113*: Tannahill-----	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
Lickskillet-----	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, thin layer, small stones.
114*: Tannahill-----	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
Rock outcrop.					

See footnote at end of table.

TABLE 16.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
115----- Telcher	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----	Fair: too clayey.
116----- Telcher	Severe: slope, percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Severe: slope.	Poor: slope.
117----- Telcher	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
118*: Telcher-----	Severe: slope, percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Severe: slope.	Poor: slope.
Suloaf-----	Severe: slope.	Severe: seepage, slope.	Severe: seepage, depth to rock.	Severe: seepage, slope.	Poor: slope.
119*. Typic Xerofluvents.					
120----- Uhlorn	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight-----	Fair: too clayey.
121----- Uhlorn	Severe: percs slowly.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: slope, too clayey.
122----- Uhlorn	Severe: slope, percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Severe: slope.	Poor: slope.
123, 124----- Uhlorn	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
125----- Uptmor	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight-----	Poor: too clayey.
126----- Uptmor	Severe: slope, percs slowly.	Severe: slope.	Severe: too clayey.	Severe: slope.	Poor: slope, too clayey.
127----- Uptmor	Severe: slope, percs slowly.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: slope, too clayey.
128----- Wapshilla	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.	Poor: slope.
129----- Westlake	Severe: floods, wetness, percs slowly.	Slight-----	Severe: floods, wetness.	Severe: floods, wetness.	Poor: wetness.
130----- Wilkins	Severe: percs slowly, wetness.	Slight-----	Severe: wetness, too clayey.	Moderate: wetness, floods.	Poor: too clayey.
131----- Zaza	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Poor: slope, thin layer, area reclaim.

\* See map unit description for the composition and behavior of the map unit.



TABLE 17.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and "poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
1, 2----- Banner	Poor: shrink-swell, low strength.	Unsuited-----	Unsuited-----	Fair: too clayey.
3----- Banner	Poor: shrink-swell, low strength.	Unsuited-----	Unsuited-----	Poor: slope.
4*: Bluesprin-----	Poor: thin layer, low strength, slope.	Unsuited-----	Unsuited-----	Poor: slope, small stones.
Keuterville-----	Poor: slope.	Unsuited-----	Unsuited-----	Poor: slope, small stones, large stones.
5*: Bluesprin-----	Poor: thin layer, low strength, slope.	Unsuited-----	Unsuited-----	Poor: slope, small stones.
Klickson-----	Poor: slope.	Unsuited-----	Unsuited-----	Poor: slope, small stones.
6*: Bluesprin-----	Poor: thin layer, low strength, slope.	Unsuited-----	Unsuited-----	Poor: slope, small stones.
Lawyer-----	Poor: slope.	Unsuited-----	Unsuited-----	Poor: slope.
7*: Bluesprin-----	Poor: thin layer, low strength, slope.	Unsuited-----	Unsuited-----	Poor: slope, small stones.
Rock outcrop.				
8----- Boles	Poor: shrink-swell, low strength.	Unsuited-----	Unsuited-----	Good.
9----- Boles	Poor: shrink-swell, low strength.	Unsuited-----	Unsuited-----	Poor: slope.
10----- Brody	Poor: slope, thin layer, area reclaim.	Unsuited-----	Unsuited-----	Poor: slope.
11*: Brody-----	Poor: slope, thin layer, area reclaim.	Unsuited-----	Unsuited-----	Poor: slope.

See footnote at end of table.

TABLE 17.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
11*: Telcher-----	Poor: low strength, slope.	Unsuited-----	Unsuited-----	Poor: slope.
12*: Brody-----	Poor: slope, thin layer, area reclaim.	Unsuited-----	Unsuited-----	Poor: slope.
Wapshilla-----	Poor: slope.	Unsuited-----	Poor: excess fines.	Poor: slope, small stones.
13----- Brower	Poor: slope.	Unsuited-----	Poor: excess fines.	Poor: slope, small stones.
14*: Brower-----	Poor: slope.	Unsuited-----	Poor: excess fines.	Poor: slope, small stones.
Brownlee-----	Poor: slope, low strength.	Unsuited-----	Unsuited-----	Poor: slope.
15*: Brower-----	Poor: slope.	Unsuited-----	Poor: excess fines.	Poor: slope, small stones.
Rock outcrop.				
16----- Brownlee	Poor: low strength.	Unsuited-----	Unsuited-----	Good.
17----- Brownlee	Poor: low strength.	Unsuited-----	Unsuited-----	Fair: slope.
18----- Brownlee	Poor: low strength.	Unsuited-----	Unsuited-----	Poor: slope.
19----- Brownlee	Poor: slope, low strength.	Unsuited-----	Unsuited-----	Poor: slope.
20----- Chard	Fair: frost action, low strength.	Fair: excess fines.	Unsuited-----	Good.
21----- Chard	Fair: frost action, low strength.	Fair: excess fines.	Unsuited-----	Fair: slope.
22----- Chard	Fair: slope, frost action, low strength.	Fair: excess fines.	Unsuited-----	Poor: slope.
23----- Chard	Poor: slope.	Fair: excess fines.	Unsuited-----	Poor: slope.
24----- Chard Variant	Good-----	Fair: excess fines.	Unsuited-----	Fair: too sandy.

See footnote at end of table.

TABLE 17.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
25----- Chard Variant	Fair: slope.	Fair: excess fines.	Unsuited-----	Poor: slope.
26----- Chicane	Poor: low strength, shrink-swell.	Unsuited-----	Unsuited-----	Fair: too clayey.
27----- Chicane	Poor: low strength, shrink-swell.	Unsuited-----	Unsuited-----	Fair: slope, too clayey.
28----- Chicane	Poor: low strength, shrink-swell.	Unsuited-----	Unsuited-----	Poor: slope.
29----- Chicane	Poor: slope, low strength, shrink-swell.	Unsuited-----	Unsuited-----	Poor: slope.
30----- De Masters	Fair: slope, thin layer, area reclaim.	Unsuited-----	Unsuited-----	Poor: slope.
31----- De Masters	Poor: slope.	Unsuited-----	Unsuited-----	Poor: slope.
32*: De Masters-----	Fair: slope, thin layer, area reclaim.	Unsuited-----	Unsuited-----	Poor: slope.
Riggins-----	Poor: thin layer, area reclaim.	Unsuited-----	Unsuited-----	Poor: slope, small stones, area reclaim.
33*: De Masters-----	Fair: slope, thin layer, area reclaim.	Unsuited-----	Unsuited-----	Poor: slope.
Suloaf-----	Poor: low strength.	Unsuited-----	Unsuited-----	Poor: slope.
34----- Ericson	Fair: low strength.	Poor: excess fines.	Poor: excess fines.	Fair: slope, small stones.
35----- Ericson	Poor: slope.	Poor: excess fines.	Poor: excess fines.	Poor: slope.
36*: Ericson-----	Poor: slope.	Poor: excess fines.	Poor: excess fines.	Poor: slope.
Rock outcrop.				
37----- Fenn	Poor: low strength, shrink-swell.	Unsuited-----	Unsuited-----	Poor: too clayey.
38----- Fenn	Poor: low strength, shrink-swell.	Unsuited-----	Unsuited-----	Poor: slope, too clayey.

See footnote at end of table.



TABLE 17.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
39----- Fenn	Poor: low strength, shrink-swell.	Unsuited-----	Unsuited-----	Poor: too clayey.
40----- Fenn Variant	Poor: low strength, shrink-swell.	Unsuited-----	Unsuited-----	Poor: too clayey.
41----- Ferdinand	Poor: low strength, area reclaim, thin layer.	Unsuited-----	Unsuited-----	Poor: too clayey.
42----- Ferdinand	Poor: low strength, area reclaim, thin layer.	Unsuited-----	Unsuited-----	Poor: slope, too clayey.
43----- Ferdinand	Poor: slope, low strength, area reclaim.	Unsuited-----	Unsuited-----	Poor: slope, too clayey.
44*: Ferdinand-----	Poor: slope, low strength, area reclaim.	Unsuited-----	Unsuited-----	Poor: slope, large stones, too clayey.
Bluesprin-----	Poor: thin layer, low strength, slope.	Unsuited-----	Unsuited-----	Poor: slope, small stones.
45*: Ferdinand-----	Poor: low strength, area reclaim, thin layer.	Unsuited-----	Unsuited-----	Poor: slope, too clayey.
Flybow-----	Poor: thin layer, area reclaim.	Unsuited-----	Unsuited-----	Poor: slope, thin layer, large stones.
Riggins-----	Poor: thin layer, area reclaim.	Unsuited-----	Unsuited-----	Poor: slope, small stones, area reclaim.
46*: Ferdinand-----	Poor: low strength, area reclaim, thin layer.	Unsuited-----	Unsuited-----	Poor: slope, too clayey.
Riggins-----	Poor: thin layer, area reclaim.	Unsuited-----	Unsuited-----	Poor: slope, small stones, area reclaim.
47----- Jacket	Poor: shrink-swell, low strength.	Unsuited-----	Unsuited-----	Good.
48----- Jacket	Poor: shrink-swell, low strength.	Unsuited-----	Unsuited-----	Fair: slope.

See footnote at end of table.

TABLE 17.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
49----- Jacket	Poor: shrink-swell, low strength.	Unsuited-----	Unsuited-----	Poor: slope.
50----- Jacket	Poor: slope, shrink-swell, low strength.	Unsuited-----	Unsuited-----	Poor: slope.
51----- Jacket Variant	Fair: low strength.	Unsuited-----	Unsuited-----	Fair: slope.
52----- Jacket Variant	Fair: slope, low strength.	Unsuited-----	Unsuited-----	Poor: slope.
53----- Jacket Variant	Poor: slope.	Unsuited-----	Unsuited-----	Poor: slope.
54----- Johnson	Fair: slope, low strength.	Unsuited-----	Unsuited-----	Poor: slope.
55----- Johnson	Poor: slope.	Unsuited-----	Unsuited-----	Poor: slope.
56----- Jughandle	Fair: slope, thin layer, area reclaim.	Poor: excess fines.	Unsuited-----	Poor: slope.
57----- Jughandle	Poor: slope.	Poor: excess fines.	Unsuited-----	Poor: slope.
58*: Jughandle-----	Poor: slope.	Poor: excess fines.	Unsuited-----	Poor: slope.
Ericson-----	Poor: slope.	Poor: excess fines.	Poor: excess fines.	Poor: slope.
59*: Jughandle-----	Poor: slope.	Poor: excess fines.	Unsuited-----	Poor: slope.
Suttler-----	Poor: slope.	Poor: excess fines.	Poor: excess fines.	Poor: slope, small stones.
60----- Jughandle Variant	Poor: wetness.	Fair: excess fines.	Unsuited-----	Good.
61----- Keuterville	Fair: slope.	Unsuited-----	Unsuited-----	Poor: slope, small stones.
62----- Keuterville	Poor: slope.	Unsuited-----	Unsuited-----	Poor: slope, small stones.
63*: Keuterville-----	Fair: slope.	Unsuited-----	Unsuited-----	Poor: slope, small stones.

See footnote at end of table.

TABLE 17.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
63*: Bluesprin-----	Poor: thin layer, area reclaim, low strength.	Unsuited-----	Unsuited-----	Poor: slope.
64*: Keuterville-----	Poor: slope.	Unsuited-----	Unsuited-----	Poor: slope, small stones, large stones.
Bluesprin-----	Poor: thin layer, low strength, slope.	Unsuited-----	Unsuited-----	Poor: slope, small stones.
65*: Keuterville-----	Poor: slope.	Unsuited-----	Unsuited-----	Poor: slope, small stones, large stones.
Klickson-----	Poor: slope.	Unsuited-----	Unsuited-----	Poor: slope, large stones.
66*: Klickson-----	Poor: slope.	Unsuited-----	Unsuited-----	Poor: slope, large stones.
Rock outcrop.				
67*: Klickson-----	Poor: slope.	Unsuited-----	Unsuited-----	Poor: slope, large stones.
Suloaf-----	Poor: slope, low strength.	Unsuited-----	Unsuited-----	Poor: slope.
68*: Klickson-----	Poor: slope.	Unsuited-----	Unsuited-----	Poor: slope, large stones.
Bluesprin-----	Poor: thin layer, low strength, slope.	Unsuited-----	Unsuited-----	Poor: slope, small stones.
69*: Klickson-----	Poor: slope.	Unsuited-----	Unsuited-----	Poor: slope, large stones.
Wapshilla-----	Poor: slope.	Unsuited-----	Poor: excess fines.	Poor: small stones, slope.
70----- Kooskia	Poor: low strength, shrink-swell.	Unsuited-----	Unsuited-----	Good.

See footnote at end of table.



TABLE 17.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
71----- Kooskia	Poor: low strength, shrink-swell.	Unsuited-----	Unsuited-----	Fair: slope.
72----- Kooskia	Poor: low strength, shrink-swell.	Unsuited-----	Unsuited-----	Poor: slope.
73*: Lawyer-----  Rock outcrop.	Poor: slope.	Unsuited-----	Unsuited-----	Poor: slope.
74*: Lawyer-----	Poor: slope.	Unsuited-----	Unsuited-----	Poor: slope.
Bluesprin-----	Poor: thin layer, low strength, slope.	Unsuited-----	Unsuited-----	Poor: slope, small stones.
75*: Lawyer-----	Poor: slope.	Unsuited-----	Unsuited-----	Poor: slope.
Tannahill-----	Poor: slope.	Unsuited-----	Poor: excess fines.	Poor: small stones, slope.
76*: Licksillet-----	Poor: thin layer, area reclaim.	Unsuited-----	Unsuited-----	Poor: slope, small stones, area reclaim.
Tannahill-----	Fair: slope, frost action, thin layer.	Unsuited-----	Poor: excess fines.	Poor: slope.
77----- Meland	Poor: thin layer, area reclaim.	Unsuited-----	Unsuited-----	Fair: area reclaim, thin layer.
78----- Meland	Poor: thin layer, area reclaim.	Unsuited-----	Unsuited-----	Poor: slope.
79----- Meland	Poor: slope, thin layer, area reclaim.	Unsuited-----	Unsuited-----	Poor: slope.
80----- Naz	Poor: slope.	Poor: excess fines.	Unsuited-----	Poor: slope.
81*: Nazaton-----	Poor: slope.	Unsuited-----	Poor: excess fines.	Poor: slope, small stones.
Naz-----	Poor: slope.	Poor: excess fines.	Unsuited-----	Poor: slope.

See footnote at end of table.

TABLE 17.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
82*: Nazaton-----	Poor: slope.	Unsuited-----	Poor: excess fines.	Poor: slope, small stones.
Suttler-----	Poor: slope.	Poor: excess fines.	Poor: excess fines.	Poor: slope, small stones.
83----- Nez Perce	Poor: low strength, shrink-swell.	Unsuited-----	Unsuited-----	Good.
84----- Nez Perce	Poor: low strength, shrink-swell.	Unsuited-----	Unsuited-----	Fair: slope.
85----- Nez Perce	Poor: low strength, shrink-swell.	Unsuited-----	Unsuited-----	Poor: slope.
86----- Nicodemus	Fair: wetness.	Unsuited-----	Good-----	Fair: small stones.
87----- Nicodemus Variant	Fair: low strength.	Unsuited-----	Poor: excess fines.	Good.
88----- Nicodemus Variant	Fair: low strength.	Unsuited-----	Poor: excess fines.	Fair: large stones.
89, 90----- Oland	Poor: slope.	Unsuited-----	Poor: excess fines.	Poor: slope, small stones.
91----- Oland Variant	Fair: slope, low strength.	Unsuited-----	Unsuited-----	Poor: slope.
92*: Riggins-----	Poor: thin layer, area reclaim.	Unsuited-----	Unsuited-----	Poor: slope, small stones, area reclaim.
Meland-----	Fair: thin layer.	Unsuited-----	Unsuited-----	Poor: slope.
93*. Rock outcrop				
94*: Rock outcrop.				
Bluesprin-----	Poor: thin layer, low strength, slope.	Unsuited-----	Unsuited-----	Poor: slope, small stones.
95*: Rock outcrop.				
Brower-----	Poor: slope.	Unsuited-----	Poor: excess fines.	Poor: slope, small stones.
96*: Rock outcrop.				

See footnote at end of table.

TABLE 17.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
96*: Klickson-----	Poor: slope.	Unsuited-----	Unsuited-----	Poor: slope, large stones.
97*: Rock outcrop.				
Nazaton-----	Poor: slope.	Unsuited-----	Poor: excess fines.	Poor: slope, small stones.
98*: Rock outcrop.				
Suttler-----	Poor: slope.	Poor: excess fines.	Poor: excess fines.	Poor: slope, small stones.
99*: Rock outcrop.				
Tannahill-----	Poor: slope.	Unsuited-----	Poor: excess fines.	Poor: small stones, slope.
100-----	Poor: shrink-swell, low strength.	Unsuited-----	Unsuited-----	Fair: too clayey.
Shebang				
101-----	Poor: shrink-swell, low strength.	Unsuited-----	Unsuited-----	Fair: slope, too clayey.
Shebang				
102-----	Poor: shrink-swell, low strength.	Unsuited-----	Unsuited-----	Poor: slope.
Shebang				
103-----	Poor: slope.	Unsuited-----	Poor: excess fines.	Poor: large stones, small stones, slope.
Spokel				
104*: Spokel-----	Poor: slope.	Unsuited-----	Poor: excess fines.	Poor: small stones, slope.
Brower-----	Poor: slope.	Unsuited-----	Poor: excess fines.	Poor: slope, small stones.
105*: Spokel-----	Poor: slope.	Unsuited-----	Poor: excess fines.	Poor: small stones, slope.
Nazaton-----	Poor: slope.	Unsuited-----	Poor: excess fines.	Poor: slope, small stones.
106*: Spokel-----	Poor: slope.	Unsuited-----	Poor: excess fines.	Poor: small stones, slope.

See footnote at end of table.



TABLE 17.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
106*: Suttler-----	Poor: slope.	Poor: excess fines.	Poor: excess fines.	Poor: slope, small stones.
107----- Suloaf	Poor: low strength.	Unsuited-----	Unsuited-----	Fair: small stones.
108----- Suloaf	Poor: low strength.	Unsuited-----	Unsuited-----	Poor: slope.
109----- Suloaf	Poor: slope, low strength.	Unsuited-----	Unsuited-----	Poor: slope.
110----- Suloaf	Poor: low strength.	Unsuited-----	Unsuited-----	Poor: slope.
111*: Suloaf-----	Poor: low strength.	Unsuited-----	Unsuited-----	Poor: slope.
Meland-----	Fair: thin layer.	Unsuited-----	Unsuited-----	Poor: slope.
112----- Tannahill	Fair: slope, frost action, thin layer.	Unsuited-----	Poor: excess fines.	Poor: slope.
113*: Tannahill-----	Poor: slope.	Unsuited-----	Poor: excess fines.	Poor: small stones, slope.
Licksillet-----	Poor: slope, thin layer, area reclaim.	Unsuited-----	Unsuited-----	Poor: slope, small stones, area reclaim.
114*: Tannahill-----	Poor: slope.	Unsuited-----	Poor: excess fines.	Poor: small stones, slope.
Rock outcrop.				
115----- Telcher	Poor: low strength.	Unsuited-----	Unsuited-----	Fair: small stones.
116----- Telcher	Poor: low strength.	Unsuited-----	Unsuited-----	Poor: slope.
117----- Telcher	Poor: low strength, slope.	Unsuited-----	Unsuited-----	Poor: slope.
118*: Telcher-----	Poor: low strength.	Unsuited-----	Unsuited-----	Poor: slope.
Suloaf-----	Poor: low strength.	Unsuited-----	Unsuited-----	Poor: slope.
119*. Typic Xerofluvents.				

See footnote at end of table.

TABLE 17.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
120----- Uhlorn	Poor: low strength.	Unsuited-----	Unsuited-----	Good.
121----- Uhlorn	Poor: low strength.	Unsuited-----	Unsuited-----	Fair: slope.
122----- Uhlorn	Poor: low strength.	Unsuited-----	Unsuited-----	Poor: slope.
123, 124----- Uhlorn	Poor: slope, low strength.	Unsuited-----	Unsuited-----	Poor: slope.
125----- Uptmor	Poor: low strength, shrink-swell.	Unsuited-----	Unsuited-----	Fair: too clayey.
126, 127----- Uptmor	Poor: slope, low strength, shrink-swell.	Unsuited-----	Unsuited-----	Poor: slope, too clayey.
128----- Wapshilla	Fair: slope.	Unsuited-----	Poor: excess fines.	Poor: slope.
129----- Westlake	Poor: wetness, low strength.	Unsuited-----	Unsuited-----	Good.
130----- Wilkins	Poor: low strength, shrink-swell.	Unsuited-----	Unsuited-----	Good.
131----- Zaza	Poor: thin layer, area reclaim.	Unsuited-----	Unsuited-----	Poor: slope, small stones, area reclaim.

\* See map unit description for the composition and behavior of the map unit.

TABLE 18.--WATER MANAGEMENT

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. Absence of an entry means soil was not evaluated]

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
1, 2, 3----- Banner	Slope-----	Piping-----	No water-----	---	Percs slowly, slope.	Percs slowly, slope, erodes easily.
4*: Bluesprin-----	Slope, depth to rock.	Large stones, thin layer.	No water-----	---	Slope, large stones.	Slope, depth to rock, large stones.
Keuterville-----	Slope-----	Large stones-----	No water-----	---	Slope-----	Slope, droughty.
5*: Bluesprin-----	Slope, depth to rock.	Large stones, thin layer.	No water-----	---	Slope, large stones.	Slope, depth to rock, large stones.
Klickson-----	Slope, seepage.	Hard to pack, seepage.	No water-----	---	Slope-----	Slope.
6*: Bluesprin-----	Slope, depth to rock.	Large stones, thin layer.	No water-----	---	Slope, large stones.	Slope, depth to rock, large stones.
Lawyer-----	Slope-----	Piping, seepage.	No water-----	---	Slope, percs slowly.	Slope, percs slowly.
7*: Bluesprin-----	Slope, depth to rock.	Large stones, thin layer.	No water-----	---	Slope, large stones.	Slope, depth to rock, large stones.
Rock outcrop.						
8, 9----- Boles	Slope-----	Hard to pack---	Slow refill----	Slope, percs slowly.	Slope, wetness, percs slowly.	Wetness, erodes easily, slope.
10----- Brody	Slope, seepage, depth to rock.	Thin layer, large stones.	No water-----	---	Slope, large stones.	Slope, erodes easily, large stones.
11*: Brody-----	Slope, depth to rock, seepage.	Thin layer----	No water-----	---	Slope, erodes easily.	Slope, erodes easily, depth to rock.
Telcher-----	Slope-----	Favorable-----	No water-----	---	Slope-----	Slope.
12*: Brody-----	Slope, depth to rock, seepage.	Thin layer, large stones.	No water-----	---	Slope, large stones.	Slope, erodes easily, large stones.
Wapshilla-----	Slope, seepage.	Piping, seepage.	No water-----	---	Slope-----	Slope.
13----- Brower	Slope, seepage.	Seepage-----	No water-----	---	Slope-----	Slope.
14*: Brower-----	Slope, seepage.	Seepage-----	No water-----	---	Slope-----	Slope.

See footnote at end of table.



TABLE 18.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
14*: Brownlee-----	Depth to rock, seepage, slope.	Thin layer-----	No water-----	---	Slope-----	Slope.
15*: Brower-----	Slope, seepage.	Seepage-----	No water-----	---	Slope-----	Slope.
Rock outcrop.						
16, 17, 18, 19---- Brownlee	Depth to rock, seepage, slope.	Thin layer-----	No water-----	---	Slope-----	Slope.
20----- Chard	Seepage-----	Piping, seepage.	No water-----	---	Slope, erodes easily.	Slope, erodes easily.
21, 22, 23----- Chard	Seepage, slope.	Piping, seepage.	No water-----	---	Slope, erodes easily.	Slope, erodes easily.
24, 25----- Chard Variant	Slope-----	Seepage-----	No water-----	---	Too sandy, slope, erodes easily.	Slope, erodes easily, droughty.
26, 27, 28, 29---- Chicane	Slope, seepage.	Wetness, hard to pack.	Slow refill----	Slope, percs slowly.	Slope, percs slowly, wetness.	Slope, erodes easily, percs slowly.
30, 31----- De Masters	Slope, depth to rock, seepage.	Thin layer-----	No water-----	---	Slope-----	Slope.
32*: De Masters-----	Slope, depth to rock, seepage.	Thin layer-----	No water-----	---	Slope-----	Slope.
Riggins-----	Slope, depth to rock.	Thin layer-----	No water-----	---	Depth to rock, slope.	Slope, depth to rock.
33*: De Masters-----	Slope, depth to rock, seepage.	Thin layer-----	No water-----	---	Slope-----	Slope.
Suloaf-----	Slope, seepage.	Thin layer-----	No water-----	---	Slope-----	Slope.
34, 35----- Ericson	Slope-----	Seepage, piping.	No water-----	---	Slope-----	Slope, erodes easily.
36*: Ericson-----	Slope-----	Piping-----	No water-----	---	Slope-----	Slope, erodes easily.
Rock outcrop.						
37, 38----- Fenn	Slope-----	Hard to pack----	No water-----	---	Slope, percs slowly.	Percs slowly, slope.
39----- Fenn	Slope-----	Hard to pack----	No water-----	---	Slope, percs slowly.	Slope, percs slowly.
40----- Fenn Variant	Favorable-----	Hard to pack, wetness.	Slow refill----	Percs slowly, slope.	Percs slowly, slope, wetness.	Percs slowly, slope.

See footnote at end of table.

TABLE 18.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
41, 42, 43----- Ferdinand	Depth to rock, slope.	Thin layer, large stones, hard to pack.	No water-----	---	Depth to rock, percs slowly, slope.	Slope, percs slowly, depth to rock.
44*: Ferdinand-----	Depth to rock, slope.	Thin layer, hard to pack, large stones.	No water-----	---	Depth to rock, percs slowly, slope.	Slope, depth to rock, percs slowly.
Bluesprin-----	Slope, depth to rock.	Large stones, thin layer.	No water-----	---	Slope, large stones.	Slope, depth to rock, large stones.
45*: Ferdinand-----	Depth to rock, slope.	Thin layer, large stones, hard to pack.	No water-----	---	Depth to rock, percs slowly, slope.	Slope, depth to rock, percs slowly.
Flybow-----	Depth to rock, slope.	Thin layer-----	No water-----	---	Depth to rock, slope, large stones.	Rooting depth, large stones, slope.
Riggins-----	Slope, depth to rock.	Thin layer-----	No water-----	---	Depth to rock, slope.	Slope, depth to rock.
46*: Ferdinand-----	Depth to rock, slope.	Low strength, large stones.	No water-----	---	Depth to rock, percs slowly, slope.	Slope, percs slowly, depth to rock.
Riggins-----	Slope, depth to rock.	Thin layer-----	No water-----	---	Depth to rock, slope.	Slope, depth to rock.
47, 48, 49, 50----- Jacket	Slope-----	Favorable-----	No water-----	---	Slope, percs slowly.	Percs slowly, slope, erodes easily.
51, 52, 53----- Jacket Variant	Slope, seepage.	Favorable-----	No water-----	---	Slope-----	Slope.
54, 55----- Johnson	Slope, seepage.	Seepage-----	No water-----	---	Slope-----	Slope.
56, 57----- Jughandle	Slope, seepage, depth to rock.	Piping, seepage, thin layer.	No water-----	---	Slope-----	Slope, erodes easily.
58*: Jughandle-----	Slope, seepage, depth to rock.	Piping, seepage, thin layer.	No water-----	---	Slope-----	Slope, erodes easily.
Ericson-----	Slope-----	Piping-----	No water-----	---	Slope-----	Slope, erodes easily.
59*: Jughandle-----	Slope, seepage, depth to rock.	Piping, seepage, thin layer.	No water-----	---	Slope-----	Slope, erodes easily.
Suttler-----	Slope, seepage.	Piping, seepage.	No water-----	---	Slope-----	Slope.
60----- Jughandle Variant	Seepage-----	Seepage, piping, wetness.	Favorable-----	Cutbanks cave, floods.	Wetness, too sandy.	Wetness.
61, 62----- Keuterville	Slope-----	Favorable-----	No water-----	---	Slope-----	Slope, droughty.

See footnote at end of table.

TABLE 18.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
63*: Keuterville-----	Slope-----	Favorable-----	No water-----	---	Slope-----	Slope, droughty.
Bluesprin-----	Slope, depth to rock.	Large stones, thin layer.	No water-----	---	Slope, large stones.	Slope, depth to rock, large stones.
64*: Keuterville-----	Slope-----	Large stones-----	No water-----	---	Slope-----	Slope, droughty.
Bluesprin-----	Slope, depth to rock.	Large stones, thin layer.	No water-----	---	Slope, large stones.	Slope, depth to rock, large stones.
65*: Keuterville-----	Slope-----	Hard to pack----	No water-----	---	Slope-----	Slope, droughty.
Klickson-----	Slope, seepage.	Large stones-----	No water-----	---	Slope, large stones.	Slope, large stones, erodes easily.
66*: Klickson-----	Slope, seepage.	Large stones-----	No water-----	---	Slope, large stones.	Slope, large stones, erodes easily.
Rock outcrop.						
67*: Klickson-----	Slope, seepage.	Large stones-----	No water-----	---	Slope, large stones.	Slope, erodes easily, large stones.
Suloaf-----	Slope, seepage.	Erodes easily, seepage.	No water-----	---	Depth to rock, slope.	Slope.
68*: Klickson-----	Slope, seepage.	Large stones-----	No water-----	---	Slope, large stones.	Slope, erodes easily, large stones.
Bluesprin-----	Slope, depth to rock.	Large stones, thin layer.	No water-----	---	Slope, large stones.	Slope, depth to rock, large stones.
69*: Klickson-----	Slope, seepage.	Large stones-----	No water-----	---	Slope, large stones.	Erodes easily, large stones.
Wapshilla-----	Slope, seepage.	Piping, seepage.	No water-----	---	Slope-----	Erodes easily, slope, droughty.
70, 71, 72----- Kooskia	Slope-----	Hard to pack----	Slow refill----	Percs slowly, slope.	Erodes easily, percs slowly, wetness.	Erodes easily, percs slowly.
73*: Lawyer-----	Slope-----	Piping, seepage.	No water-----	---	Slope, percs slowly, wetness.	Slope, percs slowly.
Rock outcrop.						

See footnote at end of table.



TABLE 18.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
74*: Lawyer-----	Slope-----	Piping, seepage.	No water-----	---	Slope, percs slowly.	Slope, percs slowly.
Bluesprin-----	Slope, depth to rock.	Large stones, thin layer.	No water-----	---	Slope, large stones.	Slope, depth to rock, large stones.
75*: Lawyer-----	Slope-----	Piping, seepage.	No water-----	---	Slope, percs slowly.	Slope, percs slowly.
Tannahill-----	Slope, seepage, depth to rock.	Thin layer-----	No water-----	---	Slope-----	Slope, droughty.
76*: Lickskillet-----	Slope, depth to rock.	Thin layer-----	No water-----	---	Depth to rock, slope.	Depth to rock, rooting depth, slope.
Tannahill-----	Slope, seepage, depth to rock.	Thin layer-----	No water-----	---	Slope-----	Slope, droughty.
77----- Meland	Depth to rock--	Thin layer-----	No water-----	---	Slope-----	Slope, erodes easily, depth to rock.
78, 79----- Meland	Slope, depth to rock.	Thin layer-----	No water-----	---	Slope-----	Slope, depth to rock, erodes easily.
80----- Naz	Slope, seepage.	Piping, seepage.	No water-----	---	Slope-----	Slope.
81*: Nazaton-----	Slope, seepage.	Seepage-----	No water-----	--	Slope-----	Slope.
Naz-----	Slope, seepage.	Piping, seepage.	No water-----	---	Slope-----	Slope.
82*: Nazaton-----	Slope, seepage.	Seepage-----	No water-----	---	Slope-----	Slope.
Suttler-----	Slope, seepage.	Piping, seepage.	No water-----	---	Slope-----	Slope.
83----- Nez Perce	Slope-----	Hard to pack---	Slow refill---	Slope, percs slowly.	Slope, percs slowly.	Slope, erodes easily, percs slowly.
84, 85----- Nez Perce	Slope-----	Hard to pack---	Slow refill---	Slope, percs slowly.	Slope, percs slowly.	Slope, percs slowly, erodes easily.
86----- Nicodemus	Seepage-----	Seepage-----	Deep to water--	Wetness-----	Wetness-----	Droughty.
87, 88----- Nicodemus Variant	Seepage-----	Piping, seepage.	Deep to water--	Favorable-----	Favorable-----	Favorable.
89, 90----- Oland	Slope, seepage.	Seepage-----	No water-----	--	Slope-----	Slope.
91----- Oland Variant	Slope-----	Piping-----	No water-----	---	Slope-----	Slope.

See footnote at end of table.

TABLE 18.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
92*: Riggins-----	Slope, depth to rock.	Thin layer----	No water-----	---	Depth to rock, slope.	Slope, rooting depth.
Meland-----	Slope, depth to rock.	Thin layer----	No water-----	---	Slope-----	Slope, depth to rock, erodes easily.
93*: Rock outcrop						
94*: Rock outcrop.						
Bluesprin-----	Slope, depth to rock.	Large stones, thin layer.	No water-----	---	Slope, large stones.	Slope, depth to rock, large stones.
95*: Rock outcrop.						
Brower-----	Slope, seepage.	Seepage-----	No water-----	---	Slope-----	Slope.
96*: Rock outcrop.						
Klickson-----	Slope, seepage.	Large stones---	No water-----	---	Slope, large stones.	Slope, large stones, erodes easily.
97*: Rock outcrop.						
Nazaton-----	Slope, seepage.	Seepage-----	No water-----	---	Slope-----	Slope.
98*: Rock outcrop.						
Suttler-----	Slope, seepage.	Piping, seepage.	No water-----	---	Slope-----	Slope.
99*: Rock outcrop.						
Tannahill-----	Slope, seepage, depth to rock.	Thin layer----	No water-----	--	Slope-----	Slope, droughty.
100, 101, 102----- Shebang	Slope-----	Hard to pack---	Slow refill----	Percs slowly, slope.	Percs slowly, slope, erodes easily.	Percs slowly, slope.
103----- Spokel	Slope, seepage.	Seepage-----	No water-----	---	Slope-----	Slope, droughty.
104*: Spokel-----	Slope, seepage.	Seepage-----	No water-----	---	Slope-----	Slope, droughty.
Brower-----	Slope, seepage.	Seepage-----	No water-----	---	Slope-----	Slope, droughty.
105*: Spokel-----	Slope, seepage.	Seepage-----	No water-----	---	Slope-----	Slope, droughty.
Nazaton-----	Slope, seepage.	Seepage-----	No water-----	---	Slope-----	Slope.

See footnote at end of table.

TABLE 18.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
106*: Spokel-----	Slope, seepage.	Seepage-----	No water-----	---	Slope-----	Slope, droughty.
Suttler-----	Slope, seepage.	Piping, seepage.	No water-----	---	Slope-----	Slope.
107, 108, 109, 110----- Suloaf	Slope, seepage.	Thin layer-----	No water-----	---	Slope-----	Slope.
111*: Suloaf-----	Slope, seepage.	Erodes easily, seepage.	No water-----	---	Slope-----	Slope.
Meland-----	Slope, depth to rock.	Hard to pack---	No water-----	---	Slope-----	Slope, erodes easily, depth to rock.
112----- Tannahill	Slope, seepage, depth to rock.	Thin layer-----	No water-----	---	Slope-----	Slope, droughty.
113*: Tannahill-----	Slope, seepage, depth to rock.	Thin layer-----	No water-----	---	Slope-----	Slope, droughty.
Lickskillet-----	Slope, depth to rock.	Thin layer-----	No water-----	---	Depth to rock, rooting depth, slope.	Rooting depth, slope, droughty.
114*: Tannahill-----	Slope, seepage, depth to rock.	Thin layer-----	No water-----	---	Slope-----	Slope, droughty.
Rock outcrop.						
115, 116, 117----- Telcher	Slope-----	Favorable-----	No water-----	---	Slope, erodes easily.	Slope, erodes easily.
118*: Telcher-----	Slope-----	Favorable-----	No water-----	---	Slope, erodes easily.	Slope, erodes easily.
Suloaf-----	Slope, seepage.	Thin layer-----	No water-----	---	Slope-----	Slope.
119*. Typic Xerofluvents.						
120, 121, 122, 123, 124----- Uhlorn	Slope-----	Favorable-----	No water-----	---	Slope-----	Slope, erodes easily.
125, 126, 127----- Uptmor	Slope-----	Hard to pack---	No water-----	---	Percs slowly, slope, erodes easily.	Percs slowly, slope, erodes easily.
128----- Wapshilla	Slope, seepage.	Piping, seepage.	No water-----	---	Slope-----	Erodes easily, slope.
129----- Westlake	Favorable-----	Wetness-----	Slow refill---	Floods-----	Wetness-----	Wetness.
130----- Wilkins	Favorable-----	Hard to pack---	Slow refill---	Percs slowly---	Wetness, percs slowly.	Percs slowly.
131----- Zaza	Slope, depth to rock.	Thin layer-----	No water-----	---	Depth to rock, slope.	Rooting depth, slope.

\* See map unit description for the composition and behavior of the map unit.



TABLE 19.--ENGINEERING PROPERTIES AND CLASSIFICATIONS

[The symbol &lt; means less than; &gt; means more than. Absence of an entry indicates that data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
1, 2, 3----- Banner	0-7	Silt loam-----	ML	A-4, A-6	0	100	100	90-100	70-90	30-40	5-15
	7-54	Silty clay, silty clay loam, clay.	CH, CL	A-7	0-5	85-100	80-100	75-100	70-95	40-60	20-30
	54-60	Gravelly loam---	SM-SC, GM-GC	A-4	0-5	65-85	60-75	50-65	35-50	20-30	5-10
4*: Bluesprin-----	0-12	Very cobbly loam	GM-GC, SM-SC	A-4, A-2	20-40	45-75	40-70	35-65	25-50	20-30	5-10
	12-31	Very cobbly clay loam.	GC	A-6	20-45	45-70	40-70	40-65	35-50	30-40	10-20
	31	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Keuterville-----	0-18	Very cobbly loam	SM-SC, GM-GC, CL-ML	A-4	35-55	60-90	55-75	45-65	35-55	20-30	5-10
	18-36	Very gravelly silty clay loam.	GC	A-6, A-2	0-5	35-60	30-50	30-50	25-50	30-40	10-15
	36-60	Very gravelly loam.	GM-GC	A-4, A-2	10-30	45-65	40-60	35-60	30-50	20-30	5-10
5*: Bluesprin-----	0-12	Very cobbly loam	GM-GC, SM-SC	A-4, A-2	20-40	45-75	40-70	35-65	25-50	20-30	5-10
	12-31	Very cobbly clay loam.	GC	A-6	20-45	45-70	40-70	40-65	35-50	30-40	10-20
	31	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Klickson-----	0-6	Silt loam-----	CL-ML	A-4	0-5	95-100	90-100	80-100	65-90	25-30	5-10
	6-51	Cobbly silt loam, very cobbly loam, cobbly loam.	CL-ML, SM-SC	A-4	20-40	75-95	70-90	60-85	40-70	25-30	5-10
	51-60	Very cobbly clay loam.	CL, CH, SC	A-7	20-45	60-95	50-90	50-90	45-85	40-55	20-30
6*: Bluesprin-----	0-12	Very cobbly loam	GM-GC, SM-SC	A-4, A-2	20-40	45-75	40-70	35-65	25-50	20-30	5-10
	12-31	Very cobbly clay loam.	GC	A-6	20-45	45-70	40-70	40-65	35-50	30-40	10-20
	31	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Lawyer-----	0-6	Silt loam-----	CL-ML	A-4	0-5	90-100	85-100	75-100	60-90	20-30	5-10
	6-23	Loam, gravelly loam.	SM, ML	A-4	5-10	80-90	70-90	60-85	45-65	20-30	NP-5
	23-72	Very gravelly clay loam.	GC	A-2, A-6	5-15	30-50	25-50	25-50	20-40	30-40	10-15
7*: Bluesprin-----	0-12	Very cobbly loam	GM-GC, SM-SC	A-4, A-2	20-40	45-75	40-70	35-65	25-50	20-30	5-10
	12-31	Very cobbly clay loam.	GC	A-6	20-45	45-70	40-70	40-65	35-50	30-40	10-20
	31	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											

See footnote at end of table.

TABLE 19.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth In	USDA texture	Classification		Frag- ments > 3 inches Pct	Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
8, 9----- Boles	0-19	Silt loam-----	CL-ML, CL	A-4, A-6	0	95-100	95-100	95-100	90-95	25-35	5-15
	19-60	Silty clay, clay	CH, CL	A-7	0	95-100	95-100	95-100	90-100	45-60	25-40
10----- Brody	0-22	Cobbly loam-----	ML, GM, SM	A-4	20-30	70-90	70-85	50-85	40-75	30-40	5-10
	22-39 39	Very cobbly loam Unweathered bedrock.	GM-GC ---	A-4 ---	20-75 ---	50-70 ---	45-65 ---	40-65 ---	35-50 ---	20-30 ---	5-10 ---
11*: Brody-----	0-22	Loam-----	ML	A-4	0-5	95-100	95-100	80-95	60-75	30-40	5-10
	22-39 39	Very cobbly loam Unweathered bedrock.	GM-GC ---	A-4 ---	20-75 ---	50-70 ---	45-65 ---	40-65 ---	35-50 ---	20-30 ---	5-10 ---
Telcher-----	0-20	Silt loam-----	ML, CL-ML	A-4	0-5	80-100	75-100	70-100	50-90	25-35	5-10
	20-44	Silty clay loam, clay loam.	CL	A-6	0-5	75-100	75-95	70-95	60-85	30-40	10-20
	44-60	Gravelly clay loam.	GC, CL, SC	A-6	0-10	50-80	50-75	45-70	35-60	30-40	10-20
12*: Brody-----	0-22	Cobbly loam-----	ML, GM, SM	A-4	20-30	70-90	70-85	50-85	40-75	30-40	5-10
	22-39 39	Very cobbly loam Unweathered bedrock.	GM-GC ---	A-4 ---	20-75 ---	50-70 ---	45-65 ---	40-65 ---	35-50 ---	20-30 ---	5-10 ---
Wapshilla-----	0-14	Loam-----	ML	A-4	0-5	85-100	75-90	65-80	50-65	25-35	NP-10
	14-22	Gravelly loam---	GM, SM	A-4	0-15	60-70	50-70	45-60	35-45	25-35	NP-10
	22-60	Very gravelly loam, very gravelly clay loam.	GM	A-2, A-4	0-15	40-60	35-50	30-45	20-45	25-35	NP-10
13----- Brower	0-9	Very gravelly loam.	GM	A-2	0-5	45-75	40-70	35-65	25-35	20-30	NP-5
	9-60	Very gravelly loam.	GM, GM-GC	A-1, A-2	0-15	25-55	20-50	15-40	10-30	20-30	NP-10
14*: Brower-----	0-9	Very gravelly loam.	GM,	A-2	0-5	45-75	40-70	35-65	25-35	20-30	NP-5
	9-60	Very gravelly loam.	GM, GM-GC	A-1, A-2	0-15	25-55	20-50	15-40	10-30	20-30	NP-10
Brownlee-----	0-8	Loam-----	ML	A-4	0	90-100	85-100	75-95	55-70	25-35	NP-10
	8-28	Gravelly clay loam, clay loam, loam.	CL	A-6	0-5	90-100	65-95	60-90	50-65	30-40	10-20
	28-42 42	Loam----- Weathered bedrock.	ML ---	A-4 ---	0-5 ---	80-95 ---	70-90 ---	60-80 ---	50-65 ---	20-25 ---	NP-5 ---
15*: Brower-----	0-9	Very gravelly loam.	GM	A-2	0-5	45-75	40-70	35-65	25-35	20-30	NP-5
	9-60	Very gravelly loam.	GM, GM-GC	A-1, A-2	0-15	25-55	20-50	15-40	10-30	20-30	NP-10
Rock outcrop.											
16, 17, 18, 19----- Brownlee	0-8	Loam-----	ML	A-4	0	90-100	85-100	75-95	55-70	25-35	NP-10
	8-28	Gravelly clay loam, clay loam, loam.	CL	A-6	0-5	90-100	65-95	60-90	50-65	30-40	10-20
	28-42 42	Loam----- Weathered bedrock.	ML ---	A-4 ---	0-5 ---	80-95 ---	70-90 ---	60-80 ---	50-65 ---	20-25 ---	NP-5 ---

See footnote at end of table.

TABLE 19.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches Pct	Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
20, 21, 22, 23----- Chard	0-30	Sandy loam-----	SM	A-2, A-4	0-5	95-100	85-100	50-65	30-40	20-30	NP-5
	30-60	Sandy loam, coarse sandy loam, loamy sand.	SM	A-2	0-5	95-100	85-100	40-50	15-35	20-30	NP-5
24, 25----- Chard Variant	0-19	Loamy fine sand	SM	A-2, A-1	0	90-100	85-100	45-75	15-30	---	NP
	19-50	Coarse sand, sand, loamy fine sand.	SP-SM, SM	A-2, A-1, A-3	0	85-100	80-100	45-70	5-20	---	NP
	50-60	Sand, gravel, cobblestones.	GP	A-1	10-30	25-50	10-35	5-10	0-5	---	NP
26, 27, 28, 29----- Chicane	0-5	Silt loam-----	CL	A-6	0	100	100	95-100	75-95	30-40	10-20
	5-21	Silty clay loam	CL	A-6	0	100	100	95-100	75-95	30-40	10-20
	21-28	Silt loam-----	ML	A-4	0	100	100	95-100	90-100	20-30	NP-5
	28-67	Clay, silty clay, silty clay loam.	CH, CL	A-7	0	100	100	95-100	90-100	40-60	20-35
30, 31----- De Masters	0-41	Silt loam-----	CL-ML	A-4	0-10	60-100	55-100	50-100	50-90	20-30	5-10
	41-55	Very gravelly loam, cobbly silty clay loam, very cobbly clay loam.	GC	A-6, A-2	5-30	45-60	40-55	35-55	25-50	25-35	10-15
	55	Weathered bedrock.	---	---	---	---	---	---	---	---	---
32*: De Masters-----	0-41	Silt loam-----	CL-ML	A-4	0-10	60-100	55-100	50-100	50-85	20-30	5-10
	41-55	Very gravelly loam, cobbly silty clay loam, very cobbly clay loam.	GC	A-6, A-2	5-30	45-60	40-55	35-55	25-50	25-35	10-15
	55	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Riggins-----	0-8	Very gravelly silt loam.	GM-GC	A-2, A-4	0-15	40-60	35-50	30-50	25-45	25-30	5-10
	8-13	Very gravelly clay loam, very gravelly loam.	GC	A-2, A-6	5-20	40-60	30-45	30-55	25-45	30-35	10-15
	13	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
33*: De Masters-----	0-41	Silt loam-----	CL-ML	A-4	0-10	80-100	55-100	50-100	50-85	20-30	5-10
	41-55	Very gravelly loam, cobbly silty clay loam, very cobbly clay loam.	GC	A-6, A-2	5-30	45-60	40-55	35-55	25-50	25-35	10-15
	55	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Suloaf-----	0-17	Silt loam-----	CL-ML	A-4	0-5	95-100	90-100	80-100	65-90	20-30	5-10
	17-41	Gravelly silt loam, gravelly clay loam.	GC, CL	A-6	0-5	60-80	55-75	50-70	40-60	25-35	10-20
	41-54	Gravelly sandy loam.	SM, GM	A-1, A-2	0-5	60-80	55-75	35-60	20-35	15-25	NP-5
	54	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.



TABLE 19.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
34, 35----- Ericson	0-17 17-60	Loam----- Fine gravelly loam.	ML GM, ML, SM	A-4 A-4, A-2	0 0	90-100 55-85	85-100 50-75	70-95 45-70	55-75 30-55	25-35 25-35	5-10 NP-10
36*: Ericson-----	0-17 17-60	Loam----- Fine gravelly loam.	ML GM, ML, SM	A-4 A-4, A-2	0 0	90-100 55-85	85-100 50-75	70-95 45-70	55-75 30-55	25-35 25-35	5-10 NP-10
Rock outcrop.											
37, 38----- Fenn	0-6 6-63	Silty clay----- Clay, silty clay	CH, CL CH	A-6, A-7 A-7	0 0	100 95-100	100 95-100	95-100 90-100	75-95 70-95	30-60 50-60	15-45 30-40
39----- Fenn	0-6 6-63	Very stony silty clay. Cobbly clay-----	CH, CL CH, GC	A-6, A-7 A-7	5-10 15-30	95-100 65-90	95-100 65-85	85-100 50-85	80-95 45-75	30-60 50-60	15-45 30-40
40----- Fenn Variant	0-19 19-65	Silty clay----- Silty clay, clay	CL, CH CL, CH	A-7 A-7	0 0	100 100	100 95-100	95-100 95-100	85-95 75-95	40-60 45-60	20-40 30-45
41, 42, 43----- Ferdinand	0-13 13-32	Silt loam----- Very cobbly silty clay, cobbly silty clay loam.	CL-ML GC, CL, CH	A-4 A-6, A-7	0-5 35-75	90-100 40-95	85-100 35-90	75-100 35-85	60-90 35-55	20-30 35-70	5-10 15-40
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
44*: Ferdinand-----	0-13 13-39	Very cobbly loam Very cobbly silty clay, cobbly silty clay loam.	CL-ML, SM-SC GC, CL, CH	A-4 A-6, A-7	35-50 35-75	75-95 40-95	70-90 35-90	65-85 35-85	40-55 35-70	20-30 35-60	5-10 15-40
	39	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Bluesprin-----	0-12 12-31	Very cobbly loam Very cobbly clay loam.	GM-GC, SM-SC GC	A-4, A-2 A-6	20-40 20-45	45-75 45-70	40-70 40-70	35-65 40-65	25-50 35-50	20-30 30-40	5-10 10-20
	31	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
45*: Ferdinand-----	0-13 13-32	Silt loam----- Very cobbly silty clay, cobbly silty clay loam.	CL-ML GC, CL, CH	A-4 A-6, A-7	0-5 35-75	90-100 40-95	85-100 35-90	75-100 35-85	60-90 35-70	20-30 35-60	5-10 15-40
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Flybow-----	0-5 5	Very cobbly loam Unweathered bedrock.	GM, GM-GC, SM, SM-SC ---	A-2 ---	15-55 ---	40-70 ---	35-65 ---	30-60 ---	25-35 ---	20-30 ---	NP-10 ---

See footnote at end of table.

TABLE 19.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches Pct	Percentage passing sieve number--				Liquid limit Pct	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
45*: Riggins-----	0-8	Very gravelly silt loam.	GM-GC	A-2, A-4	0-15	40-60	35-50	30-50	25-45	25-30	5-10
	8-13	Very gravelly clay loam, very gravelly loam.	GC, GM-GC	A-2, A-6	5-20	40-60	30-45	30-55	25-45	30-35	5-15
	13	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
46*: Ferdinand-----	0-13	Silt loam-----	CL-ML	A-4	0-5	90-100	85-100	75-100	60-90	20-30	5-10
	13-32	Very cobbly silty clay, cobbly silty clay loam.	GC, CL, CH	A-6, A-7	35-75	40-95	35-90	35-85	35-70	35-60	15-45
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Riggins-----	0-8	Very gravelly silt loam.	GM-GC	A-2, A-4	0-15	40-60	35-50	30-50	25-45	25-30	5-10
	8-13	Very gravelly clay loam, very gravelly loam.	GC, GM-GC	A-2, A-6	5-20	40-60	30-45	30-55	25-45	30-35	5-15
	13	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
47, 48, 49, 50----- Jacket	0-17	Silt loam-----	ML, CL-ML	A-4	0	100	100	90-100	75-90	20-30	NP-10
	17-30	Silty clay loam	CL	A-7	0	100	100	95-100	85-95	40-50	15-25
	30-63	Silty clay, clay loam, gravelly silty clay.	CL	A-7	0-5	75-100	65-100	65-100	60-95	40-50	20-30
51, 52, 53----- Jacket Variant	0-12	Silt loam-----	ML	A-4	0	100	100	90-100	75-90	10-20	NP-5
	12-52	Silt loam-----	CL-ML	A-4	0	100	100	90-100	75-90	20-30	5-10
	52-60	Silty clay loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	85-95	20-40	5-15
54, 55----- Johnson	0-19	Loam-----	ML, CL-ML	A-4	0	80-100	80-95	65-80	50-75	20-30	NP-10
	19-65	Loam, clay loam, gravelly loam.	CL-ML, CL, SM-SC, SC	A-4, A-6	0-10	85-100	75-100	65-85	45-75	25-35	5-15
56, 57----- Jughandle	0-27	Loam-----	ML	A-4	0	90-100	85-100	75-95	50-75	20-30	NP-5
	27-41	Coarse sandy loam, sandy loam.	SM	A-2, A-4	0	90-100	85-100	50-70	25-40	---	NP
	41	Weathered bedrock.	---	---	---	---	---	---	---	---	---
58*: Jughandle-----	0-27	Loam-----	ML	A-4	0	90-100	85-100	75-95	50-75	20-30	NP-5
	27-41	Coarse sandy loam, sandy loam.	SM	A-2, A-4	0	90-100	85-100	50-70	25-40	---	NP
	41	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Ericson-----	0-17	Loam-----	ML	A-4	0	90-100	85-100	70-95	55-75	25-35	5-10
	17-60	Fine gravelly loam.	GM, ML, SM	A-4, A-2	0	55-85	50-75	45-70	30-55	25-35	NP-10
59*: Jughandle-----	0-27	Loam-----	ML	A-4	0	90-100	85-100	75-95	50-75	20-30	NP-5
	27-41	Coarse sandy loam, sandy loam.	SM	A-2, A-4	0	90-100	85-100	50-70	25-40	---	NP
	41	Weathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 19.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
59*: Suttler-----	0-10	Loam-----	ML, CL-ML	A-4	0	90-100	85-100	75-95	55-75	20-30	NP-10
	10-39	Gravelly loam, gravelly sandy loam.	SM	A-1, A-2, A-4	0-5	65-90	55-75	40-70	20-50	15-25	NP-5
	39-60	Very gravelly sandy loam.	GM, SM	A-1	5-20	50-75	25-55	15-35	10-25	---	NP
60----- Jughandle Variant	0-15	Silt loam-----	ML	A-4	0	100	100	90-100	75-90	15-25	NP-5
	15-43	Sandy loam-----	SM	A-4, A-2	0	100	100	60-70	30-40	---	NP
	43-60	Sand-----	SP-SM, SM	A-1, A-3, A-2	0	75-95	70-95	35-70	5-15	---	NP
61, 62----- Keuterville	0-18	Gravelly loam---	CL-ML, GM-GC, SM-SC	A-4	0-5	60-90	55-75	45-65	35-55	20-30	5-10
	18-36	Very gravelly silty clay loam.	GC	A-6, A-2	0-5	35-60	30-50	30-50	25-50	30-40	10-15
	36-60	Very gravelly loam.	GM-GC	A-4, A-2	10-30	45-65	40-60	35-60	30-50	20-30	5-10
63*: Keuterville-----	0-18	Gravelly loam---	CL-ML, GM-GC, SM-SC	A-4	0-5	60-90	55-75	45-65	35-55	20-30	5-10
	18-36	Very gravelly silty clay loam.	GC	A-6, A-2	0-5	35-60	30-50	30-50	25-50	30-40	10-15
	36-60	Very gravelly loam.	GM-GC	A-4, A-2	10-30	45-65	40-60	35-60	30-50	20-30	5-10
Bluesprin-----	0-12	Silt loam-----	CL-ML	A-4	0-5	90-100	85-100	75-100	60-90	20-30	5-10
	12-31	Very cobbly clay loam.	GC	A-6	20-45	45-70	40-70	40-65	35-50	30-40	10-20
	31	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
64*: Keuterville-----	0-18	Very cobbly loam	SM-SC, GM-GC, CL-ML	A-4	35-55	60-90	55-75	45-65	35-55	20-30	5-10
	18-36	Very gravelly silty clay loam.	GC	A-6, A-2	0-5	35-60	30-50	30-50	25-50	30-40	10-15
	36-60	Very gravelly loam.	GM-GC	A-4, A-2	10-30	45-65	40-60	35-60	30-50	20-30	5-10
Bluesprin-----	0-12	Very cobbly loam	GM-GC, SM-SC	A-4, A-2	20-40	45-75	40-70	35-65	25-50	20-30	5-10
	12-31	Very cobbly clay loam.	GC	A-6	20-45	45-70	40-70	40-65	35-50	30-40	10-20
	31	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
65*: Keuterville-----	0-18	Very cobbly loam	SM-SC, GM-GC, CL-ML	A-4	35-55	60-90	55-75	45-65	35-55	20-30	5-10
	18-36	Very gravelly silty clay loam.	GC	A-6, A-2	0-5	35-60	30-50	30-50	25-50	30-40	10-15
	36-60	Very gravelly loam.	GM-GC	A-4, A-2	10-30	45-65	40-60	35-60	30-50	20-30	5-10

See footnote at end of table.



TABLE 19.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
65*: Klickson-----	0-6	Cobbly loam----	CL-ML, SM-SC	A-4	20-40	75-95	70-90	60-85	40-70	25-30	5-10
	6-51	Cobbly silt loam, cobbly loam, very cobbly loam.	CL-ML, SM-SC	A-4	20-40	75-95	70-90	60-85	40-70	25-30	5-10
	51-60	Very cobbly clay, very cobbly loam.	CL, CH, SC	A-7	20-45	60-95	50-90	50-90	45-85	40-55	20-30
66*: Klickson-----	0-6	Cobbly loam----	CL-ML, SM-SC	A-4	20-40	75-95	70-90	60-85	40-70	25-30	5-10
	6-51	Cobbly silt loam, cobbly loam, very cobbly loam.	CL-ML, SM-SC	A-4	20-40	75-95	70-90	60-85	40-70	25-30	5-10
	51-60	Very cobbly clay, very cobbly loam.	CL, CH, SC	A-7	20-45	60-95	50-90	50-90	45-85	40-55	20-30
Rock outcrop.											
67*: Klickson-----	0-6	Silt loam-----	CL-ML	A-4	0-5	95-100	90-100	80-100	65-90	25-30	5-10
	6-51	Cobbly silt loam, cobbly loam, very cobbly loam.	CL-ML, SM-SC	A-4	20-40	75-95	70-90	60-85	40-70	25-30	5-10
	51-60	Very cobbly clay, very cobbly loam.	CL, CH, SC	A-7	20-45	60-95	60-90	50-90	45-85	40-55	20-30
Suloaf-----	0-17	Cobbly silt loam	ML, GM	A-4	15-25	65-80	65-80	60-75	45-65	20-30	5-10
	17-41	Gravelly silt loam, gravelly clay loam.	GC, CL	A-6	0-5	60-80	55-75	50-70	40-60	25-35	10-20
	41-54	Gravelly sandy loam.	SM, GM	A-1, A-2	0-5	60-80	55-75	35-60	20-35	15-25	NP-5
	54	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
68*: Klickson-----	0-6	Silt loam-----	CL-ML	A-4	0-5	95-100	90-100	80-100	65-90	25-30	5-10
	6-51	Cobbly silt loam, cobbly loam, very cobbly loam.	CL-ML, SM-SC	A-4	20-40	75-95	70-90	60-85	40-70	25-30	5-10
	51-60	Very cobbly clay, very cobbly loam.	CL, CH, SC	A-7	20-45	60-95	50-90	50-90	45-85	40-55	20-30
Bluesprin-----	0-12	Very cobbly loam	GM-GC, SM-SC	A-4, A-2	20-40	45-75	40-70	35-65	25-50	20-30	5-10
	12-31	Very cobbly clay loam.	GC	A-6	20-45	45-70	40-70	40-65	35-50	30-40	10-20
	31	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
69*: Klickson-----	0-6	Silt loam-----	CL-ML	A-4	0-5	95-100	90-100	80-100	65-90	25-30	5-10
	6-51	Cobbly silt loam, cobbly loam, very cobbly loam.	CL-ML, SM-SC	A-4	10-40	75-95	70-90	60-85	40-70	25-30	5-10
	51-60	Very cobbly clay, very cobbly loam.	CL, CH, SC	A-7	20-45	60-95	50-90	50-90	45-85	40-55	20-30

See footnote at end of table.

TABLE 19.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	<u>In</u>				<u>Pct</u>					<u>Pct</u>	
69*: Wapshilla-----	0-14	Cobbly loam-----	GM, ML	A-4	15-25	65-85	65-85	55-80	40-65	25-35	NP-10
	14-22	Gravelly loam---	GM, SM	A-4	0-15	60-70	50-70	45-60	35-45	25-35	NP-10
	22-60	Very gravelly loam, very gravelly clay loam.	GM	A-2, A-4	0-15	40-60	35-50	30-45	20-45	25-35	NP-10
70, 71, 72----- Kooskia	0-21	Silt loam-----	ML, CL-ML	A-4, A-6, A-7	0-5	95-100	95-100	90-100	80-95	25-45	5-15
	21-60	Silty clay loam, silty clay.	CH, CL	A-7	0-5	90-100	90-100	90-100	80-95	40-60	20-40
73*: Lawyer-----	0-6	Silt loam-----	CL-ML	A-4	0-5	90-100	85-100	75-100	60-90	20-30	5-10
	6-23	Loam, gravelly loam.	SM, ML	A-4	5-10	80-90	70-90	60-85	45-65	20-30	NP-5
	23-72	Very gravelly clay loam.	GC	A-2, A-6	5-15	30-50	25-50	25-50	20-40	30-40	10-15
Rock outcrop.											
74*: Lawyer-----	0-6	Silt loam-----	CL-ML	A-4	0-5	90-100	85-100	75-100	60-90	20-30	5-10
	6-23	Loam, gravelly loam.	SM, ML	A-4	5-10	80-90	70-90	60-85	45-65	20-30	NP-5
	23-72	Very gravelly clay loam.	GC	A-2, A-6	5-15	30-50	25-50	25-50	20-40	30-40	10-15
Bluesprin-----	0-12	Very cobbly loam	GM-GC, SM-SC	A-4, A-2	20-40	45-75	40-70	35-65	25-50	20-30	5-10
	12-31	Very cobbly clay loam.	GC	A-6	20-45	45-70	40-70	40-65	35-50	30-40	10-20
	31	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
75*: Lawyer-----	0-6	Silt loam-----	CL-ML	A-4	0-5	90-100	85-100	75-100	60-90	20-30	5-10
	6-23	Loam, gravelly loam.	SM, ML	A-4	5-10	80-90	70-90	60-85	45-65	20-30	NP-5
	23-72	Very gravelly clay loam.	GC	A-2, A-6	5-15	30-50	25-50	25-50	20-40	30-40	10-15
Tannahill-----	0-10	Cobbly loam-----	CL-ML, SM-SC, GM-GC	A-4	5-20	70-85	65-80	65-75	40-60	20-30	5-10
	10-52	Very gravelly loam, very gravelly silty clay loam.	GM-GC	A-2, A-4	5-30	35-55	30-50	25-50	20-50	20-30	5-10
	52	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
76*: Lickskillet-----	0-10	Gravelly clay loam.	GC, SC, CL	A-6, A-2	0-10	55-80	50-75	40-70	30-60	25-35	10-15
	10-17	Very gravelly clay loam.	GC	A-6, A-2	0-15	35-55	30-50	25-50	20-40	30-40	10-20
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Tannahill-----	0-10	Loam-----	CL-ML	A-4	0-5	80-100	75-100	70-95	55-75	20-30	5-10
	10-52	Very gravelly loam, very gravelly silty clay loam.	GM-GC	A-2, A-4	5-30	35-55	30-50	25-50	20-50	20-30	5-10
	52	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 19.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches Pct	Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
77, 78, 79----- Meland	0-21	Silt loam-----	CL-ML	A-4	0	95-100	95-100	90-100	75-90	20-30	5-10
	21-32	Clay loam, gravelly clay loam.	CL, CL-ML	A-4, A-6	0-10	75-100	70-90	65-85	50-75	25-35	5-15
	32	Weathered bedrock.	---	---	---	---	---	---	---	---	---
80----- Naz	0-24	Sandy loam-----	SM	A-2, A-4	0	80-100	75-100	40-70	20-40	15-25	NP-5
	24-65	Sandy loam, loam	SM	A-2, A-1	0	80-100	75-100	40-70	20-35	---	NP
81*: Nazaton-----	0-20	Gravelly loam---	ML, CL-ML, SM, SM-SC	A-4	0-15	75-85	50-80	45-80	35-70	15-25	NP-10
	20-68	Very gravelly loam, very gravelly sandy loam.	GM, GM-GC	A-2, A-1	5-40	35-60	30-55	25-55	10-35	15-25	NP-10
Naz-----	0-24	Sandy loam-----	SM	A-2, A-4	0	80-100	75-100	40-70	20-40	15-25	NP-5
	24-65	Sandy loam, loam	SM	A-2, A-1	0	80-100	75-100	40-70	20-35	---	NP
82*: Nazaton-----	0-20	Gravelly loam---	ML, CL-ML, SM, SM-SC	A-4	0-15	75-85	50-80	45-80	35-70	15-25	NP-10
	20-68	Very gravelly loam, very gravelly sandy loam.	GM, GM-GC	A-2, A-1	5-20	35-60	30-55	25-55	10-35	15-25	NP-10
Suttler-----	0-10	Loam-----	ML, CL-ML	A-4	0	90-100	85-100	75-95	55-75	20-30	NP-10
	10-39	Gravelly loam, gravelly sandy loam.	SM	A-1, A-2, A-4	0-5	65-90	55-75	40-70	20-50	15-25	NP-5
	39-60	Very gravelly sandy loam.	GM, SM	A-1	5-20	50-75	25-55	15-35	10-25	---	NP
83, 84, 85----- Nez Perce	0-20	Silt loam-----	ML	A-4	0	95-100	95-100	90-100	90-100	30-40	5-10
	20-69	Silty clay, silty clay loam, clay.	CH, CL	A-7	0	90-100	85-100	85-100	85-100	40-55	20-35
86----- Nicodemus	0-9	Loam-----	ML, CL-ML	A-4	0	95-100	90-100	75-85	50-75	15-25	NP-5
	9-25	Very cobbly loam	GM, SM	A-1	15-40	40-65	35-60	25-45	15-35	---	NP
	25-60	Very cobbly sand	GP, GW	A-1	50-60	25-35	20-30	10-20	0-5	---	NP
87----- Nicodemus Variant	0-4	Loam-----	ML	A-4	0-5	95-100	95-100	80-95	60-75	20-30	NP-5
	4-50	Loam-----	ML, GM	A-4	0-10	80-100	75-100	70-95	45-75	20-30	NP-5
	50-60	Stratified gravelly loam to very cobbly loam.	GM, ML	A-2, A-4	0-20	55-80	55-75	45-70	30-55	20-30	NP-5
88----- Nicodemus Variant	0-6	Cobbly loam-----	ML, GM	A-4	15-30	75-95	70-90	60-85	40-70	20-30	NP-5
	6-50	Loam, gravelly loam.	ML, GM	A-4	0-10	80-100	75-100	70-95	45-75	20-30	NP-5
	50-60	Stratified loam to very cobbly loam.	GM, ML	A-2, A-4	0-20	55-80	55-75	45-70	30-55	20-30	NP-5

See footnote at end of table.



TABLE 19.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches Pct	Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
89, 90----- Oland	0-11	Silt loam-----	ML	A-4	0	95-100	90-100	80-100	65-90	20-30	NP-5
	11-26	Gravelly loam---	GM, SM, ML	A-4, A-2	0-5	55-85	50-75	40-75	30-60	20-30	NP-5
	26-40	Very gravelly loam.	GM	A-2, A-4, A-1	5-15	25-55	20-50	15-50	10-40	20-30	NP-5
	40-70	Very cobbly sandy loam, very gravelly sandy loam.	GM, GW-GM, GP-GM	A-1	15-30	25-50	20-45	10-40	5-25	---	NP
91----- Oland Variant	0-7	Loam-----	ML, CL-ML	A-4	0	95-100	90-100	75-95	55-75	15-25	NP-10
	7-62	Loam, gravelly loam.	ML, CL-ML	A-4	0	95-100	70-100	65-95	55-75	15-25	NP-10
92*: Riggins-----	0-8	Very gravelly silt loam.	GM-GC	A-2, A-4	0-15	40-60	35-50	30-50	25-45	25-30	5-10
	8-13	Very gravelly clay loam, very gravelly loam.	GC, GM-GC	A-2, A-6	5-20	40-60	30-45	30-55	25-45	30-35	5-15
	13	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Meland-----	0-21	Silt loam-----	CL-ML	A-4	0	95-100	95-100	90-100	75-90	20-30	5-10
	21-32	Clay loam, gravelly clay loam.	CL, CL-ML	A-4, A-6	0-10	75-100	70-90	65-85	50-75	25-35	5-15
	32	Weathered bedrock.	---	---	---	---	---	---	---	---	---
93*. Rock outcrop											
94*: Rock outcrop.											
Bluesprin-----	0-12	Very cobbly loam	GM-GC, SM-SC	A-4, A-2	20-40	45-75	40-70	35-65	25-50	20-30	5-10
	12-31	Very cobbly clay loam.	GC	A-6	20-45	45-70	40-70	40-65	35-50	30-40	10-20
	31	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
95*: Rock outcrop.											
Brower-----	0-9	Very gravelly loam.	GM	A-2	0-5	45-75	40-70	35-65	25-35	20-30	NP-5
	9-60	Very gravelly loam.	GM, GM-GC	A-1, A-2	0-15	25-55	20-50	15-40	10-30	20-30	NP-10
96*: Rock outcrop.											
Klickson-----	0-6	Cobbly loam-----	CL-ML, SM-SC	A-4	20-40	75-95	70-90	60-85	40-70	25-30	5-10
	6-51	Cobbly silt loam, cobbly loam, very cobbly loam.	CL-ML, SM-SC	A-4	20-40	75-95	70-90	60-85	40-70	25-30	5-10
	51-60	Cobbly clay, very cobbly loam.	CL, CH, SC	A-7	20-45	60-95	50-90	50-90	45-85	40-55	20-30
97*: Rock outcrop.											

See footnote at end of table.

TABLE 19.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches Pct	Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
97*: Nazaton-----	In										
	0-20	Gravelly loam---	ML, CL-ML, SM, SM-SC	A-4	0-15	75-85	50-80	45-80	35-70	15-25	NP-10
	20-68	Very gravelly loam, very gravelly sandy loam, very gravelly silt loam.	GM, GM-GC	A-2, A-1	5-20	35-60	30-55	25-55	10-35	15-25	NP-10
98*: Rock outcrop.											
Suttler-----	0-10	Loam-----	ML, CL-ML	A-4	0	90-100	85-100	75-95	55-75	20-30	NP-10
	10-39	Gravelly loam, gravelly sandy loam.	SM	A-1, A-2, A-4	0-5	65-90	55-75	40-70	20-50	15-25	NP-5
	39-60	Very gravelly sandy loam.	GM, SM	A-1	5-20	50-75	25-55	15-35	10-25	---	NP
99*: Rock outcrop.											
Tannahill-----	0-10	Cobbly loam, gravelly silty clay loam.	CL-ML, SM-SC, GM-GC	A-4	5-20	70-85	65-80	65-75	40-60	20-30	5-10
	10-52	Very gravelly loam, very gravelly silty clay loam.	GM-GC	A-2, A-4	5-30	35-55	30-50	25-50	20-50	20-30	5-10
	52	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
100, 101, 102----- Shebang	0-10	Silt loam-----	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-100	25-35	5-15
	10-65	Clay, silty clay	CH, CL	A-7	0-5	85-100	85-100	75-100	65-95	40-55	20-35
103----- Spokel	0-10	Very stony loam	GM, GM-GC	A-1, A-2, A-4	20-40	50-80	20-50	15-50	10-40	20-30	NP-10
	10-64	Very gravelly sandy loam, very gravelly loam.	GM, GW-GM	A-1, A-2	0-10	40-70	15-40	10-35	5-30	---	NP
104*: Spokel-----	0-10	Very gravelly loam.	GM, GM-GC	A-1, A-2, A-4	0	50-80	20-50	15-50	10-40	20-30	NP-10
	10-64	Very gravelly sandy loam, very gravelly loam.	GM, GW-GM	A-1, A-2	0-10	40-70	15-40	10-35	5-30	---	NP
Brower-----	0-9	Very gravelly loam.	GM	A-2	0-5	45-75	40-70	35-65	25-35	20-30	NP-5
	9-60	Very gravelly loam.	GM, GM-GC	A-1, A-2	0-15	25-55	20-50	15-40	10-30	20-30	NP-10
105*: Spokel-----	0-10	Very gravelly loam.	GM, GM-GC	A-1, A-2, A-4	0	50-60	20-50	15-50	10-40	20-30	NP-10
	10-64	Very gravelly sandy loam, very gravelly loam.	GM, GW-GM	A-1, A-2	0-10	40-70	15-40	10-35	5-30	---	NP

See footnote at end of table.

TABLE 19.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
105*: Nazaton-----	0-20	Gravelly loam---	ML, CL-ML, SM, SM-SC	A-4	0-15	75-85	50-80	45-80	35-70	15-25	NP-10
	20-68	Very gravelly loam, very gravelly sandy loam.	GM, GM-GC	A-2, A-1	5-20	35-60	30-55	25-55	10-35	15-25	NP-10
106*: Spokel-----	0-10	Very gravelly loam.	GM, GM-GC	A-1, SM, SM-SC	0	50-80	20-50	15-50	10-40	20-30	NP-10
	10-64	Very gravelly sandy loam, very gravelly loam.	GM, GW-GM	A-1, A-2	0-10	40-70	15-40	10-35	5-30	---	NP
Suttler-----	0-10	Loam-----	ML, CL-ML	A-4	0	90-100	85-100	75-95	55-75	20-30	NP-10
	10-39	Gravelly loam, gravelly sandy loam.	SM	A-1, A-2, A-4	0-5	65-90	55-75	40-70	20-50	15-25	NP-5
	39-60	Very gravelly sandy loam.	GM, SM	A-1	5-20	50-75	25-55	15-35	10-25	---	NP
107, 108, 109----- Suloaf	0-17	Silt loam-----	CL-ML	A-4	0-5	95-100	90-100	80-100	65-90	20-30	5-10
	17-41	Gravelly silt loam, gravelly clay loam.	GC, CL	A-6	0-5	60-80	55-75	50-70	40-60	25-35	10-20
	41-54	Gravelly sandy loam.	SM, GM	A-1, A-2	0-5	60-80	55-75	35-60	20-35	15-25	NP-5
	54	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
110----- Suloaf	0-17	Cobbly silt loam	ML, GM	A-4	15-25	65-80	65-80	60-75	45-65	20-30	5-10
	17-41	Gravelly silt loam, gravelly clay loam.	GC, CL	A-6	0-5	60-80	55-75	50-70	40-60	25-35	10-20
	41-54	Gravelly sandy loam.	SM, GM	A-1, A-2	0-5	60-80	55-75	35-60	20-35	15-25	NP-5
	54	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
111*: Suloaf-----	0-17	Silt loam-----	CL-ML	A-4	0-5	95-100	90-100	80-100	65-90	20-30	5-10
	17-41	Gravelly silt loam, gravelly clay loam.	GC, CL	A-6	0-5	60-80	55-75	50-70	40-60	25-35	10-20
	41-54	Gravelly sandy loam.	SM, GM	A-1, A-2	0-5	60-80	55-75	35-60	20-35	15-25	NP-5
	54	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Meland-----	0-21	Silt loam-----	CL-ML	A-4	0	95-100	95-100	90-100	75-90	20-30	5-10
	21-32	Clay loam, gravelly clay loam.	CL, CL-ML	A-4, A-6	0-10	75-100	70-90	65-85	50-75	25-35	5-15
	32	Weathered bedrock.	---	---	---	---	---	---	---	---	---
112----- Tannahill	0-10	Loam-----	CL-ML	A-4	0-5	80-100	75-100	70-95	55-75	20-30	5-10
	10-52	Very gravelly loam, very gravelly silty clay loam.	GM-GC	A-2, A-4	5-30	35-55	30-50	25-50	20-50	20-30	5-10
	52	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.



TABLE 19.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
113*: Tannahill-----	0-10	Cobbly loam----	CL-ML, SM-SC, GM-GC	A-4	5-20	70-85	65-80	65-75	40-60	20-30	5-10
	10-52	Very gravelly loam, very gravelly silty clay loam.	GM-GC	A-2, A-4	5-30	35-55	30-50	25-50	20-50	20-30	5-10
	52	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Lickskillet-----	0-10	Gravelly clay loam.	GC, SC, CL	A-6, A-2	0-10	55-80	50-75	40-70	30-60	25-35	10-15
	10-17	Very gravelly clay loam.	GC	A-6, A-2	0-15	35-55	30-50	25-50	20-40	30-40	10-20
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
114*: Tannahill-----	0-10	Cobbly loam, gravelly silty clay loam.	CL-ML, SM-SC, GM-GC	A-4	5-20	70-85	65-80	65-75	40-60	20-30	5-10
	10-52	Very gravelly loam, very gravelly silty clay loam.	GM-GC	A-2, A-4	5-30	35-55	30-50	25-50	20-50	20-30	5-10
	52	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
115, 116, 117----- Telcher	0-20	Silt loam-----	ML, CL-ML	A-4	0-5	80-100	75-100	70-100	50-90	25-35	5-10
	20-44	Silty clay loam, clay loam.	CL	A-6	0-5	75-100	75-95	70-95	60-85	30-40	10-20
	44-60	Gravelly clay loam.	GC, CL, SC	A-6	0-5	50-80	50-75	45-70	35-60	30-40	10-20
118*: Telcher-----	0-20	Silt loam-----	ML, CL-ML	A-4	0-5	80-100	75-100	70-100	50-90	25-35	5-10
	20-44	Silty clay loam, clay loam.	CL	A-6	0-5	75-100	75-95	70-95	60-85	30-40	10-20
	44-60	Gravelly clay loam.	GC, CL, SC	A-6	0-5	50-80	50-75	45-70	35-60	30-40	10-20
Suloaf-----	0-17	Silt loam-----	CL-ML	A-4	0-5	95-100	90-100	80-100	65-90	20-30	5-10
	17-41	Gravelly silt loam, gravelly clay loam.	GC, CL	A-6	0-5	60-80	55-75	50-70	40-60	25-35	10-20
	41-54	Gravelly sandy loam.	SM, GM	A-1, A-2	0-5	60-80	55-75	35-60	20-35	15-25	NP-5
	54	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
119*. Typic Xerofluvents											
120, 121, 122, 123, 124----- Uhlorn	0-18	Silt loam-----	CL-ML, ML	A-4	0	100	100	95-100	90-100	25-35	5-10
	18-42	Silty clay loam, clay loam.	CL	A-6, A-7	0	100	100	90-100	75-95	35-45	20-30
	42-60	Silty clay loam, clay loam.	CL	A-6, A-7	0	90-100	85-100	80-100	70-95	35-45	15-25

See footnote at end of table.

TABLE 19.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches Pct	Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
125, 126, 127----- Uptmor	0-4	Silt loam-----	CL	A-6	0-5	90-100	85-100	75-100	65-90	25-35	10-20
	4-25	Silty clay loam, silty clay.	CL	A-6, A-7	0-5	90-100	85-100	80-100	75-95	35-45	15-25
	25-46	Cobbly silty clay.	CL, CH	A-7	10-15	70-90	65-85	60-85	55-80	40-55	20-30
	46-61	Very gravelly clay loam.	GC	A-6, A-2	10-15	50-65	40-65	35-60	30-50	30-40	10-20
128----- Wapshilla	0-14	Loam-----	ML	A-4	0-5	85-100	75-90	65-80	50-65	25-35	NP-10
	14-22	Gravelly loam---	GM, SM	A-4	0-15	60-70	50-70	45-60	35-45	25-35	NP-10
	22-60	Very gravelly loam, very gravelly clay loam.	GM	A-2, A-4	0-15	40-60	35-50	30-45	20-45	25-35	NP-10
129----- Westlake	0-48	Silt loam-----	CL-ML	A-4	0	100	100	90-100	75-90	20-30	5-10
	48-60	Clay loam, loam	CL	A-6	0	100	100	90-100	75-80	30-40	10-15
130----- Wilkins	0-27	Silt loam-----	ML	A-4	0	100	100	90-100	70-90	25-30	NP-5
	27-60	Silty clay, clay	CL, CH	A-7	0	100	100	95-100	90-95	45-55	20-30
131----- Zaza	0-3	Loam-----	ML, CL-ML	A-4	0-5	75-95	75-95	65-90	50-70	20-30	NP-10
	3-12	Very gravelly loam.	GM	A-1, A-2	0-5	30-50	20-50	20-45	15-35	25-35	NP-10
	12	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

\* See map unit description for the composition and behavior of the map unit.

TABLE 20.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[The symbol < means less than; > means greater than. The erosion tolerance factor (T) is for the entire profile. Organic matter is for the surface layer. Absence of an entry means data were not available or were not estimated]

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
						K	T	
	In	In/hr	In/in	pH				Pct
1, 2, 3----- Banner	0-7 7-54 54-60	0.6-2.0 0.06-0.2 0.6-2.0	0.19-0.21 0.14-0.18 0.13-0.15	6.6-8.4 7.4-9.0 7.9-9.0	Moderate----- High----- Low-----	0.37 0.32 0.20	5	2-4
4*: Bluesprin-----	0-12 12-31 31	0.6-2.0 0.2-0.6 ---	0.12-0.14 0.12-0.16 ---	6.1-7.3 6.1-7.3 ---	Low----- Moderate----- -----	0.28 0.28 ---	2	4-6
Keuterville-----	0-18 18-36 36-60	0.6-2.0 0.2-0.6 0.2-0.6	0.06-0.08 0.08-0.10 0.06-0.08	6.1-7.3 6.1-7.3 6.1-7.3	Low----- Low----- Low-----	0.24 0.32 0.32	5	4-6
5*: Bluesprin-----	0-12 12-31 31	0.6-2.0 0.2-0.6 ---	0.12-0.14 0.12-0.16 ---	6.1-7.3 6.1-7.3 ---	Low----- Moderate----- -----	0.28 0.28 ---	2	4-6
Klickson-----	0-6 6-51 51-60	0.6-2.0 0.6-2.0 0.2-0.6	0.19-0.21 0.12-0.14 0.12-0.14	6.1-6.5 6.1-6.5 6.1-6.5	Low----- Low----- Moderate-----	0.37 0.32 0.32	5	2-4
6*: Bluesprin-----	0-12 12-31 31	0.6-2.0 0.2-0.6 ---	0.12-0.14 0.12-0.16 ---	6.1-7.3 6.1-7.3 ---	Low----- Moderate----- -----	0.28 0.28 ---	2	4-6
Lawyer-----	0-6 6-23 23-72	0.6-2.0 0.6-2.0 0.06-0.2	0.18-0.20 0.14-0.16 0.05-0.07	6.1-7.3 6.1-7.3 6.1-7.3	Low----- Low----- Moderate-----	0.32 0.28 0.28	5	4-6
7*: Bluesprin-----	0-12 12-31 31	0.6-2.0 0.2-0.6 ---	0.12-0.14 0.12-0.16 ---	6.1-7.3 6.1-7.3 ---	Low----- Moderate----- -----	0.28 0.28 ---	2	4-6
Rock outcrop.								
8, 9----- Boles	0-19 19-60	0.6-2.0 0.06-0.2	0.19-0.21 0.15-0.17	6.1-7.3 6.6-7.3	Moderate----- High-----	0.37 0.32	5	4-6
10----- Brody	0-22 22-39 39	0.6-2.0 0.6-2.0 ---	0.12-0.15 0.08-0.10 ---	5.6-6.5 6.1-6.5 ---	Low----- Low----- -----	0.37 0.43 ---	3	2-4
11*: Brody-----	0-22 22-39 39	0.6-2.0 0.6-2.0 ---	0.17-0.19 0.08-0.10 ---	5.6-6.5 6.1-6.5 ---	Low----- Low----- -----	0.43 0.43 ---	3	2-4
Telcher-----	0-20 20-44 44-60	0.6-2.0 0.2-0.6 0.2-0.6	0.17-0.21 0.19-0.21 0.14-0.16	6.1-7.3 5.6-6.5 5.6-6.5	Low----- Moderate----- Moderate-----	0.43 0.37 0.37	5	2-4
12*: Brody-----	0-22 22-39 39	0.6-2.0 0.6-2.0 ---	0.12-0.15 0.08-0.10 ---	5.6-6.5 6.1-6.5 ---	Low----- Low----- -----	0.37 0.43 ---	3	2-4
Wapshilla-----	0-14 14-22 22-60	0.6-2.0 0.6-2.0 0.6-2.0	0.17-0.19 0.10-0.14 0.06-0.08	5.6-6.5 5.6-7.3 5.6-7.3	Low----- Low----- Low-----	0.37 0.17 ---	3	2-4

See footnote at end of table.



TABLE 20.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
						K	T	
	In	In/hr	In/in	pH				Pct
13----- Brower	0-9 9-60	0.6-2.0 0.6-2.0	0.08-0.10 0.08-0.10	6.6-7.3 6.1-8.4	Low----- Low-----	0.28 0.28	5	2-4
14*: Brower-----	0-9 9-60	0.6-2.0 0.6-2.0	0.12-0.14 0.08-0.10	6.6-7.3 6.1-8.4	Low----- Low-----	0.32 0.28	5	2-4
Brownlee-----	0-8 8-28 28-42 42	0.6-2.0 0.2-0.6 2.0-6.0 ---	0.16-0.18 0.14-0.21 0.07-0.13 ---	5.6-7.3 5.6-7.3 6.1-7.3 ---	Low----- Moderate----- Low----- ---	0.32 0.32 0.28 ---	3	2-4
15*: Brower-----	0-9 9-60	0.6-2.0 0.6-2.0	0.08-0.10 0.08-0.10	6.6-7.3 6.1-8.4	Low----- Low-----	0.28 0.28	5	2-4
Rock outcrop.								
16, 17, 18, 19--- Brownlee	0-8 8-28 28-42 42	0.6-2.0 0.2-0.6 2.0-6.0 ---	0.16-0.18 0.14-0.21 0.07-0.13 ---	5.6-7.3 5.6-7.3 6.1-7.3 ---	Low----- Moderate----- Low----- ---	0.32 0.32 0.28 ---	3	2-4
20, 21, 22, 23--- Chard	0-30 30-60	2.0-6.0 2.0-6.0	0.14-0.16 0.13-0.15	6.6-7.3 6.6-9.0	Low----- Low-----	0.43 0.43	5	1-2
24, 25----- Chard Variant	0-19 19-50 50-60	2.0-6.0 6.0-20.0 6.0-20.0	0.09-0.11 0.05-0.07 0.02-0.06	6.1-7.3 6.6-9.0 6.6-9.0	Low----- Low----- Low-----	0.43 0.43 0.28	5	1-2
26, 27, 28, 29--- Chicane	0-5 5-21 21-28 28-67	0.2-2.0 0.2-0.6 0.6-2.0 0.06-0.2	0.19-0.21 0.14-0.17 0.19-0.21 0.14-0.17	6.6-7.3 6.6-7.3 6.6-7.3 6.6-8.4	Moderate----- Moderate----- Low----- High-----	0.37 0.20 0.43 0.20	5	4-9
30, 31----- De Masters	0-41 41-55 55	0.6-2.0 0.6-2.0 ---	0.15-0.20 0.12-0.16 ---	5.6-7.3 5.6-7.3 ---	Low----- Low----- ---	0.24 0.20 ---	4	4-6
32*: De Masters-----	0-41 41-55 55	0.6-2.0 0.6-2.0 ---	0.15-0.20 0.12-0.16 ---	5.6-7.3 5.6-7.3 ---	Low----- Low----- ---	0.24 0.20 ---	4	4-6
Riggins-----	0-8 8-13 13	0.6-2.0 0.2-0.6 ---	0.15-0.19 0.14-0.18 ---	6.1-7.3 6.1-7.3 ---	Low----- Low----- ---	0.32 0.32 ---	1	2-4
33*: De Masters-----	0-41 41-55 55	0.6-2.0 0.6-2.0 ---	0.15-0.20 0.12-0.16 ---	5.6-7.3 5.6-7.3 ---	Low----- Low----- ---	0.24 0.20 ---	4	4-6
Suloaf-----	0-17 17-41 41-54 54	0.6-2.0 0.6-2.0 2.0-6.0 ---	0.19-0.21 0.10-0.13 0.10-0.13 ---	5.6-7.3 6.1-6.5 6.1-6.5 ---	Low----- Moderate----- Low----- ---	0.32 0.32 0.32 ---	3	2-4
34, 35----- Ericson	0-17 17-60	0.6-2.0 0.2-0.6	0.16-0.18 0.14-0.16	5.1-6.0 5.1-6.0	Low----- Low-----	0.37 0.28	5	2-4
36*: Ericson-----	0-17 17-60	0.6-2.0 0.2-0.6	0.16-0.18 0.14-0.16	5.1-6.0 5.1-6.0	Low----- Low-----	0.37 0.28	5	2-4
Rock outcrop.								

See footnote at end of table.

TABLE 20.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
						K	T	
	In	In/hr	In/in	pH				Pct
37, 38----- Fenn	0-6 6-63	0.06-0.2 0.06-0.2	0.14-0.21 0.14-0.17	6.1-7.3 6.6-8.4	High----- High-----	0.15 0.20	5	2-4
39----- Fenn	0-6 6-63	0.06-0.2 0.06-0.2	0.14-0.17 0.12-0.14	6.1-7.3 6.6-8.4	High----- High-----	0.15 0.20	5	2-4
40----- Fenn Variant	0-19 19-65	0.06-0.2 0.06-0.2	0.14-0.17 0.14-0.17	6.6-8.4 7.9-9.0	High----- High-----	0.15 0.20	5	4-6
41, 42, 43----- Ferdinand	0-13 13-32 32	0.6-2.0 0.06-0.2 ---	0.19-0.21 0.04-0.06 ---	6.1-7.3 6.6-7.3 ---	Low----- Moderate----- -----	0.32 0.20 ---	2	4-6
44*: Ferdinand-----	0-13 13-39 39	0.6-2.0 0.06-0.2 ---	0.07-0.09 0.04-0.06 ---	6.1-7.3 6.6-7.3 ---	Low----- Moderate----- -----	0.32 0.20 ---	2	4-6
Bluesprin-----	0-12 12-31 31	0.6-2.0 0.2-0.6 ---	0.12-0.14 0.12-0.16 ---	6.1-7.3 6.1-7.3 ---	Low----- Moderate----- -----	0.28 0.28 ---	2	4-6
45*: Ferdinand-----	0-13 13-32 32	0.6-2.0 0.06-0.2 ---	0.19-0.21 0.04-0.06 ---	6.1-7.3 6.6-7.3 ---	Low----- Moderate----- -----	0.32 0.20 ---	2	4-6
Flybow-----	0-5 5	0.6-2.0 ---	0.06-0.08 ---	5.6-6.5 ---	Low----- -----	0.28 ---	1	1-2
Riggins-----	0-8 8-13 13	0.6-2.0 0.2-0.6 ---	0.15-0.19 0.14-0.18 ---	6.1-7.3 6.1-7.3 ---	Low----- Low----- -----	0.32 0.32 ---	1	2-4
46*: Ferdinand-----	0-13 13-32 32	0.6-2.0 0.06-0.2 ---	0.19-0.21 0.04-0.06 ---	6.1-7.3 6.6-7.3 ---	Low----- Moderate----- -----	0.32 0.20 ---	2	4-6
Riggins-----	0-8 8-13 13	0.6-2.0 0.2-0.6 ---	0.15-0.19 0.14-0.18 ---	6.1-7.3 6.1-7.3 ---	Low----- Low----- -----	0.32 0.32 ---	1	2-4
47, 48, 49, 50--- Jacket	0-17 17-30 30-63	0.6-2.0 0.06-0.2 0.06-0.2	0.19-0.21 0.15-0.21 0.13-0.16	6.6-7.3 5.6-6.5 5.6-6.5	Low----- High----- High-----	0.37 0.37 0.32	5	4-6
51, 52, 53----- Jacket Variant	0-12 12-52 52-60	0.6-2.0 0.6-2.0 0.6-2.0	0.19-0.21 0.19-0.21 0.19-0.21	6.6-7.3 6.6-7.3 6.6-7.3	Low----- Low----- Moderate-----	0.32 0.43 0.43	5	4-5
54, 55----- Johnson	0-19 19-65	0.6-2.0 0.6-2.0	0.16-0.18 0.16-0.21	5.6-7.3 5.6-7.3	Low----- Moderate-----	0.32 0.32	5	2-4
56, 57----- Jughandle	0-27 27-41 41	2.0-6.0 2.0-6.0 ---	0.15-0.17 0.11-0.16 ---	5.1-6.5 5.1-6.5 ---	Low----- Low----- -----	0.37 0.24 ---	---	2-4
58*: Jughandle-----	0-27 27-41 41	2.0-6.0 2.0-6.0 ---	0.15-0.17 0.11-0.16 ---	5.1-6.5 5.1-6.5 ---	Low----- Low----- -----	0.37 0.24 ---	---	2-4
Ericson-----	0-17 17-60	0.6-2.0 0.2-0.6	0.16-0.18 0.14-0.16	5.1-6.0 5.1-6.0	Low----- Low-----	0.37 0.28	5	2-4

See footnote at end of table.

TABLE 20.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
						K	T	
	In	In/hr	In/in	pH				Pct
59*:								
Jughandle-----	0-27	2.0-6.0	0.15-0.17	5.1-6.5	Low-----	0.37	---	2-4
	27-41	2.0-6.0	0.11-0.16	5.1-6.5	Low-----	0.24		
	41	---	---	---	-----	---		
Suttler-----	0-10	0.6-2.0	0.15-0.18	5.6-7.3	Low-----	0.32	5	2-4
	10-39	0.6-2.0	0.09-0.14	5.6-7.3	Low-----	0.28		
	39-60	0.6-2.0	0.08-0.11	5.6-7.3	Low-----	0.32		
60-----	0-15	0.6-2.0	0.19-0.21	5.6-6.5	Low-----	0.43	5	1-2
Jughandle	15-43	2.0-6.0	0.11-0.13	5.6-6.5	Low-----	0.43		
Variant	43-60	6.0-20	0.04-0.06	5.1-6.0	Low-----	0.24		
61, 62-----	0-18	0.6-2.0	0.12-0.14	6.1-7.3	Low-----	0.32	5	4-6
Keuterville	18-36	0.2-0.6	0.08-0.10	6.1-7.3	Low-----	0.32		
	36-60	0.2-0.6	0.06-0.08	6.1-7.3	Low-----	0.32		
63*:								
Keuterville-----	0-18	0.6-2.0	0.12-0.14	6.1-7.3	Low-----	0.32	5	4-6
	18-36	0.2-0.6	0.08-0.10	6.1-7.3	Low-----	0.32		
	36-60	0.2-0.6	0.06-0.08	6.1-7.3	Low-----	0.32		
Bluesprin-----	0-12	0.6-2.0	0.16-0.21	6.1-7.3	Low-----	0.32	2	4-6
	12-31	0.2-0.6	0.12-0.16	6.1-7.3	Moderate-----	0.28		
	31	---	---	---	-----	---		
64*:								
Keuterville-----	0-18	0.6-2.0	0.06-0.08	6.1-7.3	Low-----	0.24	5	4-6
	18-36	0.2-0.6	0.08-0.10	6.1-7.3	Low-----	0.32		
	36-60	0.2-0.6	0.06-0.08	6.1-7.3	Low-----	0.32		
Bluesprin-----	0-12	0.6-2.0	0.12-0.14	6.1-7.3	Low-----	0.28	2	4-6
	12-31	0.2-0.6	0.12-0.16	6.1-7.3	Moderate-----	0.28		
	31	---	---	---	-----	---		
65*:								
Keuterville-----	0-18	0.6-2.0	0.06-0.08	6.1-7.3	Low-----	0.24	5	4-6
	18-36	0.2-0.6	0.08-0.10	6.1-7.3	Low-----	0.32		
	36-60	0.2-0.6	0.06-0.08	6.1-7.3	Low-----	0.32		
Klickson-----	0-6	0.6-2.0	0.12-0.14	6.1-6.5	Low-----	0.32	5	2-4
	6-51	0.6-2.0	0.12-0.14	6.1-6.5	Low-----	0.32		
	51-60	0.2-0.6	0.12-0.14	6.1-6.5	Moderate-----	0.32		
66*:								
Klickson-----	0-6	0.6-2.0	0.12-0.14	6.1-6.5	Low-----	0.32	5	2-4
	6-51	0.6-2.0	0.12-0.14	6.1-6.5	Low-----	0.32		
	51-60	0.2-0.6	0.12-0.14	6.1-6.5	Moderate-----	0.32		
Rock outcrop.								
67*:								
Klickson-----	0-6	0.6-2.0	0.19-0.21	6.1-6.5	Low-----	0.37	5	2-4
	6-51	0.6-2.0	0.12-0.14	6.1-6.5	Low-----	0.32		
	51-60	0.2-0.6	0.12-0.14	6.1-6.5	Moderate-----	0.32		
Suloaf-----	0-17	0.6-2.0	0.10-0.13	5.6-7.3	Low-----	0.32	3	2-4
	17-41	0.6-2.0	0.10-0.13	6.1-6.5	Moderate-----	0.32		
	41-54	2.0-6.0	0.10-0.13	6.1-6.5	Low-----	0.32		
	54	---	---	---	-----	---		
68*:								
Klickson-----	0-6	0.6-2.0	0.19-0.21	6.1-6.5	Low-----	0.37	5	2-4
	6-51	0.6-2.0	0.12-0.14	6.1-6.5	Low-----	0.32		
	51-60	0.2-0.6	0.12-0.14	6.1-6.5	Moderate-----	0.32		

See footnote at end of table.



TABLE 20.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
						K	T	
	In	In/hr	In/in	pH				Pct
68*: Bluesprin-----	0-12 12-31 31	0.6-2.0 0.2-0.6 ---	0.12-0.14 0.12-0.16 ---	6.1-7.3 6.1-7.3 ---	Low----- Moderate----- -----	0.28 0.28 ---	2	4-6
69*: Klickson-----	0-6 6-51 51-60	0.6-2.0 0.6-2.0 0.2-0.6	0.19-0.21 0.12-0.14 0.12-0.14	6.1-6.5 6.1-6.5 6.1-6.5	Low----- Low----- Moderate-----	0.37 0.32 0.32	5	2-4
Wapshilla-----	0-14 14-22 22-60	0.6-2.0 0.6-2.0 0.6-2.0	0.10-0.14 0.10-0.14 0.06-0.08	5.6-6.5 5.6-7.3 5.6-7.3	Low----- Low----- Low-----	0.20 0.17 ---	3	2-4
70, 71, 72----- Kooskia	0-21 21-60	0.6-2.0 0.06-0.2	0.19-0.21 0.15-0.17	5.6-7.3 6.1-7.3	Low----- High-----	0.43 0.28	5	2-4
73*: Lawyer-----	0-6 6-23 23-72	0.6-2.0 0.6-2.0 0.06-0.2	0.18-0.20 0.14-0.16 0.05-0.07	6.1-7.3 6.1-7.3 6.1-7.3	Low----- Low----- Moderate-----	0.32 0.28 0.28	5	4-6
Rock outcrop.								
74*: Lawyer-----	0-6 6-23 23-72	0.6-2.0 0.6-2.0 0.06-0.2	0.18-0.20 0.14-0.16 0.05-0.07	6.1-7.3 6.1-7.3 6.1-7.3	Low----- Low----- Moderate-----	0.32 0.28 0.28	5	4-6
Bluesprin-----	0-12 12-31 31	0.6-2.0 0.2-0.6 ---	0.12-0.14 0.12-0.16 ---	6.1-7.3 6.1-7.3 ---	Low----- Moderate----- -----	0.28 0.28 ---	2	4-6
75*: Lawyer-----	0-6 6-23 23-72	0.6-2.0 0.6-2.0 0.06-0.2	0.18-0.20 0.14-0.16 0.05-0.07	6.1-7.3 6.1-7.3 6.1-7.3	Low----- Low----- Moderate-----	0.32 0.28 0.28	5	4-6
Tannahill-----	0-10 10-52 52	0.6-2.0 0.2-0.6 ---	0.12-0.14 0.06-0.08 ---	6.6-7.8 7.4-9.0 ---	Low----- Low----- -----	0.28 0.24 ---	4	2-4
76*: Lickskillet-----	0-10 10-17 17	0.6-2.0 0.6-2.0 ---	0.13-0.15 0.13-0.15 ---	6.6-7.8 6.6-7.8 ---	Low----- Low----- -----	0.24 0.20 ---	1	1-2
Tannahill-----	0-10 10-52 52	0.6-2.0 0.2-0.6 ---	0.16-0.18 0.06-0.08 ---	6.6-7.8 7.4-9.0 ---	Low----- Low----- -----	0.28 0.24 ---	4	2-4
77, 78, 79----- Meland	0-21 21-32 32	0.6-2.0 0.2-0.6 ---	0.19-0.21 0.18-0.20 ---	6.1-6.5 5.6-6.5 ---	Low----- Moderate----- -----	0.37 0.37 ---	3	4-6
80----- Naz	0-24 24-65	0.6-2.0 2.0-6.0	0.11-0.13 0.11-0.13	6.6-7.3 5.6-7.3	Low----- Low-----	0.24 0.32	5	2-4
81*: Nazaton-----	0-35 35-50 50-68	0.6-2.0 2.0-6.0 2.0-6.0	0.15-0.18 0.07-0.09 0.07-0.09	5.6-6.5 6.1-7.3 6.1-7.3	Low----- Low----- Low-----	0.32 0.28 0.24	5	2-4
Naz-----	0-24 24-65	0.6-2.0 2.0-6.0	0.11-0.13 0.11-0.13	6.6-7.3 5.6-7.3	Low----- Low-----	0.24 0.32	5	2-4

See footnote at end of table.

TABLE 20.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
						K	T	
	In	In/hr	In/in	pH				Pct
82*: Nazaton-----	0-35	0.6-2.0	0.15-0.18	5.6-6.5	Low-----	0.32	5	2-4
	35-50	2.0-6.0	0.07-0.09	6.1-7.3	Low-----	0.28		
	50-68	2.0-6.0	0.07-0.09	6.1-7.3	Low-----	0.24		
Suttler-----	0-10	0.6-2.0	0.15-0.18	5.6-7.3	Low-----	0.32	5	2-4
	10-39	0.6-2.0	0.09-0.14	5.6-7.3	Low-----	0.28		
	39-60	0.6-2.0	0.08-0.11	5.6-7.3	Low-----	0.32		
83, 84, 85----- Nez Perce	0-20	0.6-2.0	0.19-0.21	6.1-7.3	Low-----	0.37	5	4-8
	20-69	0.06-0.2	0.14-0.16	6.6-8.4	High-----	0.28		
86----- Nicodemus	0-9	2.0-6.0	0.16-0.18	5.1-6.5	Low-----	0.32	2	4-6
	9-25	2.0-6.0	0.06-0.08	5.6-6.5	Low-----	0.15		
	25-60	6.0-20	0.03-0.05	6.1-7.3	Low-----	0.10		
87----- Nicodemus Variant	0-4	2.0-6.0	0.16-0.18	6.1-7.3	Low-----	0.32	5	4-6
	4-50	0.6-2.0	0.16-0.18	6.1-7.3	Low-----	0.24		
	50-60	2.0-6.0	0.10-0.12	6.6-7.3	Low-----	0.24		
88----- Nicodemus Variant	0-6	2.0-6.0	0.12-0.14	6.1-7.3	Low-----	0.24	5	4-6
	6-50	0.6-2.0	0.16-0.18	6.1-7.3	Low-----	0.24		
	50-60	2.0-6.0	0.10-0.12	6.6-7.3	Low-----	0.24		
89, 90----- Oland	0-11	0.6-2.0	0.19-0.21	6.1-7.3	Low-----	0.32	5	4-6
	11-26	0.6-2.0	0.13-0.15	6.1-7.3	Low-----	0.37		
	26-40	0.6-2.0	0.07-0.09	6.1-7.3	Low-----	0.32		
	40-70	2.0-6.0	0.05-0.08	6.1-7.3	Low-----	0.32		
91----- Oland Variant	0-7	2.0-6.0	0.16-0.18	6.1-7.3	Low-----	0.32	5	4-6
	7-62	0.6-2.0	0.16-0.18	6.6-7.3	Low-----	0.28		
92*: Riggins-----	0-8	0.6-2.0	0.15-0.19	6.1-7.3	Low-----	0.32	1	2-4
	8-13	0.2-0.6	0.14-0.18	6.1-7.3	Low-----	0.32		
	13	---	---	---	-----	---		
Meland-----	0-21	0.6-2.0	0.19-0.21	6.1-6.5	Low-----	0.37	3	4-6
	21-32	0.2-0.6	0.18-0.20	5.6-6.5	Moderate-----	0.37		
	32	---	---	---	-----	---		
93*: Rock outcrop								
94*: Rock outcrop.								
Bluesprin-----	0-12	0.6-2.0	0.12-0.14	6.1-7.3	Low-----	0.28	2	4-6
	12-31	0.2-0.6	0.12-0.16	6.1-7.3	Moderate-----	0.28		
	31	---	---	---	-----	---		
95*: Rock outcrop.								
Brower-----	0-9	0.6-2.0	0.08-0.10	6.6-7.3	Low-----	0.28	5	2-4
	9-60	0.6-2.0	0.08-0.10	6.1-8.4	Low-----	0.28		
96*: Rock outcrop.								
Klickson-----	0-6	0.6-2.0	0.12-0.14	6.1-6.5	Low-----	0.32	5	2-4
	6-51	0.6-2.0	0.12-0.14	6.1-6.5	Low-----	0.32		
	51-60	0.2-0.6	0.12-0.14	6.1-6.5	Moderate-----	0.32		
97*: Rock outcrop.								

See footnote at end of table.

TABLE 20.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
						K	T	
	In	In/hr	In/in	pH				Pct
97*: Nazaton-----	0-20 20-68	0.6-2.0 2.0-6.0	0.15-0.18 0.07-0.09	5.6-6.5 6.1-7.3	Low----- Low-----	0.32 0.28	5	2-4
98*: Rock outcrop.								
Suttler-----	0-10 10-39 39-60	0.6-2.0 0.6-2.0 0.6-2.0	0.15-0.18 0.09-0.14 0.08-0.11	5.6-7.3 5.6-7.3 5.6-7.3	Low----- Low----- Low-----	0.32 0.28 0.32	5	2-4
99*: Rock outcrop.								
Tannahill-----	0-10 10-52 52	0.6-2.0 0.2-0.6 ---	0.12-0.14 0.06-0.08 ---	6.6-7.8 7.4-9.0 ---	Low----- Low----- ---	0.28 0.24 ---	4	2-4
100, 101, 102---- Shebang	0-10 10-65	0.6-2.0 0.06-0.2	0.19-0.21 0.14-0.17	5.6-7.3 7.4-9.0	Moderate----- High-----	0.43 0.15	5	4-6
103----- Spokel	0-10 10-64	0.6-2.0 2.0-6.0	0.05-0.08 0.08-0.10	5.6-7.3 6.6-7.3	Low----- Low-----	0.17 0.28	5	2-4
104*: Spokel-----	0-10 10-64	0.6-2.0 2.0-6.0	0.08-0.10 0.08-0.10	5.6-7.3 6.6-7.3	Low----- Low-----	0.28 0.28	5	2-4
Brower-----	0-9 9-60	0.6-2.0 0.6-2.0	0.08-0.10 0.08-0.10	6.6-7.3 6.1-8.4	Low----- Low-----	0.28 0.28	5	2-4
105*: Spokel-----	0-10 10-64	0.6-2.0 2.0-6.0	0.08-0.10 0.08-0.10	5.6-7.3 6.6-7.3	Low----- Low-----	0.28 0.28	5	2-4
Nazaton-----	0-20 20-68	0.6-2.0 2.0-6.0	0.15-0.18 0.07-0.09	5.6-6.5 6.1-7.3	Low----- Low-----	0.32 0.28	5	2-4
106*: Spokel-----	0-10 10-64	0.6-2.0 2.0-6.0	0.08-0.10 0.08-0.10	5.6-7.3 6.6-7.3	Low----- Low-----	0.28 0.28	5	2-4
Suttler-----	0-10 10-39 39-60	0.6-2.0 0.6-2.0 0.6-2.0	0.15-0.18 0.09-0.14 0.08-0.11	5.6-7.3 5.6-7.3 5.6-7.3	Low----- Low----- Low-----	0.32 0.28 0.32	5	2-4
107, 108, 109---- Suloaf	0-17 17-41 41-54 54	0.6-2.0 0.6-2.0 2.0-6.0 ---	0.19-0.21 0.10-0.13 0.10-0.13 ---	5.6-7.3 6.1-6.5 6.1-6.5 ---	Low----- Moderate----- Low----- ---	0.32 0.32 0.32 ---	3	2-4
110----- Suloaf	0-17 17-41 41-54 54	0.6-2.0 0.6-2.0 2.0-6.0 ---	0.10-0.13 0.10-0.13 0.10-0.13 ---	5.6-7.3 6.1-6.5 6.1-6.5 ---	Low----- Moderate----- Low----- ---	0.32 0.32 0.32 ---	3	2-4
111*: Suloaf-----	0-17 17-41 41-54 54	0.6-2.0 0.6-2.0 2.0-6.0 ---	0.19-0.21 0.10-0.13 0.10-0.13 ---	5.6-6.5 6.1-6.5 6.1-6.5 ---	Low----- Moderate----- Low----- ---	0.32 0.32 0.32 ---	3	2-4
Meland-----	0-21 21-32 32	0.6-2.0 0.2-0.6 ---	0.19-0.21 0.18-0.20 ---	6.1-6.5 5.6-6.5 ---	Low----- Moderate----- ---	0.37 0.37 ---	3	4-6

See footnote at end of table.



TABLE 20.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
						K	T	
	In	In/hr	In/in	pH				Pct
112----- Tannahill	0-10 10-52 52	0.6-2.0 0.2-0.6 ---	0.16-0.18 0.06-0.08 ---	6.6-7.8 7.4-9.0 ---	Low----- Low----- ---	0.28 0.24 ---	4	2-4
113*: Tannahill-----	0-10 10-52 52	0.6-2.0 0.2-0.6 ---	0.12-0.14 0.06-0.08 ---	6.6-7.8 7.4-9.0 ---	Low----- Low----- ---	0.28 0.24 ---	4	2-4
Lickskillet-----	0-10 10-17 17	0.6-2.0 0.6-2.0 ---	0.13-0.15 0.13-0.15 ---	6.6-7.8 6.6-7.8 ---	Low----- Low----- ---	0.24 0.20 ---	1	1-2
114*: Tannahill-----	0-10 10-52 52	0.6-2.0 0.2-0.6 ---	0.12-0.14 0.06-0.08 ---	6.6-7.8 7.4-9.0 ---	Low----- Low----- ---	0.28 0.24 ---	4	2-4
Rock outcrop.								
115, 116, 117---- Telcher	0-20 20-44 44-60	0.6-2.0 0.2-0.6 0.2-0.6	0.17-0.21 0.19-0.21 0.14-0.16	6.1-7.3 5.6-6.5 5.6-6.5	Low----- Moderate----- Moderate-----	0.43 0.37 0.37	5	2-4
118*: Telcher-----	0-20 20-44 44-60	0.6-2.0 0.2-0.6 0.2-0.6	0.17-0.21 0.19-0.21 0.14-0.16	6.1-7.3 5.6-6.5 5.6-6.5	Low----- Moderate----- Moderate-----	0.43 0.37 0.37	5	2-4
Suloaf-----	0-17 17-41 41-54 54	0.6-2.0 0.6-2.0 2.0-6.0 ---	0.19-0.21 0.10-0.13 0.10-0.13 ---	5.6-7.3 6.1-6.5 6.1-6.5 ---	Low----- Moderate----- Low----- ---	0.32 0.32 0.32 ---	3	2-4
119*. Typic Xerofluvents.								
120, 121, 122, 123, 124----- Uhlorn	0-18 18-42 42-60	0.6-2.0 0.2-0.6 0.2-0.6	0.19-0.21 0.19-0.21 0.19-0.21	6.1-7.3 6.1-7.3 6.1-7.3	Low----- Low----- Moderate-----	0.37 0.15 0.15	5	4-9
125, 126, 127---- Uptmor	0-4 4-25 25-46 46-61	0.6-2.0 0.06-0.2 0.06-0.2 0.06-0.2	0.18-0.21 0.16-0.18 0.14-0.16 0.12-0.14	5.6-6.5 5.6-6.5 6.6-7.3 6.6-7.3	Low----- High----- High----- High-----	0.43 0.28 0.28 0.24	3	2-4
128----- Wapshilla	0-14 14-22 22-60	0.6-2.0 0.6-2.0 0.6-2.0	0.17-0.19 0.10-0.14 0.06-0.08	5.6-6.5 5.6-7.3 5.6-7.3	Low----- Low----- Low-----	0.37 0.17 ---	3	2-4
129----- Westlake	0-48 48-60	0.6-2.0 0.2-0.6	0.19-0.21 0.19-0.21	6.1-7.3 6.6-7.3	Low----- Moderate-----	0.37 0.32	5	4-7
130----- Wilkins	0-27 27-60	0.6-2.0 0.06-0.2	0.19-0.21 0.15-0.17	5.6-6.5 6.1-8.4	Low----- High-----	0.32 0.28	5	4-6
131----- Zaza	0-3 3-12 12	0.6-2.0 0.6-2.0 ---	0.18-0.20 0.06-0.08 ---	5.6-6.5 5.6-6.5 ---	Low----- Low----- ---	0.32 0.17 ---	1	2-4

\* See map unit description for the composition and behavior of the map unit.

TABLE 21.--SOIL AND WATER FEATURES

[The definitions of "flooding" and "water table" in the Glossary explain terms such as "rare," "brief," "apparent," and "perched."  
The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern]

Soil name and map symbol	Hydro- logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					<u>Ft</u>			<u>In</u>				
1, 2, 3----- Banner	C	None-----	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
4*: Bluesprin-----	B	None-----	---	---	>6.0	---	---	20-40	Hard	Moderate	Moderate	Low.
Keuterville-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
5*: Bluesprin-----	B	None-----	---	---	>6.0	---	---	20-40	Hard	Moderate	Moderate	Low.
Klickson-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
6*: Bluesprin-----	B	None-----	---	---	>6.0	---	---	20-40	Hard	Moderate	Moderate	Low.
Lawyer-----	C	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
7*: Bluesprin-----	B	None-----	---	---	>6.0	---	---	20-40	Hard	Moderate	Moderate	Low.
Rock outcrop.												
8, 9----- Boles	C	None-----	---	---	1.5-2.5	Perched	Jan-Mar	>60	---	Moderate	High-----	Low.
10----- Brody	B	None-----	---	---	>6.0	---	---	20-40	Rippable	Moderate	Low-----	Low.
11*: Brody-----	B	None-----	---	---	>6.0	---	---	20-40	Rippable	Moderate	Low-----	Low.
Telcher-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
12*: Brody-----	B	None-----	---	---	>6.0	---	---	20-40	Rippable	Moderate	Low-----	Low.
Wapshilla-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
13----- Brower	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.

See footnote at end of table.

TABLE 21.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth Ft	Kind	Months	Depth In	Hardness		Uncoated steel	Concrete
14*: Brower-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
Brownlee-----	B	None-----	---	---	>6.0	---	---	40-60	Rippable	Moderate	High-----	Moderate.
15*: Brower-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
Rock outcrop.												
16, 17, 18, 19---- Brownlee	B	None-----	---	---	>6.0	---	---	40-60	Rippable	Moderate	High-----	Moderate.
20, 21, 22, 23---- Chard	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
24, 25----- Chard Variant	B	None-----	---	---	>6.0	---	---	>60	---	Low-----	High-----	Low.
26, 27, 28, 29---- Chicane	C	None-----	---	---	2.0-3.0	Perched	Jan-Mar	>60	---	Moderate	High-----	Low.
30, 31----- De Masters	B	None-----	---	---	>6.0	---	---	40-60	Rippable	Moderate	Low-----	Low.
32*: De Masters-----	B	None-----	---	---	>6.0	---	---	40-60	Rippable	Moderate	Low-----	Low.
Riggins-----	C	None-----	---	---	>6.0	---	---	10-20	Hard	Moderate	Moderate	Low.
33*: De Masters-----	B	None-----	---	---	>6.0	---	---	40-60	Rippable	Moderate	Low-----	Low.
Suloaf-----	B	None-----	---	---	>6.0	---	---	40-60	Hard	Moderate	Moderate	Moderate.
34, 35----- Ericson	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
36*: Ericson-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
Rock outcrop.												
37, 38, 39----- Fenn	D	None-----	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
40----- Fenn Variant	D	None-----	---	---	1.5-2.5	Apparent	Jan-Mar	>60	---	Moderate	High-----	Low.

See footnote at end of table.



TABLE 21.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth Ft	Kind	Months	Depth In	Hardness		Uncoated steel	Concrete
41, 42, 43----- Ferdinand	C	None-----	---	---	>6.0	---	---	20-40	Rippable	Moderate	High-----	Low.
44*: Ferdinand-----	C	None-----	---	---	>6.0	---	---	20-40	Rippable	Moderate	High-----	Low.
Bluesprin-----	B	None-----	---	---	>6.0	---	---	20-40	Hard	Moderate	Moderate	Low.
45*: Ferdinand-----	C	None-----	---	---	>6.0	---	---	20-40	Rippable	Moderate	High-----	Low.
Flybow-----	D	None-----	---	---	>6.0	---	---	4-10	Hard	Low-----	Moderate	Moderate.
45*: Riggins-----	C	None-----	---	---	>6.0	---	---	10-20	Hard	Moderate	Moderate	Low.
46*: Ferdinand-----	C	None-----	---	---	>6.0	---	---	20-40	Rippable	Moderate	High-----	Low.
Riggins-----	C	None-----	---	---	>6.0	---	---	10-20	Hard	Moderate	Moderate	Low.
47, 48, 49, 50---- Jacket	C	None-----	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
51, 52, 53----- Jacket Variant	B	None-----	---	---	>6.0	---	---	>60	---	High-----	Low-----	Low.
54, 55----- Johnson	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Low-----	Moderate.
56, 57----- Jughandle	B	None-----	---	---	>6.0	---	---	40-60	Rippable	Moderate	Moderate	Moderate.
58*: Jughandle-----	B	None-----	---	---	>6.0	---	---	40-60	Rippable	Moderate	Moderate	Moderate.
Ericson-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
59*: Jughandle-----	B	None-----	---	---	>6.0	---	---	40-60	Rippable	Moderate	Moderate	Moderate.
Suttler-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Low-----	Moderate.
60----- Jughandle Variant	D	Frequent----	Very brief	Dec-Feb	0.5-1.5	Apparent	Feb-Jun	>60	---	High-----	Moderate	Moderate.
61, 62----- Keuterville	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.

See footnote at end of table.

TABLE 21.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth Ft	Kind	Months	Depth In	Hardness		Uncoated steel	Concrete
63*, 64*: Keuterville-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
Bluesprin-----	B	None-----	---	---	>6.0	---	---	20-40	Hard	Moderate	Moderate	Low.
65*: Keuterville-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
Klickson-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
66*: Klickson-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
Rock outcrop.												
67*: Klickson-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
Suloaf-----	B	None-----	---	---	>6.0	---	---	40-60	Hard	Moderate	Moderate	Moderate.
68*: Klickson-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
Bluesprin-----	B	None-----	---	---	>6.0	---	---	20-40	Hard	Moderate	Moderate	Low.
69*: Klickson-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
Wapshilla-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
70, 71, 72----- Kooskia	C	None-----	---	---	2.0-3.0	Perched	Jan-Mar	>60	---	Moderate	High-----	Moderate.
73*: Lawyer-----	C	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
Rock outcrop.												
74*: Lawyer-----	C	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
Bluesprin-----	B	None-----	---	---	>6.0	---	---	20-40	Hard	Moderate	Moderate	Low.
75*: Lawyer-----	C	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
Tannahill-----	B	None-----	---	---	>6.0	---	---	40-60	Rippable	Moderate	High-----	Low.

See footnote at end of table.

TABLE 21.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth <u>Ft</u>	Kind	Months	Depth <u>In</u>	Hardness		Uncoated steel	Concrete
76*: Lickskillet-----	C	None-----	---	---	>6.0	---	---	10-20	Hard	Moderate	Moderate	Low.
Tannahill-----	B	None-----	---	---	>6.0	---	---	40-60	Rippable	Moderate	High-----	Low.
77, 78, 79----- Meland	C	None-----	---	---	>6.0	---	---	20-40	Hard	Moderate	Moderate	Moderate.
80----- Naz	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Low-----	Moderate.
81*: Nazaton-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
Naz-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Low-----	Moderate.
82*: Nazaton-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
Suttler-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Low-----	Moderate.
83, 84, 85----- Nez Perce	C	None-----	---	---	1.5-2.5	Perched	Feb-Mar	>60	---	Moderate	High-----	Low.
86----- Nicodemus	B	Rare-----	Brief-----	Jan-May	2.0-4.0	Apparent	Apr-Jun	>60	---	Moderate	Moderate	Moderate.
87, 88----- Nicodemus Variant	B	Rare-----	Brief-----	Jan-May	3.0-5.0	Apparent	Apr-Jun	>60	---	Moderate	Moderate	Moderate.
89, 90----- Oland	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
91----- Oland Variant	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
92*: Riggins-----	C	None-----	---	---	>6.0	---	---	10-20	Hard	Moderate	Moderate	Low.
Meland-----	C	None-----	---	---	>6.0	---	---	20-40	Hard	Moderate	Moderate	Moderate.
93*. Rock outcrop												
94*: Rock outcrop.												
Bluesprin-----	B	None-----	---	---	>6.0	---	---	20-40	Hard	Moderate	Moderate	Low.

See footnote at end of table.



TABLE 21.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth Ft	Kind	Months	Depth In	Hardness		Uncoated steel	Concrete
95*: Rock outcrop.												
Brower-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
96*: Rock outcrop.												
Klickson-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
97*: Rock outcrop.												
Nazaton-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
98*: Rock outcrop.												
Suttler-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Low-----	Moderate.
99*: Rock outcrop.												
Tannahill-----	B	None-----	---	---	>6.0	---	---	40-60	Rippable	Moderate	High-----	Low.
100, 101, 102----- Shebang	C	None-----	---	---	1.0-2.0	Perched	Feb-Mar	>60	---	Moderate	High-----	Low.
103----- Spokel	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
104*: Spokel-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
Brower-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
105*: Spokel-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
Nazaton-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
106*: Spokel-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
Suttler-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Low-----	Moderate.

See footnote at end of table.

TABLE 21.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					<u>Ft</u>			<u>In</u>				
107, 108, 109, 110----- Suloaf	B	None-----	---	---	>6.0	---	---	40-60	Hard	Moderate	Moderate	Moderate.
111*: Suloaf-----	B	None-----	---	---	>6.0	---	---	40-60	Hard	Moderate	Moderate	Moderate.
Meland-----	C	None-----	---	---	>6.0	---	---	20-40	Hard	Moderate	Moderate	Moderate.
112----- Tannahill	B	None-----	---	---	>6.0	---	---	40-60	Rippable	Moderate	High-----	Low.
113*: Tannahill-----	B	None-----	---	---	>6.0	---	---	40-60	Rippable	Moderate	High-----	Low.
Licksillet-----	C	None-----	---	---	>6.0	---	---	10-20	Hard	Moderate	Moderate	Low.
114*: Tannahill----- Rock outcrop.	B	None-----	---	---	>6.0	---	---	40-60	Rippable	Moderate	High-----	Low.
115, 116, 117----- Telcher	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
118*: Telcher-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
Suloaf-----	B	None-----	---	---	>6.0	---	---	40-60	Hard	Moderate	Moderate	Moderate.
119*. Typic Xerofluvents.												
120, 121, 122, 123, 124----- Uhlorn	C	None-----	---	---	>6.0	---	---	>60	---	High-----	High-----	Low.
125, 126, 127----- Uptmor	C	None-----	---	---	>6.0	---	---	>60	---	High-----	High-----	Moderate.
128----- Wapshilla	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
129----- Westlake	C	Frequent----	Very brief	Dec-Feb	0.5-1.5	Apparent	Feb-Jun	>60	---	High-----	High-----	Low.

See footnote at end of table.

TABLE 21.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro- logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth <u>Ft</u>	Kind	Months	Depth <u>In</u>	Hardness		Uncoated steel	Concrete
130----- Wilkins	D	Rare-----	Very brief	Dec-Feb	1.0-3.0	Perched	Mar-Jun	>60	---	Moderate	High-----	Moderate.
131----- Zaza	D	None-----	---	---	>6.0	---	---	10-20	Hard	Moderate	Moderate	Moderate.

\* See map unit description for the composition and behavior of the map unit.



TABLE 22.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Banner-----	Fine, montmorillonitic, mesic Calcic Argixerolls
Bluesprin-----	Loamy-skeletal, mixed, mesic Ultic Argixerolls
Boles-----	Fine, montmorillonitic, frigid Xeric Argialbolls
Brody-----	Loamy-skeletal, mixed Andic Cryochrepts
Brower-----	Loamy-skeletal, mixed, mesic Entic Haploxerolls
Brownlee-----	Fine-loamy, mixed, mesic Ultic Argixerolls
Chard-----	Coarse-loamy, mixed, mesic Calcic Haploxerolls
Chard Variant-----	Sandy, mixed, mesic Calcic Haploxerolls
Chicane-----	Fine, montmorillonitic, mesic Xeric Argialbolls
De Masters-----	Fine-loamy, mixed, frigid Pachic Ultic Argixerolls
Ericson-----	Fine-loamy, mixed Typic Cryoboralfs
Fenn-----	Fine, montmorillonitic, mesic Chromic Pelloxererts
Fenn Variant-----	Fine, montmorillonitic, mesic Typic Pelluderts
Ferdinand-----	Clayey-skeletal, montmorillonitic, mesic Calcic Argixerolls
Flybow-----	Loamy-skeletal, mixed, nonacid, mesic Lithic Xerorthents
Jacket-----	Fine, montmorillonitic, mesic Pachic Ultic Argixerolls
Jacket Variant-----	Fine-silty, mixed, mesic Pachic Ultic Haploxerolls
Johnson-----	Fine-loamy, mixed, frigid Ultic Argixerolls
Jughandle-----	Coarse-loamy, mixed Typic Cryochrepts
Jughandle Variant-----	Coarse-loamy, mixed, nonacid Humic Cryaquepts
Keuterville-----	Loamy-skeletal, mixed, mesic Ultic Argixerolls
Klickson-----	Loamy-skeletal, mixed, frigid Ultic Argixerolls
Kooskia-----	Fine, montmorillonitic, mesic Xeric Argialbolls
Lawyer-----	Loamy-skeletal, mixed, mesic Pachic Ultic Argixerolls
Licksillet-----	Loamy-skeletal, mixed, mesic Lithic Haploxerolls
Meland-----	Fine-loamy, mixed, mesic Ultic Argixerolls
Naz-----	Coarse-loamy, mixed Pachic Cryoborolls
Nazaton-----	Loamy-skeletal, mixed Pachic Cryoborolls
Nez Perce-----	Fine, montmorillonitic, mesic Xeric Argialbolls
Nicodemus-----	Loamy-skeletal, mixed, mesic Cumulic Ultic Haploxerolls
Nicodemus Variant-----	Coarse-loamy, mixed mesic Cumulic Ultic Haploxerolls
Oland-----	Loamy-skeletal, mixed, mesic Pachic Ultic Haploxerolls
Oland Variant-----	Coarse-loamy, mixed, mesic Pachic Ultic Haploxerolls
Riggins-----	Loamy-skeletal, mixed, mesic Lithic Ultic Argixerolls
Shebang-----	Fine, montmorillonitic, mesic Xeric Argialbolls
Spokel-----	Loamy-skeletal, mixed, mesic Ultic Haploxerolls
Suloaf-----	Fine-loamy, mixed, frigid Ultic Argixerolls
Suttler-----	Coarse-loamy, mixed Typic Cryumbrepts
Tannahill-----	Loamy-skeletal, mixed, mesic Calcic Argixerolls
Telcher-----	Fine-loamy, mixed Mollic Cryoboralfs
Uhlorn-----	Fine-silty, mixed, mesic Ultic Argixerolls
Uptmor-----	Fine, montmorillonitic, frigid Ultic Argixerolls
Wapshilla-----	Loamy-skeletal, mixed Mollic Cryoboralfs
Westlake-----	Fine-silty, mixed, frigid Cumulic Ultic Haploxerolls
Wilkins-----	Fine, montmorillonitic, frigid Xeric Argialbolls
Zaza-----	Loamy-skeletal, mixed, frigid Lithic Eutrochrepts

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