soil survey of

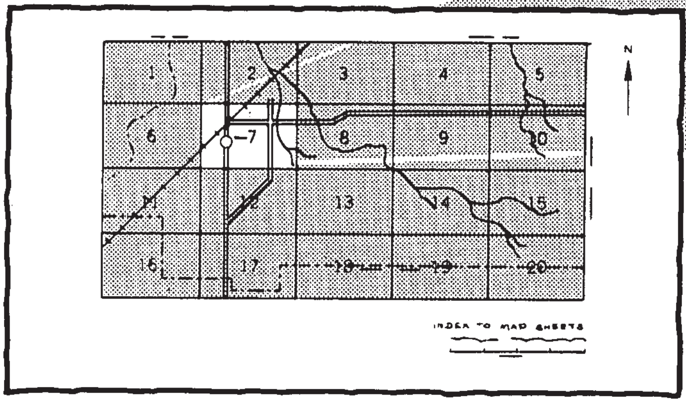
Valley Area, Idaho

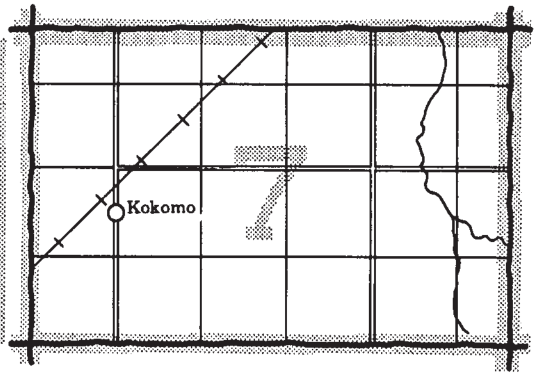
Parts of Adams and Valley Counties

United States Department of Agriculture
Soil Conservation Service
in cooperation with
University of Idaho College of Agriculture
Idaho Soil Conservation Commission

HOW TO USE

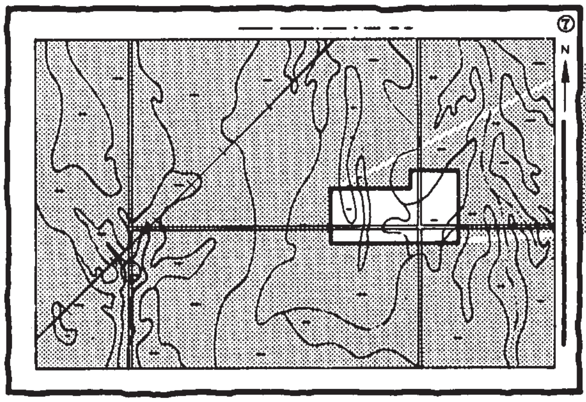
1. Locate your area of interest on the "Index to Map Sheets" (the last page of this publication).

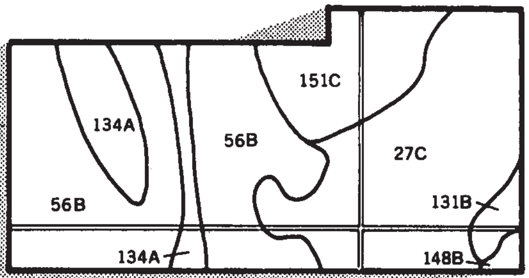




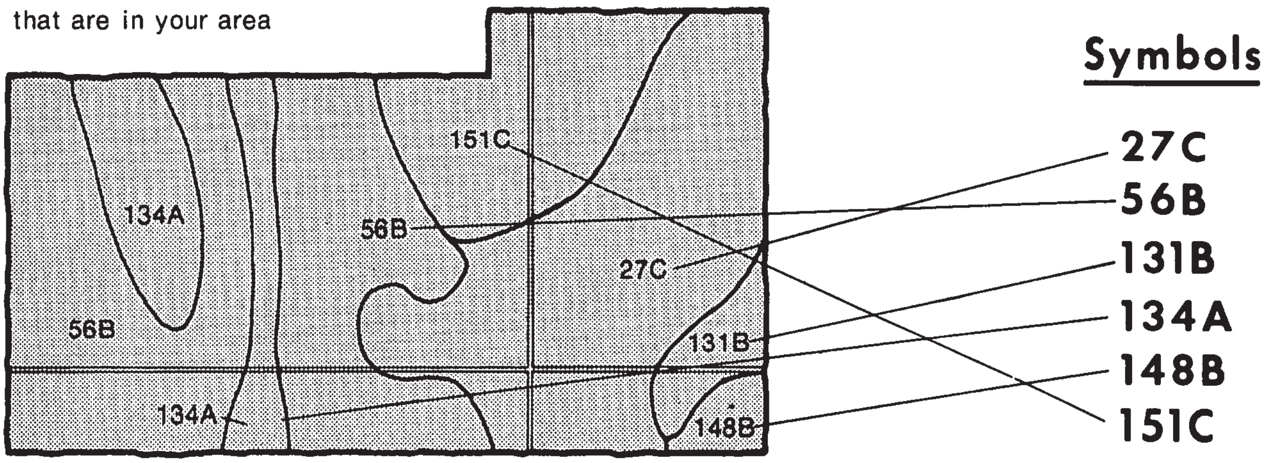
2. Note the number of the map sheet and turn to that sheet.

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



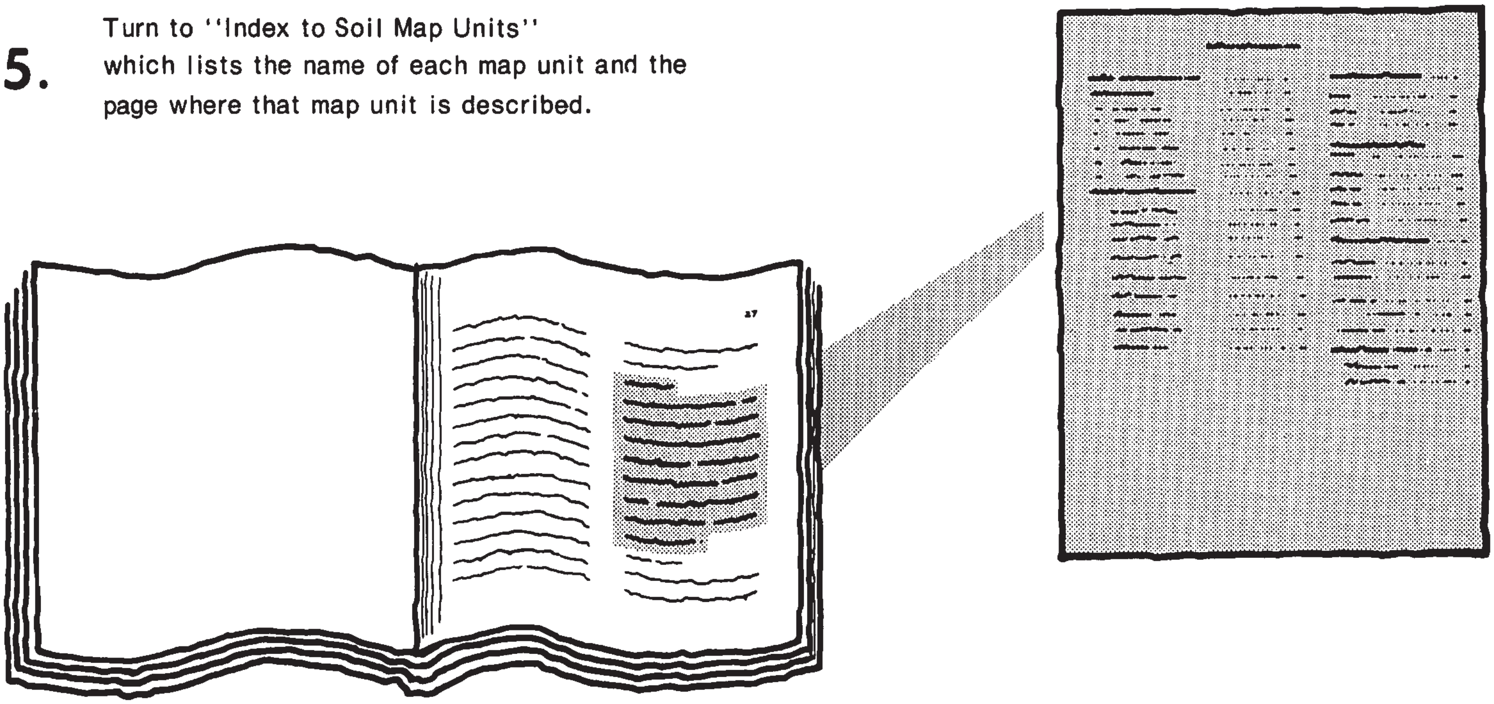


4. List the map unit symbols that are in your area

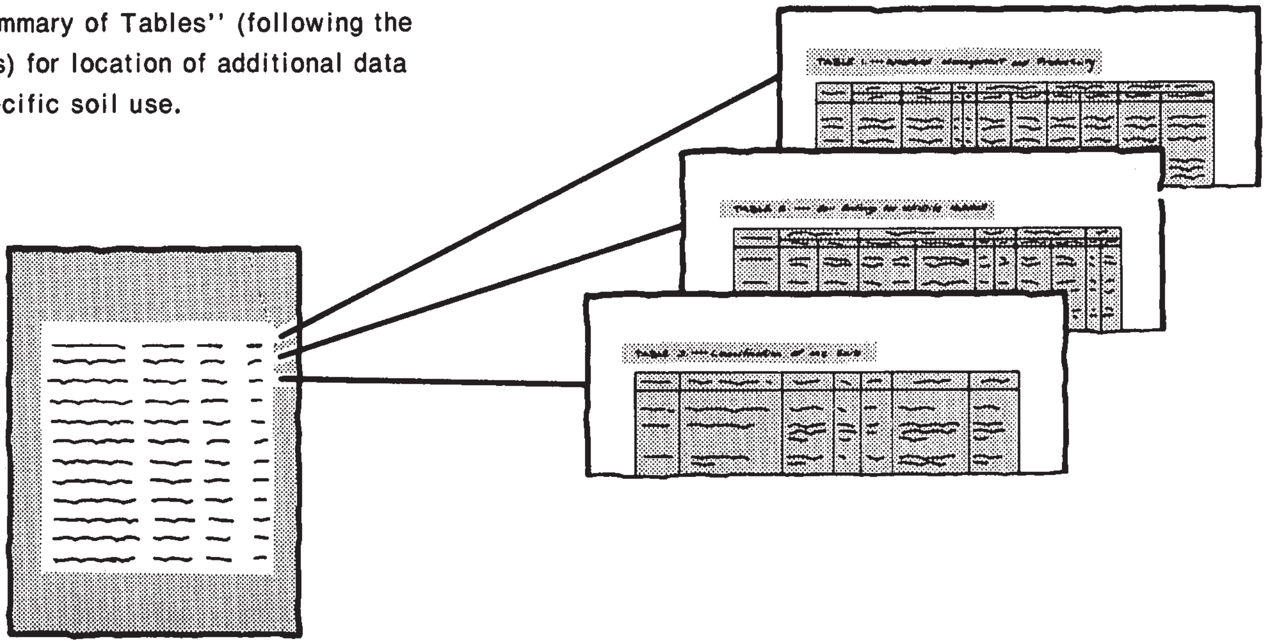


THIS SOIL SURVEY

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.



6. See "Summary of Tables" (following the Contents) for location of additional data on a 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 is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and agencies of the states, usually the Agricultural Experiment Stations. In some surveys, other federal and local agencies also contribute. 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 1958 to 1976. Soil names and descriptions were approved in 1977. Unless otherwise indicated, statements in the publication refer to conditions in the survey area in 1976. This survey was made cooperatively by the Soil Conservation Service and the University of Idaho College of Agriculture and the Idaho Soil Conservation Commission. It is part of the technical assistance furnished to the Valley Soil Conservation District.

Soil maps in this survey may be copied without permission, but any enlargement of these maps could cause misunderstanding of the detail of mapping and result in erroneous interpretations. Enlarged maps do not show small areas of contrasting soils that could have been shown at a larger mapping scale.

Cover: Long Valley in winter. The timbered area in the foreground is in the Shellrock-Jugson map unit, and the valley floor is in the Archabal-Gestrin map unit. The timbered, mountainous area in the left background is in the Bryan-Pyle-Quartzburg map unit, and the lower mountains in the right background are in the Demast-Tica-Bluebell map unit.

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Issued July 1981

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Summary of tables

Foreword

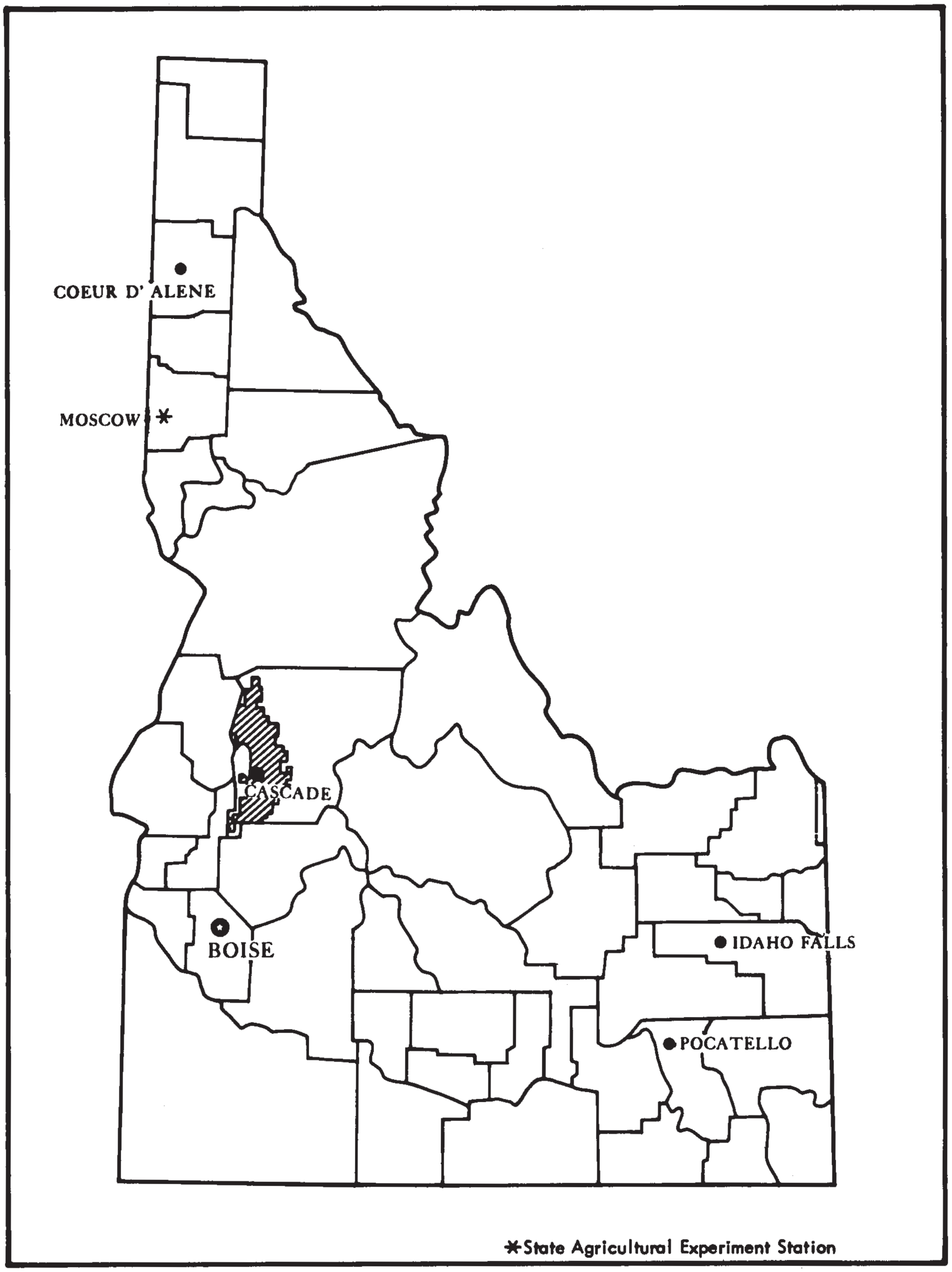
This soil survey contains much information useful in land-planning programs in the survey area. Of prime importance are the predictions of soil behavior for selected land uses. Also highlighted are limitations or hazards to land uses that are inherent in the soil, improvements needed to overcome these limitations, and the impact that selected land uses will have on the environment.

This soil survey has been prepared for many different users. Farmers, ranchers, foresters, and agronomists can use it to determine the potential of the soil and the management practices required for food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use it to plan land use, select sites for construction, develop soil resources, or identify any special practices that may be needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the soil survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur even within short distances. Soils may be seasonally wet or subject to flooding. They may be shallow to bedrock. They may be too unstable to be used as a foundation for buildings or roads. Very 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 kind of soil is shown on detailed soil maps. Each kind of soil in the survey area is described, and much information is given about each soil for specific uses. Additional information or assistance in using this publication can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

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



Location of Valley Area in Idaho.

SOIL SURVEY OF VALLEY AREA, IDAHO

Parts of Adams and Valley Counties

By L.M. Rasmussen

Fieldwork by L.M. Rasmussen, L.E. Laing, G.H. Logan, C.W. Case, G.A. Monroe, T.W. Priest, R.K. Preece, and H.R. Noe, Soil Conservation Service; S.J. Borchard and R.J. Grow, Idaho Soil Conservation Commission

United States Department of Agriculture, Soil Conservation Service, in cooperation with the University of Idaho College of Agriculture, Idaho Soil Conservation Commission

Valley Area, Idaho, is in Adams and Valley Counties in the west-central part of Idaho. The survey area is surrounded by United States National Forest lands, except along the western border. The North Fork of the Payette River flows through the area from north to south and is the source of water for Payette Lake and Cascade Reservoir.

The survey area covers 300,650 acres, or 470 square miles. Most of the area is in Valley County; about 160 acres is in Adams County. The area consists of three high mountain valleys. Grassland and cropland areas are on the valley floors, and timbered areas are on the surrounding mountains.

Long Valley is the largest of the three valleys. It is about 5 to 7 miles wide and 36 miles long and extends from the town of McCall to about 6 miles south of Cascade. Round Valley and High Valley are about 3 miles wide. Round Valley is immediately south of Long Valley, and High Valley is in the extreme southern part of the survey area.

The elevation ranges from about 4,400 feet in the southern part of the survey area along the North Fork of the Payette River to about 7,200 feet near Boulder Mountain, which is east of McCall.

General nature of the area

Valley County was established in 1917. Cascade is the county seat.

McCall, the largest village in the survey area, is at the southern end of Payette Lake. In 1970, according to the census of that year, the population of McCall was 1,758. McCall provides summer and winter attractions for vacationers: water sports on Payette Lake, vacation-home sites, and two ski areas.

Cascade, which is the second largest village, is near the southern end of Lake Cascade. In 1970, it had a population of 833.

Donnelly, which has a population of 114, and Lake Fork, which has a population of 10, are between McCall and Cascade in the heart of the farming area.

Before 1940, the farms in the survey area were family operated. In recent years, the rural population has decreased, and the size of farms has increased considerably. Some farms are now operated by absentee owners.

There are two school districts in the survey area. Cascade and McCall each have a hospital, a library, beaches, public parks, and translator stations for the relay of television broadcasts. McCall has a weekly newspaper and a radio station.

There are about 229 farms in the survey area. Of these, 61 percent are resident owned, and 39 percent are non-resident owned. Farming operations are mainly raising livestock, but hay, grain, potatoes, clover seed, and grass seed are grown on some farms. At least half the farms have tracts of timber.

Climate

In summer, the valleys in the survey area are warm or hot. The mountains are much cooler. In winter, the mountains are cold, and the valleys are colder than the lower part of adjacent mountain slopes because of cold air drainage. The mountains get precipitation throughout the year, and a deep snowpack accumulates in winter. Snowmelt in spring usually supplies more water than is needed for agriculture in the survey area. In the valleys, precipitation in summer falls as showers, and there are thunderstorms. In winter, the valley floor is covered with snow for long periods. Chinook winds, which are warm and dry, blow downslope and commonly melt the snow.

Table 1 gives data on temperature and precipitation for the survey area, as recorded at Cascade, Idaho, in the period 1951 to 1973. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 23 degrees F, and the average daily minimum temperature is 15 degrees. The lowest temperature on record, which occurred at Cascade on January 22, 1962, is -36 degrees. In summer the average temperature is 61 degrees, and the average daily maximum temperature is 78 degrees. The highest recorded temperature, which occurred on July 20, 1960, is 100 degrees.

Growing degree days, shown in table 1, are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (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, 7 inches, or 32 percent, usually falls in April through September, which includes the growing season for most crops. In 2 years out of 10, the rainfall in April through September is less than 6 inches. The heaviest 1-day rainfall during the period of record was 2.73 inches at Cascade on December 22, 1964. There are about 15 thunderstorms each year, 8 of which occur in summer.

Average seasonal snowfall is 103 inches. The greatest snow depth at any one time during the period of record was 47 inches. On the average, 59 days 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 40 percent. Humidity is higher at night, and the average at dawn is about 65 percent. The percentage of possible sunshine is 85 in summer and 45 in winter. The prevailing wind is from the southeast. Average windspeed is highest, 10 miles per hour, in March.

Transportation

Rail transportation in the Valley Area is provided by a branch of the Union Pacific Railroad. This branch terminates at McCall.

State Highway 55, which is a major route between southern and northern Idaho, is the only highway in the survey area. It passes through all the towns in the area. The only other paved roads are a farm-to-market road, which is east of Highway 55 between Donnelly and McCall, a road between Cascade and Warm Lake, and part of the roads around Payette Lake and Cascade Lake.

Daily bus service is available to northern and southern Idaho. Several truck lines transport goods into the Valley Area, mainly from Boise.

Lighted airports that are used mainly by private planes are at Cascade and McCall. The only commercial air service is a charter service out of the McCall airport. A small airstrip is located at Donnelly.

Water supply

An abundant water supply is available for urban and rural use. Payette Lake is the source of water for McCall, and Lake Cascade is the source for Cascade. Donnelly draws its water from a deep well.

Irrigation water is supplied by the many reservoirs and streams in the area. Payette Lake and Little Payette Lake have dams across their outlet and can store water in excess of their natural capacity. Cascade Lake stores water for use by several irrigation companies in Gem and Payette Counties, Idaho, downstream along the Payette River.

Horsethief Reservoir was constructed by the Idaho Fish and Game Department for fishing and recreation uses.

Vegetation

The vegetation on the valley floors consists of introduced grasses and legumes that are used for hay and grazing and lodgepole pine and native vegetation in interspersed areas. In irrigated areas, the introduced plants include bromes, timothy, tall fescue, clovers, and alfalfa. The native plants in nonirrigated areas of well drained soils include bluebunch wheatgrass, Idaho fescue, lupine, elk sedge, arrowleaf balsamroot, and mountain big sagebrush. Sedges, rushes, and willows make up the vegetation on the wetter soils.

The vegetation in the mountainous areas is mainly trees. Ponderosa pine and Douglas-fir grow on the south-facing slopes, and pine reedgrass, ninebark, snowbrush ceanothus, and elk sedge make up the understory. Grand fir, Douglas-fir, and some ponderosa pine, western larch, spruce, and subalpine fir grow on the north-facing slopes. The understory on north-facing slopes varies with the density of the canopy. It includes pine reedgrass, little princes pine, western thimbleberry, heartleaf arnica, pachystima, common beargrass, elk sedge, Woods rose, and snowberry.

How this survey was made

Soil scientists made this survey to learn what kinds of soil are in the survey area, where they are, and how they can be used. The soil scientists went into the area knowing they likely would locate many soils they already knew something about and perhaps identify some they had never seen before. 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; the kinds of rock; and many facts about the soils. They dug many holes to expose 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 the action of plant roots.

The soil scientists recorded the characteristics of the profiles they studied, and they compared those profiles with others in counties nearby and in places more distant. Thus, through correlation, they classified and named the soils according to nationwide, uniform procedures.

After classifying and naming the soils, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, roads, and other details that help in drawing boundaries accurately. The soil map at the back of this publication was prepared from aerial photographs.

The areas shown on a soil map are called map units. Some map units are made up of one kind of soil, others are made up of two or more kinds of soil, and a few have little or no soil material at all. Map units 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 soils are taken for laboratory measurements and for engineering tests. The soils are field tested, and interpretations of their characteristics may be modified during the course of the survey. New interpretations are added to meet local needs, mainly through field observation of different kinds of soil in different uses under different levels of management. Also, 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 practices 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 is usable to 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 map units that have a distinct pattern of soils, relief, and drainage. Each map unit 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 provides a broad perspective of the soils and landscapes in the survey area. It provides a basis for comparing the potential of large areas for general kinds of land use. Areas that are, for the most part, suited to certain kinds of farming or to other land uses can be identified on the map. Likewise, areas of soils having properties that are distinctly unfavorable for certain land uses can be located.

Because of its small scale, the map does not show the kind of soil at a specific site. Thus, it 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 kinds of soil in any one map unit differ from place to place in slope, depth, stoniness, drainage, or other characteristics that affect their management.

The soils in the survey area vary widely in their potential for major land uses. Table 4 shows the extent of the map units shown on the general soil map and gives general ratings of the potential of each, in relation to the other map units, for major land uses. Soil properties that pose limitations to the use are indicated. The ratings of soil potential are based on the assumption that practices in common use in the survey area are being used to overcome soil limitations. These ratings reflect the ease of overcoming the soil limitations and the probability of soil problems persisting after such practices are used.

Each map unit is rated for farming, woodland, grazing land, urban uses, and recreation uses. Woodland is land that produces either native trees or introduced species. Grazing land refers to rangeland and grazable woodland. Urban uses include residential, commercial, and industrial developments. Intensive recreation areas include campsites, picnic areas, ballfields, and other areas that are subject to heavy foot traffic. Extensive recreation areas include those used for nature study and as wilderness.

Map unit descriptions

1. Melton-Jurvannah-Roseberry

Level to very gently sloping, very deep, poorly drained soils that formed in alluvium and glacial outwash

This map unit is mainly on alluvial plains, in drainageways, and on stream bottoms along the North Fork of the Payette River and along Goldfork River. This map unit makes up about 5 percent of the survey area. It consists of about 40 percent Melton loam, 20 percent Jurvannah sandy loam, 15 percent Roseberry sandy loam, and 25 percent minor soils.

Melton soils are loams in drainageways and on bottom lands. They have cobbly, sandy, and gravelly alluvium, or outwash, at a depth of about 32 inches.

Jurvannah soils are sandy loams that are underlain by stratified sand and very gravelly sand. These soils are on gravel bars and low stream terraces.

Roseberry soils are sandy loams on alluvial plains. These soils are underlain by stratified medium and coarse textured alluvium at a depth between 40 and 60 inches.

The minor soils in this map unit are the well drained Duston soils, the somewhat excessively drained Kangas soils, and the poorly drained Blackwell and Blackwell Variant soils. Duston and Kangas soils are on low stream terraces. Blackwell and Blackwell Variant soils are in low areas and in drainageways throughout this map unit.

This unit has poor potential for use as farmland and woodland and for urban uses and intensive recreation uses because of the hazards of flooding and wetness. It has fair potential for use as grazing land. It has good potential for extensive recreation uses. This unit has good to fair potential for the development of wildlife habitat.

2. Roseberry-Donnel

Level to moderately sloping, very deep, poorly drained and well drained soils that formed in alluvium and glacial outwash

This map unit is on alluvial and glacial outwash plains, stream bottoms, and terraces south of Lake Fork, surrounding Donnelly, and north of Horsethief Reservoir. This map unit makes up about 11 percent of the survey area. It consists of about 50 percent Roseberry coarse sandy loam, 40 percent Donnel sandy loam, and 10 percent minor soils.

Roseberry soils are poorly drained, coarse sandy loams that are underlain by stratified coarse sand and fine sandy loam. These soils are on stream bottoms, alluvial plains, and outwash plains.

Donnel soils are well drained sandy loams that are underlain by loamy sand. These soils are on alluvial fans and terraces.

The minor soils in this map unit are the poorly drained Blackwell, Cabarton, and Melton soils and the moderately well drained Gestrin soils. Blackwell, Cabarton, and Melton soils are in drainageways. Gestrin soils are on alluvial fans and terraces.

This unit has poor potential for farming, urban uses, and intensive recreation uses because of wetness. It has good potential for use as grazing land and for extensive recreation uses. It has fair potential for use as woodland; however, most areas have been cleared and are used for other purposes. The well drained soils in this unit have good potential for most uses. This unit has good to fair potential for the development of habitat for most kinds of wildlife.

3. Archabal-Gestrin

Level to strongly sloping, very deep, well drained and moderately well drained soils that formed in alluvium and glacial outwash

This map unit is on alluvial fans and terraces south of McCall, in Round Valley, southeast and east of Cascade, and in places along Cascade Lake. This map unit makes up about 17 percent of the survey area. It consists of about 70 percent Archabal loam, 20 percent Gestrin loam, and 10 percent minor soils.

Archabal soils are well drained loams that are underlain by loose sand and gravel. In the area between McCall and Lake Fork, these soils have a cobbly substratum. Archabal soils are on moderately dissected glacial-outwash or alluvial fans, terraces, and plains.

Gestrin soils are moderately well drained loams that are underlain by stratified sandy loam and loamy sand. In the area between McCall and Lake Fork, these soils have a cobbly substratum. Gestrin soils are on alluvial fans and terraces.

The minor soils in this unit are the poorly drained Blackwell, Cabarton, Melton, and Roseberry soils, the well drained Donnel and Swede soils, and the somewhat excessively drained Kangas soils. Blackwell, Cabarton, and Melton soils are in drainageways. Roseberry soils are on low fans and terraces. Donnel and Kangas soils are on fans and terraces. Swede soils are on old, high terraces.

This unit has good potential for farming, for use as grazing land, and for intensive and extensive recreation uses. It has fair potential for urban uses because the Archabal soils have moderate permeability and a moderate shrink-swell potential. It has good potential for use as woodland, but most areas have been cleared and are used for other purposes. The potential for some uses decreases from good to fair as the slope increases from nearly level to moderately steep. This unit has good to fair potential for the development of habitat for rangeland and openland wildlife.

4. Swede-Donnel-Nisula

Gently sloping to steep, very deep, well drained soils that formed in alluvium and colluvium

This map unit is on terraces, alluvial fans, and colluvial foot slopes along the edge of Long Valley. Some areas of this unit are in High Valley. This map unit makes up about 6 percent of the survey area. It consists of about 40 percent Swede silt loam, 25 percent Donnel sandy loam, 25 percent Nisula loam, and 10 percent minor soils.

Swede soils are silt loams that have a silty clay loam subsoil. These soils are on old alluvial fans and colluvial toe slopes.

Donnel soils are sandy loams that are underlain by loamy sand and sand alluvium. These soils are on alluvial fans and terraces.

Nisula soils are loams that have a clay loam subsoil. They are on alluvial fans and colluvial foot slopes.

The minor soils in this unit are the poorly drained Blackwell, Cabarton, and Roseberry soils, the moderately well drained Gestrin soils, the well drained Archabal and Bluebell soils, and the somewhat excessively drained Shellrock soils. Blackwell and Cabarton soils are in drainageways. Archabal, Gestrin, and Roseberry soils are on alluvial fans and terraces. Bluebell and Shellrock soils formed in residuum on foothills.

This map unit has only fair potential for farming, urban uses, and intensive recreation uses because of the steepness of slopes, the moderately slow permeability, and the moderate shrink-swell potential. It has good potential for use as woodland and grazing land and for extensive recreation uses. The potential for some uses decreases from fair to poor as the slope increases from gently sloping to strongly sloping. This unit has good to fair potential for the development of wildlife habitat.

5. McCall

Gently sloping to steep, very deep, somewhat excessively drained soils that formed in glacial till

This map unit is on glacial moraines and outwash plains. The areas are around the town of McCall and around Little Payette Lake. This map unit makes up about 4 percent of the survey area. It consists of about 75 percent McCall very cobbly sandy loam and 25 percent minor soils.

McCall soils are very cobbly sandy loams that are underlain by very cobbly coarse sand. These soils are on glacial moraines and outwash fans.

The minor soils in this unit are the poorly drained Blackwell, Melton, and Roseberry soils, the well drained Duston and Naz soils, and the somewhat excessively drained Jugson, Kangas, and Shellrock soils. Blackwell and Melton soils are in drainageways. Duston, Kangas, and Roseberry soils are on alluvial fans and terraces. Jugson, Naz, and Shellrock soils formed in residuum on foothills.

This unit has poor potential for farming, urban uses, and intensive recreation uses because of the steepness of slopes and the large stones and boulders on the surface. It has good potential for use as woodland and for extensive recreation uses. It has only fair potential for use as grazing land because the closed tree canopy restricts the growth of understory vegetation. This unit has good potential for the development of habitat for woodland wildlife.

6. McCall-Rock outcrop

Gently sloping to steep, very deep, somewhat excessively drained soils that formed in glacial till; and Rock outcrop

This map unit is on foothills and mountains along the North Fork of the Payette River, surrounding Payette Lake and Upper Payette Lake, and in Lick Creek Canyon. This map unit makes up about 6 percent of the survey area. It is about 20 percent McCall very cobbly sandy loam, 20 percent Rock outcrop, and 60 percent minor soils.

McCall soils are very cobbly sandy loams that are underlain by very cobbly sand and granite bedrock. These soils formed in glacial till material that was deposited in depressions on mountainsides.

Rock outcrop consists of areas of exposed granite. In areas of Rock outcrop, the soil material and vegetation have been removed by glaciation.

The minor soils in this map unit are the poorly drained Melton and Roseberry soils, the well drained Donnel, Naz, and Quartzburg Variant soils, and the somewhat excessively drained Jugson soils. Melton soils are in drainageways. Donnel and Roseberry soils are on river bottoms. Jugson soils are on north-facing slopes and were not affected by glaciation. Quartzburg Variant and Naz soils are on mountain slopes, and they also were not affected by glaciation.

This map unit has poor potential for farming, urban uses, and intensive recreation uses because of the steep slopes, restricted accessibility to the areas, and the presence of Rock outcrop and stones on the surface. It has fair potential for use as woodland and grazing land and for extensive recreation uses because of the steep slopes, restricted accessibility to the areas, and the many rock outcrops. This unit has good potential for the development of habitat for woodland wildlife.

7. Demast-Tica-Bluebell

Gently sloping to steep, shallow to deep, well drained soils that formed in residuum and colluvium that derived from basalt

This map unit consists of small, scattered areas on foothills and mountains. The areas are on Red Ridge east of Donnelly, southeast of Donnelly, and in Ponderosa State Park north of McCall. This map unit makes up about 4 percent of the survey area. It consists of about 35 percent Demast loam, 20 percent Tica very cobbly loam, 20 percent Bluebell cobbly loam, and 25 percent minor soils.

Demast soils are deep loams that have a cobbly loam subsoil and substratum. Fractured basalt bedrock is at a depth between 40 and 60 inches. These soils are on steep, colluvial and residual side slopes on foothills and mountains.

Tica soils are shallow, very cobbly loams that have a very cobbly clay subsoil. Fractured basalt bedrock is at a depth between 10 and 20 inches. These soils are on ridgetops on foothills and mountains.

Bluebell soils are moderately deep cobbly loams that have a very gravelly clay loam subsoil. Fractured basalt bedrock is at a depth between 20 and 40 inches. These soils are on side slopes and on some ridgetops on foothills and mountains.

The minor soils in this unit are the poorly drained Cabarton soils, the moderately well drained Sudduth Variant, the well drained Swede and Nisula soils, and the somewhat excessively drained Jugson, McCall, and Shellrock soils. Cabarton soils are in drainageways. The Sudduth Variant and Swede and Nisula soils are on high terraces and colluvial foot slopes. McCall soils are on glacial moraines. Jugson and Shellrock soils formed in granite and are on foothills and mountains.

This unit has poor potential for farming, urban uses, and intensive recreation uses because of the shallowness to rock, the cobbly surface layer, and the steepness of slopes. It has good potential for use as woodland and grazing land and for extensive recreation uses. The shallow and moderately deep soils in this unit have good potential for use as rangeland and poor potential for use as woodland. The deep soils in this unit have good potential for use as woodland; they have poor potential for use as rangeland because the closed canopy decreases the understory vegetation. This unit has good potential for the development of habitat for rangeland or woodland wildlife.

8. Shellrock-Jugson

Gently sloping to steep, moderately deep and deep, somewhat excessively drained soils that formed in residuum that derived from granite

This map unit is on foothills and mountains along the east side of Long Valley. It makes up about 15 percent of the survey area. This map unit consists of about 50 percent Shellrock loamy coarse sand, 25 percent Jugson coarse sandy loam, and 25 percent minor soils.

Shellrock soils are deep loamy coarse sands on south-facing slopes of foothills and mountains. Weathered granite bedrock is at a depth between 40 and 60 inches.

Jugson soils are moderately deep coarse sandy loams that have a substratum of loamy coarse sand. Weathered granite bedrock is at a depth between 20 and 40 inches. These soils are on north-facing slopes of foothills and mountains.

The minor soils in this unit are the poorly drained Roseberry soils, the well drained Koppes soils, and the somewhat excessively drained Pyle and Quartzburg soils. Also included in this unit are areas of Rock outcrop. Roseberry soils are in small mountain meadows. Pyle soils are on the saddles and spur ridges of mountains. Koppes soils are in swales and in convex positions on mountain slopes. Quartzburg soils and Rock outcrop are on south-facing convex slopes.

This unit has poor potential for farming, urban uses, and intensive recreation uses because of the steep slopes. It has good potential for use as woodland and grazing land and for extensive recreation uses. This unit has good potential for the development of habitat for woodland wildlife.

9. Bryan-Pyle-Quartzburg

Moderately steep and steep, moderately deep and very deep, well drained and somewhat excessively drained soils that formed in residuum and colluvium that derived from granodiorite, quartz diorite, and granite

This map unit is on foothills and mountains surrounding Round Valley and High Valley. Some areas are along the west side of Cascade Lake. This map unit makes up about 19 percent of the survey area. It consists of about 45 percent Bryan coarse sandy loam, 25 percent Pyle loamy coarse sand, 15 percent Quartzburg loamy coarse sand, and 15 percent minor soils.

Bryan soils are very deep, well drained coarse sandy loams that have a substratum of very gravelly loamy coarse sand. Weathered granite bedrock is at a depth between 60 and 80 inches. These soils are on the north-facing slopes of foothills and mountains.

Pyle soils are moderately deep, somewhat excessively drained loamy coarse sands that have a substratum of gravelly sand. Weathered granite bedrock is at a depth between 20 and 40 inches. These soils are on south-facing slopes, ridgetops, and spur ridges of foothills and mountains.

Quartzburg soils are moderately deep, somewhat excessively drained loamy coarse sands that have a substratum of very gravelly loamy coarse sand. Weathered granite bedrock is at a depth between 20 and 30 inches. These soils are on south-facing slopes and ridgetops of foothills and mountains.

The minor soils in this map unit are the well drained Coski, Koppes, Ligget, and Naz soils and the somewhat excessively drained Jugson and Shellrock soils. Coski soils are on convex slopes and benches on mountain slopes. Koppes and Ligget soils are in swales and concave positions on mountain slopes. Naz and Shellrock soils are on south-facing slopes. Jugson soils are on north-facing slopes.

This unit has poor potential for farming, urban uses, and intensive recreation uses because of the steep slopes and the shallowness to rock. It has good potential for use as woodland and for extensive recreation uses. It has only fair potential for use as grazing land because in some areas the dense tree canopy decreases the understory vegetation. This unit has fair to poor potential for the development of wildlife habitat.

10. Koppes-Pyle

Moderately steep and steep, moderately deep and very deep, well drained and somewhat excessively drained soils that formed in residuum that derived from granite and granodiorite

This map unit is on foothills and mountains between Big Creek and Clear Creek and in a small area north of Skunk Creek. This map unit makes up about 6 percent of the survey area. It consists of about 50 percent Koppes coarse sandy loam, 25 percent Pyle loamy coarse sand, and 25 percent minor soils.

Koppes soils are very deep, well drained coarse sandy loams that have a gravelly loamy coarse sand substratum. Weathered granite bedrock and colluvium are at a depth between 60 and 70 inches. These soils are in swales and concave positions on mountain slopes.

Pyle soils are moderately deep, somewhat excessively drained loamy coarse sands that have a gravelly sand substratum. Weathered granite bedrock is at a depth between 20 and 40 inches. These soils are on ridgetops and spur ridges of foothills and mountains.

The minor soils in this unit are the well drained Bryan and Coski soils, the somewhat excessively drained Jugson and Shellrock soils, and the excessively drained Toiyabe soils. Coski soils are on convex slopes and benches on mountain slopes. Bryan and Jugson soils are on north-facing slopes. Shellrock and Toiyabe soils are on south-facing slopes.

This unit has poor potential for farming, urban uses, and intensive recreation uses because of the steep slopes and the shallowness to rock. It has good potential for use as woodland and grazing land and for extensive recreation uses. This unit has fair potential for the development of wildlife habitat.

11. Jugson-Pyle

Gently sloping to steep, moderately deep, somewhat excessively drained soils that formed in residuum that derived from granite and granodiorite

This map unit is on foothills and mountains along the boundary of the national forest in the eastern part of the survey area. The areas of the unit extend from McCall to Cascade. This map unit makes up about 7 percent of the survey area. It consists of about 50 percent Jugson coarse sandy loam, 35 percent Pyle loamy coarse sand, and 15 percent minor soils.

Jugson soils are coarse sandy loams that have a loamy coarse sand substratum. Weathered granite bedrock is at a depth between 20 and 40 inches. Jugson soils are on north-facing slopes of foothills and mountains.

Pyle soils are loamy coarse sands that have a gravelly sand substratum. Weathered granitic rock is at a depth between 20 and 40 inches. These soils are on south-facing slopes of foothills and mountains.

The minor soils in this map unit are the well drained Bryan, Coski, and Koppes soils and the somewhat excessively drained Quartzburg and Shellrock soils. The Coski and Koppes soils are in swales and convex positions on mountain slopes. Bryan soils are on north-facing slopes. Quartzburg soils are on ridgetops and spur ridges on mountains. Shellrock soils are on south-facing slopes.

This unit has poor potential for farming, urban uses, and intensive recreation uses because of the steep slopes and the shallowness to rock. It has good potential for use as woodland and for extensive recreation uses. It has fair potential for use as grazing land because the closed tree canopy restricts the growth of understory vegetation. This unit has good to fair potential for the development of habitat for woodland wildlife.

Broad land use considerations

About 20 percent of the survey area is used for farming. The farmland is on the valley floors and is mainly in map units 3 and 4. The main crops are oats, seed Irish potatoes, hay, and pasture plants. The short growing season limits the choice and productivity of crops. The soils in map units 3 and 4 have good potential for grasses and legumes. Areas of strongly sloping soils are scattered throughout these units, and cultivation in these areas is limited because of the hazard of erosion.

About 20 percent of the survey area is used as grazing land. Map units 2 and 3 have good potential for grasses; map units 4, 7, 8, and 10 have good to fair potential; and map units 1, 5, 6, 9, and 11 have fair potential. In map unit 2, seasonal wetness is a limitation. The soils in map units 4, 7, 8, and 10 are on foothills and mountains, and the density of the tree canopy varies. The understory vegetation in map unit 8 is sparse. The soils in map unit 1 are wet, are subject to flooding, and have vegetation that has poor palatability. In map units 5, 9, and 11, the soils are on mountains and have steep slopes, and the tree canopy is dense. Map unit 6 is in very rugged areas on mountains and has poor accessibility, steep slopes, and numerous rock outcrops.

About 60 percent of the survey area is woodland. Map units 4, 5, 8, 9, 10, and 11 have good potential for woodland use. Some of the soils in these units, however, are steep, so in most areas special equipment is needed to harvest trees. Map unit 7 has good to poor potential for woodland use because the soils in this map unit vary in depth. Map unit 6 has fair potential because rock outcrops are numerous and the topography is rugged.

Throughout the survey area, but especially in the towns of McCall, Cascade, and Donnelly, the soils are used as construction sites. Map units 3 and 4 have fair potential for this use. The rest have poor potential because of wetness or steep slopes. In general, level to gently sloping Archabal, Donnel, and Duston soils have the best potential for use as construction sites. These soils are in map units 2, 3, and 4. In map units 1 and 2, wetness is a limitation. The soils in map units 5 through 11 are steep; construction is limited by the slope and by the stoniness and shallowness of the soils.

The potential of the soils for recreation uses ranges from poor to good, depending on the intensity of the use. Map unit 3 has good potential for intensive recreation uses. Map unit 4 has fair potential for intensive recreation uses; the limitations are the slope, the moderately slow permeability, and the moderate shrink-swell potential. Map units 1 and 2 have poor potential for intensive recreation uses because of wetness. Map units 5 through 11 have poor potential for intensive recreation uses because of steep slopes. The map units that have poor potential for intensive recreation uses generally include small areas of soils that are suitable. All the map units in this survey area have good potential for extensive recreation uses, except map unit 6, which has very rugged topography.

Soil maps for detailed planning

The map units shown on the detailed soil maps at the back of this publication represent the kinds of soil in the survey area. They are described in this section. The descriptions together with the soil maps can be useful in determining the potential of a soil and in managing it for food and fiber production; in planning land use and developing soil resources; and in enhancing, protecting, and preserving the environment. More information for each map unit, or soil, is given in the section "Use and management of the soils."

Preceding the name of each map unit is the symbol that identifies the soil on the detailed soil maps. Each soil description includes general facts about the soil and a brief description of the soil profile. In each description, the principal hazards and limitations are indicated, and the management concerns and practices needed are discussed.

This survey was mapped at two levels of detail. At the most detailed level, the map units are narrowly defined, that is, the soil boundaries were plotted and verified at closely spaced intervals. At the less detailed level, the map units are broadly defined; the soil boundaries were plotted and verified at wider intervals. The broadly defined map units are indicated by an asterisk in the soil map legend.

The map units on the detailed soil maps represent an area on the landscape made up mostly of the soil or soils for which the unit is named.

Soils that have about the same profile make up a *soil series*. Except for allowable differences in texture of the surface layer or of the underlying substratum, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement in the profile. A soil series commonly is named for a town or geographic feature near the place where a soil of that series was first observed and mapped.

Soils of one series can differ in texture of the surface layer or in the underlying substratum and in slope, erosion, stoniness, salinity, wetness, or other characteristics that affect their use. On the basis of such differences, a soil series is divided into phases. The name of a *soil phase* commonly indicates a feature that affects use or management. For example, Archabal loam, 2 to 4 percent slopes, is one of several phases within the Archabal series.

Some map units are made up of two or more dominant kinds of soil, for example, a soil complex.

A *soil complex* consists of areas of two or more soils that are so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area includes some of each of the two or more dominant soils, and the pattern and proportion are somewhat similar in all areas. Bryan-Pyle complex, 40 to 60 percent slopes, is an example.

Most map units include small, scattered areas of soils other than those that appear in the name of the map unit. Some of these soils have properties that differ substantially from those of the dominant soil or soils and thus could significantly affect use and management of the map unit. These soils are briefly described in each map unit description. Some of the more unusual or strongly contrasting soils that are included are identified by a special symbol on the soil map.

Many survey areas include places that have little or no soil material and support little or no vegetation. Such places are called *miscellaneous areas*; they are delineated on the soil map and given descriptive names. Pits, gravel, is an example. Some of these areas are too small to be delineated and are identified by a special symbol on the soil map.

The acreage and proportionate extent of each map unit are given in table 5. Information on properties, limitations, capabilities, and potentials for many soil uses is given for each kind of soil in other tables. (See "Summary of tables.") Many of the terms used in describing soils are defined in the Glossary.

Soil descriptions

1—Archabal loam, 0 to 2 percent slopes. This is a very deep, well drained, level to nearly level soil. This soil formed in alluvium or glacial outwash. It is on alluvial fans and terraces at an elevation of 4,800 to 5,000 feet. The average annual precipitation is 23 inches, the average annual temperature is 42 degrees F., and the frost-free period is about 70 days.

Included in mapping are small areas of Gestrin loam and Melton loam and areas of a soil that has a sandy loam surface layer and soils that are gravelly throughout. Also included are escarpment areas where the soils are similar to this Archabal soil except that they have slopes that range to 40 percent.

Typically, the surface layer is dark grayish brown and brown, strongly acid loam 14 inches thick. The upper part of the subsoil is yellowish brown and brown, strongly acid loam 17 inches thick; and the lower part is yellowish brown, strongly acid coarse sandy loam 21 inches thick. The substratum, to a depth of 60 inches or more, is pale brown, strongly acid coarse sand. In areas between Lake Fork and McCall, this Archabal soil has cobbles and gravel in the substratum.

Permeability is moderate in the upper part of the subsoil and rapid below a depth of 40 to 60 inches. The root zone extends to a depth of 60 inches or more. The available water capacity is high. Runoff is slow. The hazard of erosion is slight, or there is no hazard.

This soil is used for oats, hay, and seed Irish potatoes; as pasture, watershed, and wildlife habitat; and for urban development and recreation uses. The natural plant community on this soil is limited. In disturbed areas where this soil does not have a grass cover, lodgepole pine and ponderosa pine can be established naturally.

Pasture is the most important use of this soil. The short growing season limits the choice and productivity of crops. Land leveling, seeding, weed control, pasture and hayland management, and irrigation management are needed. A suitable crop rotation consists of hay or pasture that is maintained as long as the stand is productive, 3 or 4 years of oats or seed Irish potatoes, and then seeding to adapted grasses and legumes. To obtain an optimum yield, lime and fertilizer should be applied on the basis of soil tests.

Border, furrow, and corrugation irrigation systems are suitable. The length of the run in border irrigation is 1,600 to 2,600 feet, and in furrow and corrugation irrigation, it is 500 to 1,000 feet. The longest runs should only be used on slopes of less than 0.5 percent.

This soil supports vegetation that is suitable as food for grouse, snowshoe hare, squirrel, songbirds, weasel, hawk, fox, coyote, skunk, bear, deer, and elk. In cultivated areas, trees and shrubs could be planted to provide cover for wildlife.

This soil is limited for urban use by the moderate shrink-swell potential of the upper part of the subsoil. This limitation should be considered in the design of foundations. Suitability as sites for roads and streets is limited by the moderate frost action potential. This soil is well suited to recreation facilities.

Capability subclass IVc, irrigated and nonirrigated.

2—Archabal loam, 2 to 4 percent slopes. This is a very deep, well drained, very gently sloping soil. This soil formed in alluvium or glacial outwash. It is on alluvial fans and terraces at an elevation of 4,800 to 5,000 feet. The average annual precipitation is 23 inches, the average annual temperature is 42 degrees F., and the frost-free period is about 70 days.

Included in mapping are small areas of Gestrin loam and Melton loam, areas of a soil that has a sandy loam surface layer, and some soils that have gravel throughout the profile. Also included are escarpment areas where the soils are similar to this Archabal soil except that they have slopes that range to 40 percent.

Typically, the surface layer is dark grayish brown and brown, strongly acid loam 14 inches thick. The upper part of the subsoil is yellowish brown and brown, strongly acid loam 17 inches thick, and the lower part is yellowish brown, strongly acid coarse sandy loam 21 inches thick. The substratum, to a depth of 60 inches or more, is pale brown, strongly acid coarse sand. In areas between Lake Fork and McCall, this Archabal soil has cobbles and gravel in the substratum.

Permeability is moderate in the upper part of the subsoil and rapid below a depth of 40 to 60 inches. The root zone extends to a depth of 60 inches or more. The available water capacity is high. Runoff is slow. The hazard of erosion is slight, or there is no hazard.

This soil is used for oats, hay, and seed Irish potatoes; as pasture, watershed, and wildlife habitat; and for urban development and recreation uses. The natural plant community on this soil is limited. In disturbed areas where this soil does not have a grass cover, lodgepole pine and ponderosa pine can be established naturally.

Pasture is the most important use of this soil. The short growing season limits the choice and productivity of crops. Land leveling, seeding, weed control, pasture and hayland management, and irrigation management are needed. A suitable crop rotation consists of hay or pasture that is maintained as long as the stand is productive, 2 or 3 years of oats or seed Irish potatoes, and then seeding to adapted grasses and legumes. To obtain an optimum yield, lime and fertilizer should be applied on the basis of soil tests.

Corrugation or furrow irrigation systems are suitable. The length of the run should be 325 to 500 feet.

This soil supports vegetation that is suitable as food for grouse, snowshoe hare, squirrel, songbirds, weasel, hawk, fox, coyote, skunk, bear, deer, and elk. This soil provides good grazing for big game animals. However, most areas of this soil are cultivated, so it is necessary to plant trees and shrubs if food and cover are to be developed for wildlife.

This soil is limited for urban uses by the moderate shrink-swell potential of the upper part of the subsoil. This limitation should be considered in the design of foundations. Suitability as sites for roads and streets is limited by the moderate frost action potential. This soil is well suited to most recreation facilities. It is limited for playground use by the steepness of the slopes.

Capability subclass IVe, irrigated, and IVc, nonirrigated.

3—Archabal loam, 4 to 12 percent slopes. This is a very deep, well drained, gently sloping to moderately sloping soil. This soil formed in alluvium or glacial outwash. It is on alluvial fans and terraces on the valley floor (fig. 1). The elevation is 4,800 to 5,000 feet. The average annual precipitation is 23 inches, the average annual temperature is 42 degrees F., and the frost-free period is about 70 days.

Included in mapping are small areas of Gestrin loam, areas of a soil that has a sandy loam surface layer, and soils that have gravel throughout the profile.

Typically, the surface layer is dark grayish brown and brown, strongly acid loam 12 inches thick. The upper part of the subsoil is yellowish brown and brown, strongly acid loam 17 inches thick, and the lower part is yellowish brown, strongly acid coarse sandy loam 21 inches thick. The substratum is pale brown, strongly acid coarse sand to a depth of 60 inches or more. In areas between Lake Fork and McCall, this Archabal soil has cobbles and gravel in the substratum.

Figure 1.—Abandoned farmstead in Archabal loam, 4 to 12 percent slopes. Cabarton silty clay loam is in the drainageways, and Swede silt loam, 12 to 20 percent slopes, is in the foreground and in the cultivated areas in the background. Shellrock loamy coarse sand, 12 to 35 percent slopes, is in the woodland in the background.

Permeability is moderate in the upper part of the subsoil and rapid below a depth of 40 to 60 inches. The root zone extends to a depth of 60 inches or more. The available water capacity is high. Runoff is medium, and the hazard of erosion is slight or moderate.

This soil is used for oats, hay, and seed Irish potatoes. It is also used as pasture, watershed, and wildlife habitat and for urban development and recreation uses. The natural plant community on this soil is limited. In disturbed areas where this soil does not have a grass cover, lodgepole pine and ponderosa pine can be established naturally.

Pasture is the most important use of this soil because the short growing season limits the choice and productivity of crops. Seeding, weed control, pasture and hayland management, and irrigation management are needed. A suitable crop rotation consists of hay or pasture that is maintained as long as the stand is productive, 1 or 2 years of oats or seed Irish potatoes, and then seeding to adapted grasses and legumes. To obtain an optimum yield, lime and fertilizer should be applied on the basis of soil tests.

Corrugation, sprinkler, or furrow irrigation systems are suitable. The length of the run should be less than 325 feet. Irrigation ditches require water-control structures. Contour or cross-slope tillage can help to prevent erosion.

This soil supports vegetation that is suitable as food for grouse, snowshoe hare, squirrel, songbirds, weasel, hawk, fox, coyote, skunk, bear, deer, and elk. This soil provides good grazing for big game animals. However, most areas of this soil are cultivated, so it is necessary to plant trees and shrubs if food and cover are to be developed for wildlife.

This soil is limited for urban uses by the moderate shrink-swell potential of the upper part of the subsoil. This limitation should be considered in the design of foundations. This soil is limited for use as sites for roads and streets by the steepness of the slopes and the frost action potential. It is limited for most recreation facilities, except paths and trails, by the steepness of the slopes.

Capability subclass IVe, irrigated and nonirrigated.

4—Archabal loam, 12 to 20 percent slopes. This is a very deep, well drained, strongly sloping soil (fig. 2). This soil formed in alluvium or glacial outwash. It is on dissected terraces and alluvial fans at an elevation of 4,800 to 5,000 feet. The average annual precipitation is 23 inches, the average annual temperature is 42 degrees F., and the frost-free period is about 70 days.

Included in mapping are small areas of a soil that has a sandy loam surface layer. Also included are escarpment areas where the soils are similar to this Archabal soil except that they have slopes that range to 40 percent.

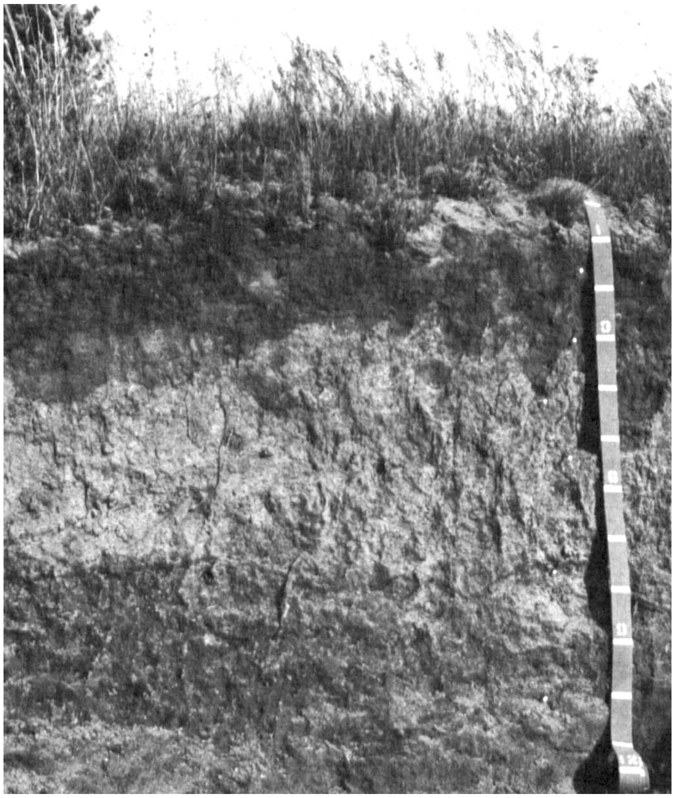


Figure 2.—Profile of Archabal loam, 12 to 20 percent slopes, in an area of grass vegetation. The grayish brown surface layer has a clear irregular boundary. The loam subsoil is at a depth between 3 and 8 decimeters. The substratum is coarse sand and extends to a depth of 12 decimeters or more.

Typically, the surface layer is dark grayish brown and brown, strongly acid loam 10 inches thick. The upper part of the subsoil is yellowish brown and brown, strongly acid loam 17 inches thick; and the lower part is yellowish brown, strongly acid coarse sandy loam 21 inches thick. The substratum is pale brown, strongly acid coarse sand to a depth of 60 inches or more. In areas between Lake Fork and McCall, this soil has cobbles and gravel in the substratum.

Permeability is moderate in the upper part of the subsoil and rapid below a depth of 40 to 60 inches. The root zone extends to a depth of 60 inches or more. The available water capacity is high. Runoff is medium, and the hazard of erosion is moderate.

This soil is used for hay; as pasture, watershed, and wildlife habitat; and for urban development and recreation uses. The natural plant community on this soil is limited. In disturbed areas where there is no grass cover, lodgepole pine and ponderosa pine can be established naturally.

Pasture is the most important use of this soil because the short growing season limits the choice and productivity of crops. Seeding, weed control, pasture and hayland management, and irrigation management are needed. A suitable crop rotation consists of hay or pasture that is maintained as long as the stand is productive, 1 or 2 years of oats, and seeding to adapted grasses and legumes. To obtain an optimum yield, lime and fertilizer should be applied on the basis of soils tests. Because this soil is strongly sloping, a vegetative cover should be maintained on the surface to prevent erosion.

A sprinkler system of irrigation is suitable. Contour or cross-slope tillage can help to prevent erosion. Irrigation ditches require water-control structures.

This soil supports vegetation that is suitable as food for grouse, snowshoe hare, squirrel, songbirds, hawk, fox, coyote, skunk, weasel, bear, deer, and elk. The soil provides good grazing for big game animals. However, most areas of this soil are cultivated, so it is necessary to plant trees and shrubs if food and cover are to be developed for wildlife.

This soil is limited for urban uses by the steepness of slopes and the moderate shrink-swell potential of the upper part of the subsoil. These limitations should be considered in the design of foundations. Suitability of the soil as sites for roads, streets, and recreation facilities is limited by the steepness of slopes.

Capability subclass VIe, irrigated and nonirrigated.

5—Blackwell clay loam. This is a very deep, poorly drained, level and nearly level soil. This soil formed in stratified, mixed alluvium. It is on low terraces and stream bottoms at an elevation of 4,800 to 5,100 feet. The slope is 0 to 2 percent. The average annual precipitation is 23 inches, the average annual temperature is 41 degrees F., and the frost-free period is about 70 days.

Included in mapping are small areas of Blackwell mucky silt loam, Melton loam, and Cabarton silty clay loam. Also included are escarpment areas where the soils are similar to this Blackwell soil except that they have slopes that range to 20 percent.

Typically, the upper part of the surface layer is dark gray, medium acid silt loam about 1 inch thick; the middle part is dark grayish brown and very dark gray, medium acid clay loam 10 inches thick; and the lower part is dark gray, slightly acid sandy clay loam 8 inches thick. The underlying material, to a depth of 27 inches, is gray, slightly acid sandy clay loam. Below that, to a depth of 60 inches or more, it is light brownish gray, slightly acid, stratified loamy coarse sand and sandy clay loam.

Permeability is moderately slow. The root zone extends to a depth of 60 inches or more. The available water capacity is moderate. Runoff is slow. The hazard of erosion is slight, or there is no hazard. The water table is at a depth between 3 and 30 inches from early in spring to midsummer.

This soil is used as rangeland, watershed, and wildlife habitat and for recreation uses. The native plant community consists of sedges, redtop, tufted hairgrass, and willows. Proper grazing and using a planned grazing system are needed to maintain an adequate plant cover and plant vigor and to improve grazing efficiency and wildlife habitat.

Summer grazing is the most important use of this soil. Drainage of this soil is possible but difficult because of the low position of the soil on the landscape. Using shallow ditches to remove excess surface water can help to improve plant growth. If drained, this soil can be cultivated and seeded to adapted grasses and legumes.

This soil supports vegetation that is suitable as food and cover for fisher, mink, hawk, skunk, muskrat, and beaver and for ducks, geese, and other waterfowl. Leaving some areas unharvested and growing seed crops as food and cover can help to increase the wildlife population. Other wildlife in this area include grouse, snowshoe hare, squirrel, weasel, and songbirds.

This soil is limited for urban use and for dams, roads, and recreation facilities by the hazards of wetness and flooding.

Capability subclass Vw, irrigated and nonirrigated.

6—Blackwell mucky silt loam. This is a very deep, poorly drained, level and nearly level soil. This soil formed in stratified, mixed alluvium in areas of marsh. It is on stream bottoms at an elevation of 4,800 to 5,000 feet. The slope is 0 to 2 percent. The average annual precipitation is 23 inches, the average annual temperature is 41 degrees F., and the frost-free period is about 70 days.

Included in mapping are small areas of Blackwell clay loam, Melton loam, and Cabarton silty clay loam.

Typically, the upper part of the surface layer is dark gray, medium acid, mucky silt loam 19 inches thick; and the lower part is gray, medium acid sandy loam 8 inches thick. The underlying material is light brownish gray, slightly acid, stratified loamy coarse sand and sandy clay loam to a depth of 60 inches or more.

Permeability is moderately slow. The root zone extends to a depth of 60 inches or more. The available water capacity is moderate. Runoff is slow; the hazard of erosion is slight, or there is no hazard. The water table is at a depth between 3 and 30 inches from early in spring to midsummer.

This soil is used as rangeland, watershed, and wildlife habitat and for recreation uses. The natural plant community consists of sedges, redtop, tufted hairgrass, and willows. Proper grazing and a planned grazing system are needed to maintain an adequate plant cover and plant vigor, to improve grazing efficiency, and to improve wildlife habitat.

Summer grazing is the most important use of this soil. Drainage of this soil is not practical because of its low position on the landscape. Using shallow ditches to remove excess surface water can help to improve plant growth.

This soil supports vegetation that is suitable as food for fisher, mink, muskrat, hawk, skunk, and beaver and for ducks, geese, and other waterfowl. Grazing should be avoided in some areas to provide cover for wildlife and to help increase the wildlife population. Other wildlife in this area include grouse, snowshoe hare, squirrel, weasel, and songbirds.

This soil is limited for urban uses and for dams, roads, and recreation facilities by the hazards of wetness and flooding.

Capability subclass Vw, irrigated and nonirrigated.

7—Blackwell Variant silt loam. This is a very deep, poorly drained, level to very gently sloping soil. This soil formed in mixed alluvium. It is on stream bottoms at an elevation of 4,800 to 5,100 feet. The slope is 0 to 3 percent. The average annual precipitation is 23 inches, the average annual temperature is 41 degrees F., and the frost-free period is about 70 days.

Included in mapping are small areas of Melton loam, Blackwell clay loam, and a soil that has a surface layer of peat and muck 14 inches thick and is underlain by sand and loamy sand.

The Blackwell Variant soil typically has a 1-inch thick organic layer that overlies the surface layer. The surface layer is dark gray and grayish brown, medium acid silt loam 4 inches thick. The surface layer is underlain by a buried surface layer of an older soil that is dark gray, slightly acid silt loam 3 inches thick. The underlying material is light brownish gray, slightly acid silt loam 7 inches thick over light gray, slightly acid coarse sand; it extends to a depth of 60 inches or more.

Permeability is moderate to a depth of 10 to 14 inches and very rapid below that depth. The root zone extends to a depth of 60 inches or more. The available water capacity is low. Runoff is very slow. The hazard of erosion is slight, or there is no hazard. The water table is at a depth between 12 and 24 inches from midspring to midsummer.

This soil is used as rangeland and watershed and for wildlife habitat and recreation uses. The native plant community consists of sedges, redtop, tufted hairgrass, and willows. Proper grazing and a planned grazing system are needed to maintain an adequate plant cover and plant vigor, to improve grazing efficiency, and to improve wildlife habitat.

Summer grazing is the most important use of this soil. Drainage of this soil generally is not practical because of its low position on the landscape. Using shallow ditches to remove excess surface water can help to improve plant growth.

This soil supports vegetation that is suitable as food for fisher, mink, muskrat, beaver, hawk, and skunk and for ducks, geese, and other waterfowl. Grazing should be avoided in some areas to help improve the cover for wildlife and to help increase the wildlife population. Other wildlife in the area include grouse, snowshoe hare, weasel, squirrel, and songbirds.

This soil is limited for urban uses and for dams, roads, and recreation facilities by the hazards of wetness and flooding.

Capability subclass Vw, irrigated and nonirrigated.

8—Bluebell cobbly loam, 5 to 35 percent slopes. This is a moderately deep, well drained, gently sloping to steep soil. This soil formed in residuum of basalt. It is on foothills and mountains at an elevation of 5,500 to 6,000 feet. The average annual precipitation is 26 inches, the average annual temperature is 41 degrees F., and the frost-free period is about 70 days.

Included in mapping are small areas of Demast loam and Tica very cobbly loam.

Typically, the upper part of the surface layer is 13 inches thick; it is dark grayish brown, neutral cobbly loam. The lower part, which is 5 inches thick, is brown, slightly acid cobbly loam. The subsoil is brown, slightly acid, very gravelly clay loam 7 inches thick. Fractured basalt is at a depth of 25 inches.

Permeability is moderately slow. The root zone extends to a depth of 20 to 40 inches. The available water capacity is very low. Runoff is medium to rapid, and the hazard of erosion is moderate to severe.

This soil is used as woodland and watershed and for wildlife habitat and recreation. The stand of timber and the understory plants on this soil need to be maintained.

This soil has good potential for use as grazable woodland. The principal native forage plants in the understory include bluebunch wheatgrass, Idaho fescue, elk sedge, arrowleaf balsamroot, mountain big sagebrush, and common snowberry.

If this soil is used for grazing livestock, management is needed to maintain tree regeneration and to maintain or improve forage plant vigor. An adequate amount of litter should be left on the surface to protect the soil. This soil is not suited to cultivation because the surface layer is cobbly.

This soil is poorly suited to the production of ponderosa pine. It can produce about 3,400 cubic feet per acre (0.6 inch or more in diameter) of pine at 50 years of age, or 43,000 board feet per acre (Scribner rule) of merchantable timber, 11.6 inches or more in diameter, from an unmanaged stand at 200 years of age, based on the mean annual increment (*4*).

Timber production is restricted by the moderate depth and the very low available water capacity of this soil. Harvesting is restricted by the hazard of erosion, cobbles in the surface layer, and the moderate depth. In harvesting trees, conventional methods that make use of rubber-tired skidders and crawlers can be used. Road construction requires the excavation of bedrock because of the moderate depth of this soil. Reforestation and site preparation should be planned carefully so that soil loss is minimized and seedling mortality is reduced during the hot, dry summer.

This soil supports vegetation that is suitable as food for grouse, songbirds, hawk, coyote, squirrel, deer, bear, and elk. It provides good forage for big game but not good cover.

This soil is limited for urban use, roads, and recreation facilities by the moderate depth to bedrock, cobblestones, and slope.

Capability subclass VIe, nonirrigated.

9—Bryan-Ligget complex, 20 to 40 percent slopes. This complex consists of moderately steep and steep soils that are on north-facing slopes on mountains in the southern part of the survey area. These soils are at an elevation of 5,000 to 6,500 feet. Bryan coarse sandy loam makes up about 50 percent of this complex, and Ligget sandy loam makes up about 40 percent. The remaining 10 percent of this complex is Pyle loamy coarse sand, Naz sandy loam, a soil that is similar to Quartzburg soils but is very deep, and a soil that is coarse sandy loam throughout the profile and has a subsoil.

The Bryan soil is a very deep, well drained soil on convex slopes. It formed in residuum of granodiorite and quartz diorite. The average annual precipitation is 30 inches, the average annual temperature is 39 degrees F., and the frost-free period is about 60 days.

The Bryan soil typically has a 3-inch thick organic layer that overlies the surface layer. The surface layer is grayish brown, slightly acid coarse sandy loam 10 inches thick. The underlying material is light gray, slightly acid loamy coarse sand and gravelly loamy coarse sand 24 inches thick over white, medium acid, very gravelly loamy coarse sand, it extends to a depth of 60 inches or more.

The Bryan soil has very rapid permeability. The root zone extends to a depth of 60 inches or more. The available water capacity is low. Runoff is medium to rapid, and the hazard of erosion is moderate to severe.

The Ligget soil is a very deep, well drained soil on concave slopes. It formed in residuum of quartz diorite. The average annual precipitation is 30 inches, the average annual temperature is 39 degrees F., and the frost-free period is about 60 days.

The Ligget soil typically has a 1-inch thick organic layer that overlies the surface layer. The surface layer is brown, medium acid sandy loam 8 inches thick. The upper part of the subsoil is pale brown, medium acid sandy loam 16 inches thick, and the lower part is light brown and very pale brown, medium acid coarse sandy loam 24 inches thick. Decomposing quartz diorite is at a depth of 48 inches.

The Ligget soil has moderately rapid permeability. The root zone extends to a depth between 40 and 60 inches. The available water capacity is moderate. Runoff is medium or rapid, and the hazard of erosion is moderate or severe.

This complex is used as woodland and watershed and for recreation and wildlife habitat. The stand of timber and the understory plants on this soil need to be maintained for these uses.

The Bryan soil is suited to the production of grand fir, Douglas-fir, and ponderosa pine. It can produce about 11,500 cubic feet per acre (0.6 inch or more in diameter) of timber at 110 years of age, or 41,000 board feet per acre (Scribner rule) of merchantable timber, 12.6 inches or more in diameter, from an unmanaged stand at 140 years of age, based on the mean annual increment (*5*). Grand fir is the dominant species on this soil; however, this species was stunted about 40 years ago, and thus productivity has been reduced.

Timber production is restricted by the steepness of slopes and the hazard of erosion. In harvesting trees, conventional methods that make use of rubber-tired skidders and crawlers can be used. Roads, skid trails, and landings should be planned carefully to minimize soil loss. Reforestation after harvest must be managed carefully so that plant competition from undesirable understory plants is minimized.

The Ligget soil is suited to the production of grand fir, Douglas-fir, ponderosa pine, and western larch. It can produce about 11,150 cubic feet per acre (0.6 inch or more in diameter) of timber at 110 years of age, or 41,000 board feet per acre (Scribner rule) of merchantable timber, 12.6 inches or more in diameter, from an unmanaged stand at 140 years of age, based on the mean annual increment.

Timber production is restricted by the shallowness to rock and the steepness of slopes. In harvesting trees, conventional methods that make use of rubber-tired skidders and crawlers can be used; however, these methods are restricted during rainy periods in spring. When this soil is wet, equipment has poor traction and ruts form in the roads. Roads, landings, and skid trails should be planned carefully to minimize soil loss. Reforestation after harvest must be managed carefully so the competition from undesirable understory plants is minimized.

The very sparse native understory vegetation on these soils is not suitable for grazing if the overstory stand of trees is fully stocked. If the tree canopy is opened by logging, fire, or other disturbance, the potential for grazing and the understory vegetation improve, and the grazing potential remains for 10 to 20 years. Grazing should be managed to insure tree regeneration and to protect the soil by leaving an adequate amount of litter on the surface.

The principal native understory plants in areas where the canopy is more open are elk sedge, pine reedgrass, common snowberry, mountain blueberry, and mallow ninebark. Total annual air-dry herbage production ranges from about 1,000 pounds per acre in areas where the canopy is more open to 175 pounds per acre in areas where the stand is fully stocked.

Roads, skid trails, landings, and other areas where the soil has been disturbed should be seeded to adapted plant species to reduce erosion. Seeding in these areas should take place in the fall following the soil disturbance so that competition from weeds and brush is minimized. By reducing brush competition, seeding can also promote natural tree regeneration. Some adapted plant species that can be used in seeding are orchardgrass, timothy, tall fescue, and white dutch clover.

These soils support vegetation that is suitable as cover and food for grouse, squirrel, snowshoe hare, songbirds, weasel, hawk, coyote, bear, deer, and elk. If these soils are used for wildlife habitat, planting seed crops as food for wildlife can improve the habitat.

These soils are limited for urban use and as sites for recreation facilities by the steepness of slopes.

Capability subclass VIe, nonirrigated.

10—Bryan-Ligget complex, 40 to 60 percent slopes. This complex consists of steep soils that are on north-facing slopes on mountains in the southern part of the survey area. These soils are at an elevation of 5,000 to 6,500 feet. Bryan coarse sandy loam makes up about 60 percent of this complex, Ligget sandy loam makes up 30 percent. The remaining 10 percent of the complex consists of Pyle loamy coarse sand, Naz sandy loam, Quartzburg loamy coarse sand, and a soil that is similar to Quartzburg soils but is very deep.

The Bryan soil is a very deep, well drained soil on convex slopes. It formed in residuum of granodiorite and quartz diorite. The average annual precipitation is 30 inches, the average annual temperature is 39 degrees F., and the frost-free period is about 60 days.

The Bryan soil typically has a 3-inch thick organic layer that overlies the surface layer. The surface layer is grayish brown, slightly acid coarse sandy loam 10 inches thick. The underlying material is light gray, slightly acid loamy coarse sand and gravelly loamy coarse sand 24 inches thick over white, medium acid, very gravelly loamy coarse sand; it extends to a depth of 60 inches or more.

The Bryan soil has very rapid permeability. The root zone extends to a depth of 60 inches or more. The available water capacity is low. Runoff is very rapid, and the hazard of erosion is severe or very severe.

The Ligget soil is a very deep, well drained soil on concave slopes. It formed in residuum of quartz diorite. The average annual precipitation is 30 inches, the average annual temperature is 39 degrees F., and the frost-free period is about 60 days.

The Ligget soil typically has a 1-inch thick organic layer that overlies the surface layer. The surface layer is brown, medium acid sandy loam 8 inches thick. The upper part of the subsoil is pale brown, medium acid sandy loam 16 inches thick, and the lower part is light brown and very pale brown, medium acid coarse sandy loam 24 inches thick. Decomposing quartz diorite is at a depth of 48 inches.

The Ligget soil has moderately rapid permeability. The root zone extends to a depth of 40 to 60 inches. The available water capacity is moderate. Runoff is very rapid, and the hazard of erosion is severe or very severe.

This complex is used as woodland and watershed and for recreation and wildlife habitat. The stand of timber and the understory plants on these soils need to be maintained for these uses.

The Bryan soil is suited to the production of grand fir, Douglas-fir, and ponderosa pine. It can produce about 11,500 cubic feet per acre (0.6 inch or more in diameter) of timber at 110 years of age, or 41,000 board feet per acre (Scribner rule) of merchantable timber, 12.6 inches or more in diameter, from an unmanaged stand at 140 years of age, based on the mean annual increment. Grand fir is the dominant species on this soil; however, this species was stunted about 40 years ago, and thus productivity has been reduced.

Timber production is restricted by the steepness of slopes and the hazard of erosion. Slopes generally are too steep for cross-slope operations using conventional equipment such as rubber-tired skidders and crawlers. Special equipment that causes a minimum of soil disturbance should be used in harvesting trees.

The Ligget soil is suited to the production of grand fir, Douglas-fir, ponderosa pine, and western larch. It can produce about 11,150 cubic feet per acre (0.6 inch or more in diameter) of timber at 110 years of age, or 41,000 board feet (Scribner rule) of merchantable timber, 12.6 inches or more in diameter, from an unmanaged stand at 140 years of age, based on the mean annual increment.

Timber production is restricted by the steepness of slopes and shallowness to bedrock. When this soil is wet, equipment has poor traction, and ruts quickly form in the roads. In harvesting trees, conventional methods that make use of rubber-tired skidders and crawlers are not suitable. Special equipment that causes a minimum of soil disturbance should be used. Reforestation after harvest must be managed carefully so that competition from undesirable understory plants is minimized.

The very sparse native understory vegetation on these soils is not suitable for grazing if the overstory stand of trees is fully stocked. If the tree canopy is opened by logging, fire, or other disturbance, the potential for grazing and the understory vegetation improve, and the grazing potential remains for 10 to 20 years. Grazing should be managed to insure tree regeneration and to protect the soil by leaving an adequate amount of litter on the surface. The steep slopes severely restrict the movement of livestock and the accessibility to forage.

The principal native understory plants in areas where the canopy is more open are elk sedge, pine reedgrass, common snowberry, mountain blueberry, and mallow ninebark. Total annual air-dry herbage production ranges from about 1,000 pounds per acre in areas where the canopy is more open to 75 pounds per acre in areas where the stand is fully stocked.

Roads, skid trails, landings, and other areas where the soil has been disturbed should be seeded to adapted plant species to reduce erosion. Seeding in these areas should take place in the fall following the soil disturbance so that competition from weeds and brush is minimized. By reducing brush competition, seeding can also promote natural tree regeneration. Some adapted plant species that can be used in seeding are orchardgrass, timothy, tall fescue, and white dutch clover.

These soils support vegetation that is suitable as cover and food for grouse, squirrel, snowshoe hare, songbirds, weasel, hawk, coyote, bear, deer, and elk. If the soils are used for wildlife habitat, planting seed crops as food for wildlife can improve the habitat.

These soils are limited for urban uses and as sites for recreation facilities by the steepness of slopes.

Capability subclass VIIe, nonirrigated.

11—Bryan-Pyle complex, 40 to 60 percent slopes. This complex consists of steep soils on north-facing slopes on mountains in the southern part of the survey area. These soils are at an elevation of 4,400 to 6,500 feet. Bryan coarse sandy loam makes up about 60 percent of this complex, and Pyle loamy coarse sand makes up 30 percent. The remaining 10 percent consists of Jugson coarse sandy loam, Koppes coarse sandy loam, Quartzburg loamy coarse sand, Toiyabe loamy coarse sand, a soil that is similar to Quartzburg soils but is very deep, and a soil that is coarse sandy loam throughout the profile and has a subsoil.

The Bryan soil is on convex and concave slopes. It is very deep and well drained. This soil formed in residuum of granodiorite and quartz diorite. The average annual precipitation is 30 inches, the average annual temperature is 39 degrees F., and the frost-free period is about 60 days.

Typically, the Bryan soil has a 3-inch thick organic layer that overlies the surface layer. The surface layer is grayish brown, slightly acid coarse sandy loam 10 inches thick. The underlying material is light gray, slightly acid loamy coarse sand and gravelly loamy coarse sand about 24 inches thick over white, medium acid, very gravelly loamy coarse sand; it extends to a depth of 60 inches or more.

The Bryan soil has very rapid permeability. The root zone extends to a depth of 60 inches or more. The available water capacity is low. Runoff is very rapid, and the hazard of erosion is severe or very severe.

The Pyle soil is on ridgetops, spurs, and saddles on mountains. It is moderately deep and somewhat excessively drained. This soil formed in residuum of granodiorite. The average annual precipitation is 30 inches, the average annual temperature is 39 degrees F., and the frost-free period is about 60 days.

Typically, the Pyle soil has a 1-inch thick organic layer that overlies the surface layer. The surface layer is grayish brown, neutral loamy coarse sand 4 inches thick. The upper part of the underlying material is pale brown, slightly acid loamy coarse sand 10 inches thick; the middle part is pale brown, medium acid coarse sand 6 inches thick; and the lower part is very pale brown, slightly acid gravelly sand 13 inches thick. Decomposing granodiorite is at a depth of 33 inches.

The Pyle soil has very rapid permeability. The root zone extends to a depth between 20 and 40 inches. The available water capacity is very low. Runoff is rapid, and the hazard of erosion is severe or very severe.

The soils of this complex are used as woodland and watershed and for recreation uses and wildlife habitat. The stand of timber and the understory plants on these soils need to be maintained for these uses.

The Bryan soil is suited to the production of grand fir, Douglas-fir, and ponderosa pine. It can produce about 11,500 cubic feet per acre (0.6 inch or more in diameter) of timber at 110 years of age, or 41,000 board feet per acre (Scribner rule) of merchantable timber, 12.6 inches or more in diameter, from an unmanaged stand at 140 years of age, based on the mean annual increment. Grand fir is the dominant species on this soil; however, this species was stunted about 40 years ago, and thus, productivity has been reduced.

Timber production is restricted by the steepness of slopes and the hazard of erosion. The slopes generally are too steep for cross-slope operations using conventional equipment such as rubber-tired skidders and crawlers. Special equipment that causes a minimum of soil disturbance should be used in harvesting trees. Reforestation after harvest must be managed carefully to reduce plant competition of undesirable understory plants.

The Pyle soil is suited to the production of Douglas-fir and ponderosa pine. It can produce about 2,750 cubic feet per acre (0.6 inch or more in diameter) of timber at 40 years of age, or 33,800 board feet per acre (Scribner rule) of merchantable timber, 11.6 inches or more in diameter, from an unmanaged stand at 150 years of age, based on the mean annual increment.

Timber production is restricted by the very low available water capacity and the moderate depth of the soil. Harvesting is restricted by the steepness of slopes, the hazard of erosion, and the moderate depth of the soil. The slopes generally are too steep for cross-slope operations using conventional equipment such as rubber-tired skidders and crawlers. Road construction requires excavation of the bedrock because of the moderate depth of this soil. Special equipment that causes a minimum of soil disturbance should be used in harvesting trees. Stands of cut-over timber commonly are understocked because of the high seedling mortality during hot, dry periods in summer. Reforestation and site preparation should be planned carefully before trees are harvested to insure natural reproduction. Shade from mature trees can help to reduce seedling mortality.

The native understory vegetation on the Bryan soil is very sparse and not suitable for grazing if the stand of trees is fully stocked. If the tree canopy is opened by logging, fire, or other disturbance, the production and quality of the understory vegetation improve, and the understory has limited potential for grazing.

The principal native understory plants on the Bryan soil in areas where the canopy is more open are elk sedge, pine reedgrass, mountain blueberry, and mallow ninebark. Total annual air-dry herbage production ranges from about 1,000 pounds per acre in areas where the canopy is more open to 100 pounds per acre in areas where the stand is fully stocked.

The potential for grazing the native understory vegetation on the Pyle soil is poor to fair if the stand of trees is fully stocked. If the tree canopy is opened by logging, fire, or other disturbance, the production and quality of the understory vegetation improve.

The principal native understory plants on the Pyle soil in areas where the canopy is more open are elk sedge, pine reedgrass, and mallow ninebark. Total annual air-dry herbage production ranges from about 1,000 pounds per acre in areas where the canopy is more open to 500 pounds per acre in areas where the stand is fully stocked.

After the tree stand is opened up, the grazing potential of these soils improves and remains for 10 to 20 years. Proper grazing and using a planned grazing system are essential to insure tree regeneration, to maintain an adequate plant cover and plant vigor, and to protect the soil by leaving an adequate amount of litter on the surface. The steep slopes severely restrict the movement of livestock and the accessibility to forage.

Roads, skid trails, landings, and other areas where the soil has been disturbed should be seeded to adapted plant species to reduce erosion. Seeding in these areas should take place in the fall following the soil disturbance so that competition from weeds and brush is minimized. By reducing brush competition, seeding can also promote natural tree regeneration. Some adapted plant species that can be used in seeding are orchardgrass, tall fescue, timothy, pubescent wheatgrass, and intermediate wheatgrass.

These soils support vegetation that is suitable as cover and food for grouse, squirrel, snowshoe hare, songbirds, weasel, hawk, coyote, bear, deer, and elk. If these soils are used for wildlife habitat, planting seed crops as food for wildlife can improve the habitat.

These soils are limited for urban development and recreation use by the steep slopes and by the moderate depth of the Pyle soil.

Capability subclass VIIe, nonirrigated.

12—Cabarton silty clay loam. This is a very deep, poorly drained, level to very gently sloping soil. This soil formed in mixed alluvium. It is in drainageways and on low alluvial fans on the valley floor at an elevation of 4,500 to 5,200 feet. The slope is 0 to 3 percent. The average annual precipitation is 22 inches, the average temperature is 40 degrees F., and the frost-free period is about 67 days.

Included in mapping are small areas of Blackwell clay loam and Melton loam. Also included are areas of Cabarton silty clay loam where the slopes are 3 to 5 percent and escarpment areas where the soils are similar to this Cabarton soil but have slopes that range to 20 percent.

Typically, the surface layer is light gray, medium acid silty clay loam 9 inches thick. The underlying material, to a depth of 49 inches, is dark gray and light gray, slightly acid clay. Below that, it is light gray, slightly acid clay loam to a depth of 60 inches or more.

Permeability is slow. The root zone extends to a depth of 60 inches or more. The available water capacity is high. Runoff is slow. The hazard of erosion is slight, or there is no hazard. The water table is at a depth between 6 and 18 inches from early in spring to midsummer.

This soil is used as rangeland and watershed and for wildlife habitat and recreation uses. The native plant community is mainly sedges, redtop, tufted hairgrass, and willow. Proper grazing and a planned grazing system are essential to maintain an adequate plant cover and plant vigor and to improve grazing efficiency and wildlife habitat.

Summer grazing is the most important use of this soil. Drainage generally is not practical because of the low position of the soil on the landscape and the clayey texture. Using shallow ditches to remove excess water can help to improve plant growth. If drained, this soil can be cultivated and seeded to adapted grasses and legumes. If this soil is cultivated when it is wet, severe packing can result because of the clayey texture.

This soil supports vegetation that is suitable as food and cover for fisher, mink, muskrat, hawk, skunk, and beaver and for ducks, geese, and other waterfowl. The areas where seed crops are grown are limited. Other wildlife in the area include grouse, snowshoe hare, weasel, squirrel, and songbirds.

This soil is limited for urban use and for roads and recreation facilities by its clayey texture and by wetness and flooding.

Capability subclass Vw, nonirrigated.

13—Coski sandy loam, 20 to 40 percent slopes. This is a very deep, well drained, moderately steep and steep soil. This soil formed in colluvium and residuum of granite. It is on foothills and ridgetops on mountains at an elevation of 5,000 to 6,500 feet. The average annual precipitation is 30 inches, the average annual temperature is 39 degrees F., and the frost-free period is about 60 days.

Included in mapping are small areas of Bryan coarse sandy loam, Jugson coarse sandy loam, Koppes coarse sandy loam, and Naz sandy loam. Also included is a soil that is similar to this Coski soil except that it has a thicker surface layer.

Typically, the surface layer is dark grayish brown and brown, medium acid sandy loam 15 inches thick. The subsoil is brown, slightly acid coarse sandy loam 13 inches thick. The upper part of the substratum is pale brown, medium acid, gravelly coarse sandy loam 10 inches thick; the next part is very pale brown, medium acid, very gravelly loamy coarse sand 11 inches thick; and the lower part, to a depth of 60 inches or more, is white, strongly acid gravelly coarse sand.

Permeability is moderately rapid in the subsoil and very rapid in the lower part of the substratum. The root zone extends to a depth of 60 inches or more. The available water capacity is moderate. Runoff is medium to rapid, and the hazard of erosion is moderate to severe.

This soil is used as woodland and watershed and for wildlife habitat and recreation uses. The stand of timber and the understory plants on this soil need to be maintained for these uses.

This soil is suited to the production of Douglas-fir and ponderosa pine. It can produce about 5,050 cubic feet per acre (0.6 inch or more in diameter) of timber at 50 years of age, or 44,600 board feet per acre (Scribner rule) of merchantable timber, 11.6 inches or more in diameter, from an unmanaged stand at 120 years of age, based on the mean annual increment.

In harvesting trees, conventional methods that make use of rubber-tired skidders and crawlers can be used. Reforestation after harvest must be managed carefully so that competition from undesirable understory vegetation is minimized.

The potential for grazing the native understory vegetation is poor to fair if the stand of trees is fully stocked. If the tree canopy is opened by logging, fire, or other disturbance, the production and quality of the understory vegetation improve. The grazing potential improves and remains for 10 to 20 years. Proper grazing and a planned grazing system are essential to insure tree regeneration, to maintain an adequate plant cover and plant vigor, and to protect the soil by leaving an adequate amount of litter on the surface. The steep slopes severely restrict the movement of livestock and the accessibility to forage.

The principal native understory plants in areas where the canopy is more open include elk sedge, pine reedgrass, and snowbrush ceanothus. Total annual air-dry herbage production ranges from about 1,000 pounds per acre in areas where the canopy is more open to 400 pounds per acre in areas where the stand is fully stocked.

Roads, skid trails, landings, and other areas where the soil has been disturbed should be seeded to adapted plant species to reduce erosion. Seeding in these areas should take place in the fall following the soil disturbance so that competition from weeds and brush is minimized. By reducing brush competition, seeding can also promote natural tree regeneration. Some adapted plant species that can be used in seeding are orchardgrass, tall fescue, pubescent wheatgrass, and intermediate wheatgrass.

This soil supports vegetation that is suitable as cover and food for grouse, squirrel, snowshoe hare, hawk, coyote, deer, bear, and elk.

This soil is limited for urban use and recreation facilities by the steep slopes.

Capability subclass VIe, nonirrigated.

14—Demast loam, 15 to 30 percent slopes. This is a deep, well drained, strongly sloping and moderately steep soil. This soil formed in colluvium and residuum of basalt. It is on mountains at an elevation of 5,500 to 6,000 feet. The average annual precipitation is 25 inches, the average annual temperature is 40 degrees F., and the frost-free period is about 65 days.

Included in mapping are small areas of Bluebell cobbly loam, Tica very cobbly loam, a soil that is similar to this Demast soil but is more than 35 percent gravel and cobbles, and a soil that is similar to this Demast soil except that it has a thinner surface layer.

Typically, the surface layer is dark brown and brown, slightly acid loam 16 inches thick. The upper part of the subsoil is brown, slightly acid loam 17 inches thick; and the lower part is brown, slightly acid cobbly loam 11 inches thick. The substratum is brown, slightly acid cobbly loam; it is underlain by basalt at a depth of 60 inches.

Permeability is moderately slow. The root zone extends to a depth between 40 and 60 inches. The available water capacity is moderate. Runoff is medium to rapid, and the hazard of erosion is moderate to severe.

This soil is used as woodland and watershed and for wildlife habitat and recreation uses. The stand of timber and the understory plants on this soil need to be maintained for these uses.

This soil is suited to the production of grand fir, Douglas-fir, and ponderosa pine. It can produce about 11,850 cubic feet per acre (0.6 inch or more in diameter) of timber at 100 years of age, or 59,000 board feet per acre (Scribner rule) of merchantable timber, 12.6 inches or more in diameter, from an unmanaged stand at 120 years of age, based on the mean annual increment. Grand fir is the dominant species on this soil; however, this species was stunted about 40 years ago, and thus productivity has been reduced.

Timber production is restricted by the hazard of erosion and the moderately slow permeability of the subsoil. In harvesting trees, conventional methods that make use of rubber-tired skidders and crawlers can be used but may be restricted during rainy periods in winter and spring. When this soil is wet, equipment has poor traction and ruts form in the roads. Reforestation should be planned carefully so that competition from undesirable understory plants is minimized.

The native understory vegetation is very sparse and is not suitable for grazing if the stand of trees is fully stocked. If the tree canopy is opened by logging, fire, or other disturbance, the understory vegetation increases and the potential for grazing improves. This grazing potential remains for 10 to 20 years. Grazing should be managed to insure tree regeneration and to protect the soil by leaving an adequate amount of litter on the surface.

The principal native understory plants in areas where the canopy is more open are elk sedge, pine reedgrass, common snowberry, little princes pine, and heartleaf arnica. Total annual air-dry herbage production ranges from about 1,200 pounds per acre in areas where the canopy is more open to 50 pounds per acre in areas where the stand is fully stocked.

Roads, skid trails, and other areas where the soil has been disturbed should be seeded to adapted plant species to reduce erosion. Seeding in these areas should take place in the fall following the soil disturbance so that competition from weeds and brush is minimized. By reducing brush competition, seeding can also promote natural tree regeneration. Some adapted plant species that can be used in seeding are orchardgrass, timothy, tall fescue, and white dutch clover.

This soil supports vegetation that is suitable as cover and food for grouse, songbirds, squirrel, snowshoe hare, hawk, coyote, deer, bear, and elk.

This soil is limited for urban use, roads, and recreation facilities by the steepness of the slopes.

Capability subclass VIe, nonirrigated.

15—Demast loam, 30 to 60 percent slopes. This is a deep, well drained, steep soil. This soil formed in colluvium and residuum of basalt. It is on mountains at an elevation of 5,500 to 6,000 feet. The average annual precipitation is 25 inches, the average annual temperature is 40 degrees F., and the frost-free period is about 65 days.

Included in mapping are small areas of Bluebell cobbly loam that has slopes of less than 35 percent, Tica very cobbly loam, a soil that is similar to this Demast soil but is more than 35 percent gravel and cobbles, and a soil that is similar to this Demast soil except that it has a thinner surface layer.

Typically, the surface layer is dark brown and brown, slightly acid loam 16 inches thick. The upper part of the subsoil is brown, slightly acid loam 17 inches thick; and the lower part is brown, slightly acid cobbly loam 11 inches thick. The substratum is brown, slightly acid cobbly loam; it is underlain by basalt at a depth of 60 inches.

Permeability is moderately slow. The root zone extends to a depth between 40 and 60 inches. The available water capacity is moderate. Runoff is rapid to very rapid, and the hazard of erosion is severe to very severe.

This soil is used as woodland and watershed and for wildlife habitat and recreation uses. The stand of timber and the understory plants on this soil need to be maintained for these uses.

This soil is suited to the production of grand fir, Douglas-fir, and ponderosa pine. It can produce about 11,850 cubic feet per acre (0.6 inch or more in diameter) of timber at 100 years of age, or 59,000 board feet per acre (Scribner rule) of merchantable timber, 12.6 inches or more in diameter, from an unmanaged stand at 120 years of age, based on the mean annual increment. Grand fir is the dominant species on this soil; however, this species was stunted about 40 years ago, and thus productivity is reduced.

Timber production is restricted by the steepness of the slopes, the hazard of erosion, and the moderately slow permeability of the subsoil. When this soil is wet, equipment has poor traction and ruts form quickly in roads. Special equipment that causes a minimum of soil disturbance should be used for harvesting trees; conventional methods that make use of rubber-tired skidders and crawlers can not be used. Reforestation after harvest must be managed carefully to reduce competition from undesirable understory plants.

The native understory vegetation is very sparse and is not suitable for grazing if the stand of trees is fully stocked. If the tree canopy is opened by logging, fire, or other disturbance, the production and quality of the understory vegetation improve and the understory has limited potential for grazing. This grazing potential remains for 10 to 20 years. Livestock grazing should be managed to insure tree regeneration and to protect the soil by leaving an adequate amount of litter on the surface. The steep slopes severely restrict the movement of livestock and the accessibility to forage.

The principal native understory plants in the areas where the canopy is more open are elk sedge, pine reedgrass, common snowberry, little princes pine, and heartleaf arnica. Total annual air-dry herbage production ranges from about 1,200 pounds per acre in areas where the canopy is more open to 50 pounds per acre in areas where the stand is fully stocked.

Roads, skid trails, landings, and other areas where the soil has been disturbed should be seeded to adapted plant species to reduce erosion. Seeding in these areas should take place in the fall following the soil disturbance so that competition from weeds and brush is minimized. By reducing brush competition, seeding can also promote natural tree regeneration. Some adapted plant species that can be used in seeding are orchardgrass, timothy, tall fescue, and white dutch clover.

This soil supports vegetation that is suitable as cover and food for grouse, squirrel, hawk, coyote, snowshoe hare, deer, bear, and elk.

This soil is limited for urban uses, roads, and recreation facilities by the steepness of the slopes.

Capability subclass VIIe, nonirrigated.

16—Donnel sandy loam, 0 to 2 percent slopes. This is a very deep, well drained, level to nearly level soil. This soil formed in granitic alluvium. It is on alluvial fans and terraces on the valley floor at an elevation of 4,800 to 5,100 feet. The average annual precipitation is 23 inches, the average annual temperature is 41 degrees F., and the frost-free period is about 72 days.

Included in mapping are small areas of Gestrin loam, Melton loam, and Roseberry coarse sandy loam. Also included are escarpment areas where the soils are similar to this Donnel soil except that they have slopes that range to 40 percent.

Typically, the surface layer is grayish brown, medium acid sandy loam 15 inches thick. The subsoil is pale brown, medium acid coarse sandy loam 5 inches thick. The substratum, to a depth of 35 inches, is very pale brown, slightly acid coarse sandy loam. Below that, to a depth of 60 inches or more, it is very pale brown, slightly acid and medium acid, stratified sandy loam and loamy sand.

Permeability is moderately rapid to a depth of 30 to 60 inches and rapid below that depth. The root zone extends to a depth of 60 inches or more. The available water capacity is moderate. Runoff is slow; the hazard of erosion is slight, or there is no hazard.

This soil is used for oats, hay, and seed Irish potatoes; as pasture, watershed, and wildlife habitat; and for recreation uses. The natural plant community on this soil is limited. In disturbed areas where this soil does not have a grass cover, lodgepole pine and ponderosa pine can be established naturally.

Pasture is the most important use of this soil because the short growing season limits the choice and productivity of crops. Land leveling, seeding, weed control, pasture and hayland management, and irrigation management are needed. A suitable crop rotation consists of hay or pasture that is maintained as long as the stand is productive, 3 to 4 years of oats or seed Irish potatoes, and seeding to adapted grasses and legumes. To obtain an optimum yield, lime and fertilizer should be applied on the basis of soil tests.

Border, furrow, and corrugation irrigation systems are suitable. The length of the run in border irrigation should be 1,600 to 2,600 feet, and in furrow and corrugation irrigation it should be 500 to 1,000 feet. The longest runs should be used on slopes of less than 0.5 percent.

This soil supports vegetation that is suitable as food for grouse, snowshoe hare, squirrel, songbirds, skunk, hawk, fox, coyote, weasel, deer, bear, and elk. It provides good grazing for big game animals. In most areas, this soil is cultivated, so trees and shrubs need to be planted to provide cover for wildlife.

This soil is well suited to urban uses, roads, and recreation facilities.

Capability subclass IVs, irrigated and nonirrigated.

17—Donnel sandy loam, 2 to 4 percent slopes. This is a very deep, well drained, very gently sloping soil. This soil formed in granitic alluvium. It is on alluvial fans and terraces on the valley floor at an elevation of 4,800 to 5,100 feet. The average annual precipitation is 23 inches, the average annual temperature is 41 degrees F., and the frost-free period is about 72 days.

Included in mapping are small areas of Gestrin loam, Melton loam, and Roseberry coarse sandy loam. Also included are escarpment areas where the soils are similar to this Donnel soil except that they have slopes that range to 40 percent.

Typically, the surface layer is grayish brown, medium acid sandy loam 15 inches thick. The subsoil is pale brown, medium acid coarse sandy loam 5 inches thick. The substratum, to a depth of 35 inches, is very pale brown, slightly acid coarse sandy loam. Below that, to a depth of 60 inches or more, it is very pale brown, slightly acid to medium acid, stratified sandy loam and loamy sand.

Permeability is moderately rapid to a depth of 30 to 60 inches and is rapid below this depth. The root zone extends to a depth of 60 inches or more. The available water capacity is moderate. Runoff is slow, and the hazard of erosion is slight.

This soil is used for oats, hay, and seed Irish potatoes; as pasture, watershed, and wildlife habitat; and for recreation uses. The natural plant community on this soil is limited. In disturbed areas where this soil does not have a grass cover, lodgepole pine and ponderosa pine can be established naturally.

Pasture is the most important use of this soil because the short growing season limits the choice and productivity of crops. Land leveling, seeding, weed control, pasture and hayland management, and irrigation management are needed. A suitable crop rotation consists of hay or pasture that is maintained as long as the stand is productive, 2 or 3 years of oats or seed Irish potatoes, and seeding to adapted grasses and legumes. To obtain an optimum yield, lime and fertilizer should be applied on the basis of soil tests.

Furrow and corrugation irrigation systems are suitable. The length of the run should be 325 to 500 feet.

This soil supports vegetation that is suitable as food for grouse, snowshoe hare, squirrel, hawk, skunk, fox, coyote, weasel, deer, bear, and elk. It provides good grazing for big game animals. However, most areas of this soil are cultivated, so it is necessary to plant trees and shrubs if food and cover are to be developed for wildlife.

This soil is well suited to urban use, roads, and most recreation facilities. Slope is a limitation if this soil is used as a site for playgrounds.

Capability subclass IVe, irrigated, and IVs, nonirrigated.

18—Donnel sandy loam, 4 to 12 percent slopes. This is a very deep, well drained, gently sloping to moderately sloping soil. This soil formed in granitic alluvium. It is on alluvial fans and terraces on the valley floor at an elevation of 4,800 to 5,100 feet. The average annual precipitation is 23 inches, the average annual temperature is 41 degrees F., and the frost-free period is about 72 days.

Included in mapping are small areas of Gestrin loam.

Typically, the surface layer is grayish brown, medium acid sandy loam 15 inches thick. The subsoil is pale brown, medium acid coarse sandy loam 5 inches thick. The substratum, to a depth of 35 inches, is very pale brown, slightly acid coarse sandy loam. Below that, to a depth of 60 inches or more, it is very pale brown, slightly acid to medium acid, stratified sandy loam and loamy sand.

Permeability is moderately rapid to a depth of 30 to 60 inches and rapid below this depth. The root zone extends to a depth of 60 inches or more. The available water capacity is moderate. Runoff is medium, and the hazard of erosion is moderate.

This soil is used for oats and hay; as pasture, watershed, and wildlife habitat; and for recreation uses. The natural plant community on this soil is limited. In disturbed areas where this soil does not have a grass cover, lodgepole pine and ponderosa pine can be established naturally.

Pasture is the most important use of this soil because the short growing season limits the choice and productivity of crops. Seeding, weed control, pasture and hayland management, and irrigation management are needed. A suitable crop rotation consists of hay or pasture that is maintained as long as the stand is productive, 1 or 2 years of oats, and seeding to adapted grasses and legumes. To obtain an optimum yield, lime and fertilizer should be applied on the basis of soil tests.

Corrugation, sprinkler, and furrow irrigation systems are suitable. The length of the run should be less than 325 feet. Irrigation ditches require drop and water-control structures. Contour or cross-slope tillage can help to prevent erosion.

This soil supports vegetation that is suitable as food for grouse, snowshoe hare, squirrel, songbirds, weasel, deer, bear, and elk. It provides good grazing for big game animals. However, most areas of this soil are cultivated, so it is necessary to plant trees and shrubs if food and cover are to be developed for wildlife.

This soil is limited for urban use, roads, and recreation facilities by the steepness of slopes.

Capability subclass IVe, irrigated and nonirrigated.

19—Dumps, mine. This miscellaneous area consists of uneven piles of waste rock, sand, and gravel from placer and dredge mining.

Most areas can be smoothed and planted to trees or shrubs. In some areas, trees and shrubs have been established naturally.

Capability subclass VIII, nonirrigated.

20—Duston sandy loam, 0 to 2 percent slopes. This is a very deep, well drained, level to nearly level soil. This soil formed in mixed alluvium and glacial outwash. It is on glacial outwash plains, terraces, and alluvial fans on the valley floor at an elevation of 4,900 to 5,300 feet. The average annual precipitation is 26 inches, the average annual temperature is 41 degrees F., and the frost-free period is about 70 days.

Included in mapping are small areas of Jurvannah sandy loam, Roseberry coarse sandy loam, and Kangas coarse sandy loam. Also included are escarpment areas where the soils are similar to this Duston soil except that they have slopes that range to 40 percent.

Typically, this soil has a 3-inch thick organic layer that overlies the surface layer. The surface layer is dark grayish brown, slightly acid sandy loam 2 inches thick. The subsoil is brown, slightly acid sandy loam 3 inches thick. The substratum, to a depth of 12 inches, is grayish brown, slightly acid sandy loam; to a depth of 46 inches, it is yellowish brown, slightly acid loamy sand; and to a depth of 60 inches or more, it is yellowish brown, slightly acid coarse sand.

Permeability is very rapid. The root zone extends to a depth of 60 inches or more. The available water capacity is low. Runoff is slow. The hazard of erosion is slight, or there is no hazard.

This soil is used as woodland and watershed and for urban use, wildlife habitat, and recreation uses. The stand of timber and the understory plants on this soil need to be maintained for these uses.

This soil is suited to the production of ponderosa pine and lodgepole pine. It can produce about 2,750 cubic feet per acre (0.6 inch or more in diameter) of pine at 40 years of age, or 33,800 board feet per acre (Scribner rule) of merchantable timber, 11.6 inches or more in diameter, from an unmanaged stand at 150 years of age, based on the mean annual increment.

Timber production is restricted by the very low available water capacity of this soil. In harvesting trees, conventional methods that make use of rubber-tired skidders and crawlers can be used. Reforestation and site preparation should be planned carefully before harvesting trees to insure natural reproduction. Shade from mature trees can help to reduce seedling mortality during hot, dry periods in summer.

The potential for grazing the native understory vegetation is fair if the stand of trees is fully stocked. If the tree canopy is opened by logging, fire, or other disturbance, the production and quality of the understory vegetation improve, and thus the grazing potential improves. The grazing potential remains for 10 to 20 years. Proper grazing and a planned grazing system are essential to insure tree regeneration, to maintain an adequate plant cover and plant vigor, and to protect the soil by leaving an adequate amount of litter on the surface.

The principal native understory plants in the areas where the canopy is more open are elk sedge, pine reedgrass, and common snowberry. Total annual air-dry herbage production ranges from about 1,200 pounds per acre in areas where the canopy is more open to 700 pounds per acre in areas where the stand is fully stocked.

Roads, skid trails, landings, and other areas where the soil has been disturbed should be seeded to adapted plant species to reduce erosion. Seeding in these areas should take place in the fall following the soil disturbance so that competition from weeds and brush is minimized. By reducing brush competition, seeding can also promote natural tree regeneration. Some adapted plant species that can be used in seeding are orchardgrass, tall fescue, pubescent wheatgrass, and intermediate wheatgrass.

This soil has potential for hay, pasture, and oats. The short growing season limits the selection of crops that can be grown and crop production. Tree and brush clearing, land leveling, seeding, weed control, pasture management, and irrigation management are needed. A suitable crop rotation consists of pasture or hay that is maintained as long as the stand is productive, 3 or 4 years of oats, and then seeding to adapted grasses or legumes. For best yields, lime and fertilizer should be applied on the basis of soil tests.

If water for irrigation is available, border, furrow, corrugation, and sprinkler irrigation systems are suitable. The length of the run in border irrigation should be 600 to 1,200 feet, and in furrow and corrugation irrigation, 400 to 500 feet. The longest runs should be used on slopes of less than 0.5 percent.

This soil supports vegetation that is suitable as food for grouse, snowshoe hare, squirrel, songbirds, hawk, fox, skunk, deer, bear, and elk. It provides good grazing for big game animals. Food for wildlife can be developed by planting seed crops. There is good cover for wildlife in uncultivated areas.

This soil is well suited to urban uses, roads, and recreation facilities. Near the town of McCall, this soil is used for urban development. If this soil is used as a site for septic tank absorption fields, the pollution of ground water and of nearby Payette Lake is a hazard because the permeability of this soil is very rapid. The hazard of cutbanks caving is a limitation to excavation. A central sewage system is used in most urban areas in this map unit.

Capability subclass IVs, irrigated and nonirrigated.

21—Duston sandy loam, 2 to 4 percent slopes. This is a very deep, well drained, very gently sloping soil. This soil formed in mixed alluvium and glacial outwash. It is on glacial outwash plains, terraces, and alluvial fans on the valley floor at an elevation of 4,900 to 5,300 feet. The average annual precipitation is 26 inches, the average annual temperature is 41 degrees F., and the frost-free period is about 70 days.

Included in mapping are small areas of Jurvannah sandy loam, Roseberry coarse sandy loam, and Kangas coarse sandy loam. Also included are escarpment areas where the soils are similar to this Duston soil except that they have slopes that range to 40 percent.

The Duston soil typically has a 3-inch thick organic layer that overlies the surface layer. The surface layer is dark grayish brown, slightly acid sandy loam 2 inches thick. The subsoil is brown, slightly acid sandy loam 3 inches thick. The substratum, to a depth of 42 inches, is grayish brown, slightly acid loamy sand. Below that, to a depth of 60 inches or more, it is yellowish brown, slightly acid coarse sand.

Permeability is very rapid. The root zone extends to a depth of 60 inches or more. The available water capacity is low. Runoff is slow, and the hazard of erosion is slight.

This soil is used as woodland and watershed and for urban uses, wildlife habitat, and recreation uses. The stand of timber and the understory plants on this soil need to be maintained for these uses.

This soil is suited to the production of ponderosa pine and lodgepole pine. It can produce about 2,750 cubic feet per acre (0.6 inch or more in diameter) of pine at 40 years of age, or 33,800 board feet per acre (Scribner rule) of merchantable timber, 11.6 inches or more in diameter, from an unmanaged stand at 150 years of age, based on the mean annual increment.

Timber production is restricted by the very low available water capacity of this soil. In harvesting trees, conventional methods that make use of rubber-tired skidders and crawlers can be used. Reforestation and site preparation should be planned carefully before tree harvest to insure natural reproduction. Shade from mature trees can help to reduce seedling mortality during hot, dry periods in summer.

The potential for grazing the native understory vegetation is fair if the stand of trees is fully stocked. If the tree canopy is opened by logging, fire, or other disturbance, the production and quality of the understory vegetation improves, and thus the grazing potential improves. The grazing potential remains for 10 to 20 years. Proper grazing and using a planned grazing system are essential to insure tree regeneration, to maintain an adequate plant cover and plant vigor, and to protect the soil by leaving an adequate amount of litter on the surface.

The principal native understory plants in areas where the canopy is more open are elk sedge, pine reedgrass, and common snowberry. Total annual air-dry herbage production ranges from about 1,200 pounds per acre in areas where the canopy is more open to 700 pounds per acre in areas where the stand is fully stocked.

Roads, skid trails, landings, and other areas where the soil has been disturbed should be seeded to adapted plant species to reduce erosion. Seeding in these areas should take place in the fall following the soil disturbance so that competition from weeds and brush is minimized. By reducing brush competition, seeding can also promote natural tree regeneration. Some adapted plant species that can be used in seeding are orchardgrass, tall fescue, pubescent wheatgrass, and intermediate wheatgrass.

This soil has potential for hay, pasture, and oats. The short growing season limits the selection of crops that can be grown and crop production. Tree and brush clearing, land leveling, seeding, weed control, pasture management, and irrigation management are needed. A suitable crop rotation consists of pasture or hay that is maintained as long as the stand is productive, 2 or 3 years of oats, and then seeding to adapted grasses and legumes. To obtain an optimum yield, lime and fertilizer should be applied on the basis of soil tests.

If irrigation water is available, furrow, corrugation, and sprinkler irrigation systems are suitable. The length of the run should be 200 to 400 feet.

This soil supports vegetation that is suitable as food for grouse, snowshoe hare, squirrel, songbirds, fox, hawk, skunk, deer, bear, and elk. It provides good grazing for big game animals. Food for wildlife can be provided by planting seed crops. There is good cover for wildlife in uncultivated areas.

This soil is well suited to urban use, roads, and most recreation facilities. Slope is a limitation for playgrounds. Near the town of McCall, this soil is used for urban development. If this soil is used as a site for septic tank absorption fields, the pollution of ground water and of nearby Payette Lake is a hazard because the permeability of this soil is moderately rapid. The hazard of cutbanks caving is a limitation to excavation work. A central sewage system is used in most of the urban areas in this map unit.

Capability subclass IVe, irrigated, and IVs, nonirrigated.

22—Gestrin loam, 0 to 2 percent slopes. This is a very deep, moderately well drained, level to nearly level soil. This soil formed in alluvium. It is on alluvial fans and terraces on the valley floor at an elevation of 4,800 to 5,100 feet. The average annual precipitation is 23 inches, the average annual temperature is 41 degrees F., and the frost-free period is about 70 days.

Included in mapping are small areas of Archabal loam, Blackwell clay loam, Melton loam, and areas of a soil that has a sandy loam surface layer. Also included are escarpment areas where the soils are similar to this Gestrin soil except that they have slopes that range to 40 percent.

Typically, the surface layer is 24 inches thick. It is gray and dark grayish brown, strongly acid loam in the upper part and brown, medium acid loam in the lower part. The subsoil is pale brown, medium acid coarse sandy loam 8 inches thick. The substratum, to a depth of 60 inches or more, is very pale brown, medium acid coarse sandy loam and loamy coarse sand. Mottles are common below a depth of 40 inches. In areas between Lake Fork and McCall, the Gestrin soil has cobbles and gravel in the substratum.

Permeability is moderate in the surface layer and rapid below a depth of 30 to 60 inches. The root zone extends to a depth of 60 inches or more. The available water capacity is high. Runoff is slow. The hazard of erosion is slight, or there is no hazard. The water table is at a depth between 3 and 4 feet from midspring to midsummer.

This soil is used for oats and hay; as pasture, watershed, and wildlife habitat; and for recreation uses. The natural plant community on this soil is limited. In disturbed areas where this soil does not have a grass cover, lodgepole pine and ponderosa pine can be established naturally.

Pasture is the most important use of this soil because the short growing season limits the choice and productivity of crops. Land leveling, seeding, weed control, pasture and hayland management, and irrigation management are needed. A suitable crop rotation consists of hay or pasture that is maintained as long as the stand is productive, 3 or 4 years of oats, and then seeding to adapted grasses and legumes. To obtain an optimum yield, lime and fertilizer should be applied on the basis of soil tests.

Border, furrow, and corrugation irrigation systems are suitable. The length of the run in border irrigation should be 1,600 to 2,600 feet, and in furrow and corrugation irrigation, it should be 500 to 1,000 feet. The longest runs should be used on slopes of less than 0.5 percent.

This soil supports vegetation that is suitable as food for grouse, snowshoe hare, squirrel, songbirds, hawk, fox, skunk, deer, weasel, and elk. It provides good grazing for big game animals. In most areas, this soil is cultivated. Trees and shrubs need to be planted to provide cover for wildlife.

This soil is limited for urban uses and roads by wetness and flooding. It is suited to most recreation facilities except campgrounds.

Capability subclass IVc, irrigated and nonirrigated.

23—Gestrin loam, 2 to 4 percent slopes. This is a very deep, moderately well drained, very gently sloping soil. This soil formed in alluvium. It is on alluvial fans and terraces on the valley floor at an elevation of 4,800 to 5,100 feet. The average annual precipitation is 23 inches, the average annual temperature is 41 degrees F., and the frost-free period is about 70 days.

Included in mapping are small areas of Archabal loam and areas of a soil that has a sandy loam surface layer. Also included are escarpment areas where the soils are similar to this Gestrin soil except that they have slopes that range to 40 percent.

Typically, the surface layer is 24 inches thick. It is gray and dark grayish brown, strongly acid loam 18 inches thick in the upper part and brown, medium acid loam 6 inches thick in the lower part. The subsoil is pale brown, medium acid coarse sandy loam 8 inches thick. The substratum, to a depth of 60 inches or more, is very pale brown, medium acid coarse sandy loam and loamy coarse sand. Mottles are common below a depth of 40 inches. In areas between Lake Fork and McCall, this soil has cobbles and gravel in the substratum.

Permeability is moderate in the surface layer and rapid below a depth of 30 to 60 inches. The root zone extends to a depth of 60 inches or more. The available water capacity is high. Runoff is slow, and the hazard of erosion is slight. The water table is between depths of 3 and 4 feet from midspring to midsummer.

This soil is used for oats and hay; as pasture, watershed, and wildlife habitat; and for recreation uses. The natural plant community on this soil is limited. In disturbed areas where there is no grass cover, lodgepole pine and ponderosa pine can be established naturally.

Pasture is the most important use of this soil because the short growing season limits the choice and productivity of crops. Land leveling, seeding, weed control, pasture and hayland management, and irrigation management are needed. A suitable crop rotation consists of hay or pasture that is maintained as long as the stand is productive, 2 or 3 years of oats, and then seeding to adapted grasses and legumes. To obtain an optimum yield, lime and fertilizer should be applied on the basis of soil tests.

Corrugation and furrow irrigation systems are suitable. The length of the run should be 325 to 500 feet.

This soil supports vegetation that is suitable as food for grouse, snowshoe hare, squirrel, songbirds, hawk, fox, skunk, weasel, deer, and elk. It provides good grazing for big game animals. However, most areas of this soil are cultivated, so it is necessary to plant trees and shrubs if food and cover are to be developed for wildlife.

This soil is limited for urban uses and roads by the hazards of wetness and flooding. It is suited to most recreation facilities. However, the use of this soil as sites for playgrounds and camp areas is limited by the steepness of slopes and the hazard of flooding.

Capability subclass IVe, irrigated, and IVc, nonirrigated.

24—Gestrin loam, 4 to 12 percent slopes. This is a very deep, moderately well drained, gently sloping to moderately sloping soil. This soil formed in alluvium. It is on alluvial fans and terraces on the valley floor at an elevation of 4,800 to 5,100 feet. The average annual precipitation is 23 inches, the average annual temperature is 41 degrees F., and the frost-free period is about 70 days.

Included in mapping are small areas of Archabal loam and areas of a soil that is similar to Archabal soils except that it has gravel in the profile.

Typically, the surface layer is 24 inches thick. It is gray and dark grayish brown, strongly acid loam in the upper part and brown, medium acid loam in the lower part. The subsoil is pale brown, medium acid coarse sandy loam 8 inches thick. The substratum, to a depth of 60 inches or more, is very pale brown, medium acid coarse sandy loam and loamy coarse sand. Mottles are common below a depth of 40 inches. In areas between Lake Fork and McCall, the Gestrin soil has cobbles and gravel in the substratum.

Permeability is moderate in the surface layer and rapid below a depth of 30 to 60 inches. The root zone extends to a depth of 60 inches or more. The available water capacity is high. Runoff is medium, and the hazard of erosion is moderate. The high water table is between depths of 3 and 4 feet from midspring to midsummer.

This soil is used for oats or hay; as pasture, watershed, and wildlife habitat; and for recreation uses. The natural plant community on this soil is limited. In disturbed areas where this soil does not have a grass cover, lodgepole pine and ponderosa pine can be established naturally.

Pasture is the most important use of this soil because the short growing season limits the choice and productivity of cultivated crops. Seeding, weed control, pasture and hayland management, and irrigation management are needed. A suitable crop rotation consists of hay or pasture that is maintained as long as the stand is productive, 1 or 2 years of oats, and then seeding to adapted grasses and legumes. To obtain an optimum yield, lime and fertilizer should be applied on the basis of soil tests.

Corrugation, sprinkler, and furrow irrigation systems are suitable. The length of the run should be less than 325 feet. Irrigation ditches require drop and water-control structures. Using contour or cross-slope tillage can help to prevent erosion.

This soil supports vegetation that is suitable as food for grouse, snowshoe hare, squirrel, songbirds, weasel, hawk, fox, skunk, deer, and elk. It provides good grazing for big game animals. However, most areas of this soil are cultivated, so it is necessary to plant trees and shrubs if food and cover are to be developed for wildlife.

This soil is limited for urban uses, roads, and recreation facilities by wetness and flooding and the steepness of slopes.

Capability subclass IVe, irrigated and nonirrigated.

25—Jugson coarse sandy loam, 5 to 30 percent slopes. This is a moderately deep, somewhat excessively drained, gently sloping to moderately steep soil. This soil formed in residuum of granite. It is on north-facing slopes on mountains surrounding the valleys at an elevation of 5,000 to 7,000 feet. The average annual precipitation is 35 inches, the average annual temperature is 34 degrees F., and the frost-free period is about 50 days.

Included in mapping are small areas of Rock outcrop, Shellrock loamy coarse sand, Bryan coarse sandy loam, Pyle loamy coarse sand, and areas of a soil that has a sandy loam surface layer.

Typically, this soil has a 1-inch thick organic layer that overlies the subsurface layer. The subsurface layer is light brownish gray, slightly acid coarse sandy loam less than 1 inch thick. The subsoil is grayish brown, slightly acid coarse sandy loam 20 inches thick. The substratum is light brownish gray, medium acid loamy coarse sand 15 inches thick. Decomposed biotite granite is at a depth of 35 inches.

Permeability is moderately rapid in the subsoil and rapid in the substratum. The root zone extends to a depth of 20 to 40 inches. The available water capacity is low. Runoff is medium, and the hazard of erosion is moderate or severe.

This soil is used as woodland and watershed and for wildlife habitat and recreation uses. The stand of timber and the understory plants on this soil need to be maintained for these uses.

This soil is suited to the production of grand fir, Douglas-fir, lodgepole pine, and western white pine. It can produce about 13,500 cubic feet per acre (0.6 inch or more in diameter) of pine at 100 years of age, or 81,000 board feet per acre (Scribner rule) of merchantable timber, 12.6 inches or more in diameter, from an unmanaged stand at 120 years of age, based on the mean annual increment.

Timber production is restricted by the very low available water capacity of this soil and by the hazard of erosion. In harvesting trees, conventional equipment such as rubber-tired skidders and crawlers can be used. Roads, landings, and skid trails should be planned carefully so that soil loss is minimized. Reforestation after harvest should be managed carefully so that competition from undesirable understory plants is minimized.

The native understory vegetation is very sparse and is not suitable for grazing if the stand of trees is fully stocked. If the tree canopy is opened by logging, fire, or other disturbance, the potential for grazing and the understory vegetation improve. The grazing potential remains for 10 to 20 years. Grazing should be managed to insure tree regeneration and to protect the soil by leaving an adequate amount of litter on the surface.

The principal native understory plants in areas where the canopy is more open are common beargrass, goldthread, and pachystima. Total annual air-dry herbage production ranges from about 1,000 pounds per acre in areas where the canopy is more open to 50 pounds per acre in areas where the stand is fully stocked.

Roads, skid trails, landings, and other areas where the soil has been disturbed should be seeded to adapted plant species to reduce erosion. Seeding in these areas should take place in the fall following the soil disturbance so that competition from weeds and brush is minimized. By reducing brush competition, seeding can also promote natural tree regeneration. Some adapted plant species that can be used in seeding are orchardgrass, timothy, tall fescue, and white dutch clover.

This soil supports vegetation that is suitable as cover and food for grouse, snowshoe hare, squirrel, songbirds, hawk, fox, coyote, skunk, bear, deer, and elk. If the soil is used for wildlife habitat, planting seed crops as food for wildlife can improve the habitat.

This soil is limited for many urban uses by the moderate depth to rock and the steepness of slopes. Its suitability for roads and streets and recreation facilities is limited by the steepness of slopes.

Capability subclass VIe, nonirrigated.

26—Jugson coarse sandy loam, 30 to 60 percent slopes. This is a moderately deep, somewhat excessively drained, steep soil. This soil formed in material that weathered from granite. It is on north-facing slopes on mountains surrounding the valleys at an elevation of 5,000 to 7,000 feet. The average annual precipitation is 35 inches, the average annual temperature is 34 degrees F., and the frost-free period is 50 days.

Included in mapping are small areas of Rock outcrop, Shellrock loamy coarse sand, Bryan coarse sandy loam, Pyle loamy coarse sand, and areas of a soil that has a sandy loam surface layer.

Typically, this soil has a 1-inch thick organic layer that overlies a subsurface layer. The subsurface layer is light brownish gray, slightly acid coarse sandy loam less than 1 inch thick. The subsoil is grayish brown, slightly acid coarse sandy loam 20 inches thick. The substratum is light brownish gray, medium acid loamy coarse sand 15 inches thick. Decomposing biotite granite is at a depth of 35 inches.

Permeability is moderately rapid in the subsoil and rapid in the substratum. The root zone extends to a depth between 20 and 40 inches. The available water capacity is low. Runoff is rapid, and the hazard of erosion is severe or very severe.

This soil is used as woodland and watershed and for wildlife habitat and recreation uses. The stand of timber and the understory plants on this soil need to be maintained for these uses.

This soil is suited to the production of grand fir, lodgepole pine, Douglas-fir, and western white pine. It can produce about 13,500 cubic feet per acre (0.6 inch or more in diameter) of timber at 100 years of age, or 81,000 board feet per acre (Scribner rule) of merchantable timber, 12.6 inches or more in diameter, from an unmanaged stand at 120 years of age, based on the mean annual increment.

Timber production is restricted by the steepness of slopes and the hazard of erosion. Slopes generally are too steep for cross-slope operations using conventional equipment such as rubber-tired skidders and crawlers. In harvesting trees, special equipment that causes a minimum of soil disturbance should be used. Reforestation after harvest should be managed carefully so that competition from undesirable understory plants is minimized.

The native understory vegetation is very sparse and is not suitable for grazing if the stand of trees is fully stocked. If the tree conopy is opened by logging, fire, or other disturbance, the understory vegetation and the potential for grazing improve. This grazing potential remains for 10 to 20 years. Grazing should be managed to insure tree regeneration and to protect the soil by leaving an adequate amount of litter on the surface. The steep slopes severely restrict the movement of livestock and the accessibility to forage.

The principal native understory plants in areas where the canopy is more open are common beargrass, goldthread, and pachystima. Total annual air-dry herbage production ranges from about 1,000 pounds per acre in areas where the canopy is more open to 50 pounds per acre in areas where the stand is fully stocked.

Roads, skid trails, landings, and other areas where the soil has been distributed should be seeded to adapted plant species to reduce erosion. Seeding in these areas should take place in the fall following the soil disturbance so that competition from weeds and brush is minimized. By reducing brush competition, seeding can promote natural tree regeneration. Some adapted plant species that can be used in seeding are orchardgrass, timothy, tall fescue, and white dutch clover.

This soil supports vegetation that is suitable as cover and food for grouse, snowshoe hare, squirrel, songbirds, hawk, fox, coyote, skunk, weasel, bear, deer, and elk. It provides good food for big game animals and good cover for other wildlife. If this soil is used for wildlife habitat, planting seed crops as food for wildlife can improve the habitat.

This soil is limited for urban uses by the moderate depth to rock and the steepness of slopes. Its suitability for roads and streets and for recreation facilities is limited by the steepness of slopes.

Capability subclass VIIe, nonirrigated.

27—Jurvannah sandy loam. This is a very deep, poorly drained, level to nearly level soil. This soil formed in alluvium that derived from granite. It is on alluvial fans, low stream terraces, and flood plains along streams at an elevation of 4,800 to 5,100 feet. The slope is 0 to 2 percent. The average annual precipitation is 23 inches, the average annual temperature is 39 degrees F., and the frost-free period is about 70 days.

Included in mapping are small areas of Melton loam and Roseberry coarse sandy loam. Also included are escarpment areas where the soils are similar to this Jurvannah soil except that they have slopes that range to 40 percent.

Typically, the surface layer is grayish brown, medium acid sandy loam 6 inches thick. The underlying material, to a depth of 10 inches, is very pale brown, medium acid sand; to a depth of 22 inches, it is white, medium acid gravelly sand; and to a depth of 60 inches or more, it is pink and yellowish red and very pale brown and pale brown, slightly acid, very gravelly sand.

Permeability is very rapid. The root zone extends to a depth of 60 inches or more. The available water capacity is very low. Runoff is slow; the hazard of erosion is slight, or there is no hazard. The water table is between depths of 18 and 36 inches from midspring to midsummer.

This soil is used as rangeland and watershed and for wildlife habitat and recreation uses. The natural plant community is mainly sedges, rushes, redtop, tufted hairgrass, and willow. Proper grazing and a planned grazing system are needed to maintain an adequate plant cover and plant vigor, to improve grazing efficiency, and to improve wildlife habitat.

This soil is mainly used for summer grazing. Drainage of this soil is possible, but it is difficult because of the low position of the soil on the landscape. Using shallow ditches to remove excess surface water can help to improve plant growth. If drained, this soil can be cultivated and seeded to adapted grasses and legumes.

This soil supports vegetation that is suitable as food for ducks, geese, and other waterfowl. Uncultivated and unharvested areas provide excellent cover for wildlife. The short growing season limits the growth of grain or seed crops. Other wildlife in the area include grouse, rabbit, fox, skunk, hawk, squirrel, songbirds, fisher, mink, muskrat, beaver, and weasel. The population of these animals is small; however, leaving some areas unharvested or growing seed crops as food for wildlife can help to increase the wildlife population.

This soil is limited for urban uses, roads, and recreation facilities by the hazards of wetness and flooding. This soil is a good source of gravel; however, the high water table limits accessibility in some areas.

Capability subclass Vw, irrigated and nonirrigated.

28—Kangas coarse sandy loam. This is a very deep, somewhat excessively drained, level to nearly level soil. This soil formed in glacial outwash. It is on outwash plains and terraces along streams at an elevation of 4,800 to 5,100 feet. The slope is 0 to 2 percent. The average annual precipitation is 23 inches, the average annual temperature is 39 degrees F., and the frost-free period is about 70 days.

Included in mapping are small areas of Roseberry coarse sandy loam, Melton loam, Donnel sandy loam, and Kangas fine gravelly loamy coarse sand. Also included are areas where this Kangas soil has slopes that range to 8 percent and escarpment areas where the soils are similar to this Kangas soil except that they have slopes that range to 40 percent.

Typically, the surface layer is grayish brown and brown, slightly acid coarse sandy loam 16 inches thick. The underlying material, to a depth of 42 inches, is pale brown and very pale brown, slightly acid fine gravelly loamy sand; and, to a depth of 60 inches or more, it is very pale brown, slightly acid fine gravelly coarse sand.

Permeability is rapid. The root zone extends to a depth of 60 inches or more. The available water capacity is very low. Runoff is slow or very slow. The hazard of erosion is slight, or there is no hazard.

This soil is used as rangeland and watershed and for wildlife habitat and recreation. The principal native understory plants are Idaho fescue, arrowleaf balsamroot, and mountain big sagebrush. If the vigor of the grasses declines, the vegetation will be dominated by sagebrush. If this soil is used for grazing livestock, proper grazing and using a planned grazing system are essential to maintain or to improve range condition, plant vigor, and wildlife habitat.

In some areas, this soil has been cultivated. A suitable rotation consists of grass or hay maintained as long as the stand is productive, 1 or 2 years of oats, and then seeding to adapted grasses and legumes. Border and sprinkler irrigation systems are suitable. Because of the high water intake rate of this soil, sprinklers are the best method of irrigation.

This soil supports vegetation that is suitable as food for grouse, snowshoe hare, squirrel, hawk, fox, skunk, songbirds, and deer. The best cover is provided in areas that have been invaded by lodgepole pine and brush. Crops provide food for wildlife.

This soil is limited for urban uses because it is subject to flooding. Because of the rapid permeability, the pollution of ground water is a hazard. This soil is a good source of sand.

Capability subclass IVs, irrigated and nonirrigated.

29—Kangas fine gravelly loamy coarse sand. This is a very deep, somewhat excessively drained, level to nearly level soil. This soil formed in glacial outwash. It is on outwash plains and terraces along streams at an elevation of 4,800 to 5,100 feet. The slope is 0 to 2 percent. The average annual precipitation is 23 inches, the average annual temperature is 39 degrees F., and the frost-free period is about 70 days.

Included in mapping are small areas of Roseberry coarse sandy loam, Melton loam, Donnel sandy loam, and Kangas coarse sandy loam. Also included are areas where this Kangas soil has slopes that range to 8 percent and escarpment areas where the soils are similar to this Kangas soil except that they have slopes that range to 40 percent.

Typically, the surface layer is grayish brown and brown, slightly acid, fine gravelly loamy coarse sand 16 inches thick. The underlying material, to a depth of 42 inches, is pale brown and very pale brown, slightly acid, fine gravelly loamy coarse sand; and, to a depth of 60 inches or more, it is very pale brown, slightly acid, fine gravelly coarse sand.

Permeability is rapid. The root zone extends to a depth of 60 inches or more. The available water capacity is very low. Runoff is very slow. The hazard of erosion is slight, or there is no hazard.

This soil is used as rangeland and watershed and for wildlife habitat and recreation uses. The principal native understory plants are Idaho fescue, arrowleaf balsamroot, and mountain big sagebrush. If the vigor of grasses declines, the vegetation will be dominated by sagebrush. If this soil is used for grazing livestock, proper grazing and using a planned grazing system are essential to maintain or to improve range condition, plant vigor, and wildlife habitat.

In some areas, this soil has been cultivated. A suitable crop rotation consists of grass or hay maintained as long as the stand is productive, 1 or 2 years of oats, and then seeding to adapted grasses and legumes. The droughty condition of this soil is a limitation to plant growth. Because of the very high rate of water intake, sprinklers are the best method of irrigation.

This soil supports vegetation that is suitable as food for grouse, snowshoe hare, squirrel, fox, skunk, hawk, songbirds, and deer. The best wildlife cover is provided in areas that have been invaded by lodgepole pine and brush. Crops can provide food for wildlife.

This soil is limited for urban uses because it is subject to flooding. Because of the rapid permeability, the pollution of ground water is a hazard. This soil is limited to use as a site for recreation facilities because of the coarse textured surface layer. This soil is a good source of sand.

Capability subclass IVs, irrigated and nonirrigated.

30—Koppes-Toiyabe complex, 40 to 60 percent slopes. This complex consists of steep soils that are on south-facing slopes of mountains between Beaver Creek and Clear Creek. These soils are at an elevation of 4,500 to 6,000 feet. Koppes coarse sandy loam makes up about 50 percent of this complex, and Toiyabe loamy coarse sand makes up about 35 percent. The remaining 15 percent of the complex consists of Coski sandy loam, Pyle loamy coarse sand, and Quartzburg loamy coarse sand.

The Koppes soil is very deep and well drained. If formed in colluvium and residuum of granite. It is in swales and concave positions on mountains. The average annual precipitation is 29 inches, the average annual temperature is 39 degrees F., and the frost-free period is about 60 days.

Typically, the surface layer of the Koppes soil is grayish brown, slightly acid coarse sandy loam 13 inches thick. The underlying material, to a depth of 44 inches, is pale brown, slightly acid, gravelly loamy coarse sand and loamy coarse sand; and, to a depth of 60 inches or more, it is pale brown, neutral, gravelly loamy coarse sand and gravelly sand.

The Koppes soil has rapid permeability. The root zone extends to a depth of 60 inches or more. The available water capacity is low. Runoff is rapid, and the hazard of erosion is severe or very severe.

Toiyabe soil is shallow and excessively drained. It formed in residuum of granite. It is on mountain ridgetops and saddles. The average annual precipitation is 29 inches, the average annual temperature is 41 degrees F., and the frost-free period is about 70 days.

Typically, the surface layer of the Toiyabe soil is grayish brown, medium acid loamy coarse sand 5 inches thick. The underlying material is light brownish gray, medium acid, gravelly loamy coarse sand 6 inches thick. Decomposing granite is at a depth of 11 inches.

The Toiyabe soil has rapid permeability. The root zone extends to a depth of 10 to 20 inches. The available water capacity is very low. Runoff is rapid, and the hazard of erosion is severe or very severe.

This complex is used as woodland and watershed and for recreation uses and wildlife habitat. The stand of timber and the forage plants on these soils need to be maintained for these uses.

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

Timber production is restricted by the very low available water capacity of this soil. Harvesting is restricted by the steepness of slopes and the hazard of erosion. Slopes generally are too steep for cross-slope operations using conventional equipment such as rubber-tired skidders and crawlers. Special equipment that causes a minimum of soil disturbance should be used in harvesting trees. Reforestation and site preparation should be planned carefully before harvesting trees to insure natural reproduction.

The Toiyabe soil is suited to the production of ponderosa pine. It can produce about 2,750 cubic feet per acre (0.6 inch or more in diameter) of pine at 40 years of age, or 33,800 board feet per acre (Scribner rule) of merchantable timber, 11.6 inches or more in diameter, from an unmanaged stand at 150 years of age, based on the mean annual increment.

Timber production is restricted by the very low available water capacity and the shallowness of this soil. Harvesting is restricted by the steepness of slopes, the hazard of erosion, and the shallowness of the soil. Slopes generally are too steep for cross-slope operations using conventional equipment such as rubber-tired skidders and crawlers. Because of the shallowness of this soil, road construction requires the excavation of bedrock. Special equipment that causes a minimum of soil disturbance should be used in harvesting trees. Stands of cut-over timber commonly are understocked because of the high seedling mortality during hot, dry periods in summer. Reforestation and site preparation should be planned carefully before trees are harvested to insure natural reproduction. Shade from mature trees can help to reduce seedling mortality.

The potential for grazing the native understory vegetation on the Koppes soil is fair if the stand of trees is fully stocked. The principal native understory plants in areas where the canopy is more open are mallow ninebark, elk sedge, pine reedgrass, and common snowberry. Total annual air-dry herbage production ranges from about 1,200 pounds per acre in areas where the canopy is more open to 550 pounds per acre in areas where the stand is fully stocked.

The potential for grazing the native understory vegetation on the Toiyabe soil is fair if the stand of trees is fully stocked. The principal native understory plants in areas where the canopy is more open are Idaho fescue, common snowberry, bluebunch wheatgrass, and elk sedge. Total annual air-dry herbage production ranges from about 900 pounds per acre in areas where the canopy is more open to 300 pounds per acre in areas where the stand is fully stocked.

If the tree canopy is opened on either soil by logging, fire, or other disturbance, the production and quality of the understory vegetation improve, and thus the grazing potential improves. The grazing potential remains for 10 to 20 years. Proper grazing and a planned grazing system are essential to insure tree regeneration, to maintain an adequate plant cover and plant vigor, and to protect the soil by leaving an adequate amount of litter on the surface. The steep slopes severely restrict the movement of livestock and the accessibility to forage.

Roads, skid trails, landings, and other areas where the soil has been disturbed should be seeded to adapted plant species to reduce erosion. Seeding in these areas should take place in the fall following the soil disturbance so that competition from weeds and brush is minimized. By reducing brush competition, seeding can also promote natural tree regeneration. Some adapted plant species that can be used in seeding are orchardgrass, tall fescue, pubescent wheatgrass, and intermediate wheatgrass.

These soils support vegetation that is suitable as food and cover for grouse, squirrel, snowshoe hare, songbirds, weasel, hawk, fox, coyote, skunk, bear, deer, and elk. If these soils are used for wildlife habitat, planting seed crops as food for wildlife can improve the habitat.

These soils are limited for urban and recreation uses by the steep slopes and the shallowness of the Toiyabe soil.

Capability subclass VIIe, nonirrigated.

31—McCall complex, 5 to 50 percent slopes. This complex consists mainly of gently sloping to steep soils and some very steep soils on glacial moraines surrounding Payette Lake. These soils are at an elevation of 4,900 to 5,300 feet. McCall very cobbly sandy loam on south-facing slopes makes up about 60 percent of this complex, and McCall very cobbly sandy loam on north-facing slopes makes up about 35 percent. The remaining 5 percent of the complex consists of Jugson coarse sandy loam, Gestrin loam, Melton loam, Archabal loam, and a soil that is similar to McCall soils but has a surface layer of very cobbly loam, very gravelly loam, or very gravelly sandy loam.

McCall soils are very deep and somewhat excessively drained. They formed in moderately coarse textured and coarse textured, cobbly and stony glacial till. The average annual precipitation is 25 inches, the average annual temperature is 39 degrees F., and the frost-free period is about 70 days.

The McCall soil on south-facing slopes typically has a 1-1/2 inch thick organic layer that overlies the surface layer. The surface layer is dark grayish brown, medium acid, very cobbly sandy loam and brown, slightly acid, very cobbly sandy loam 8 inches thick. The subsoil is brown and pale brown, slightly acid, very cobbly sandy loam and very cobbly coarse sandy loam 40 inches thick. The substratum, to a depth of 60 inches or more, is light brownish gray, slightly acid, very cobbly coarse sand.

The McCall soil on north-facing slopes typically is similar to that on south-facing slopes except that the organic layer and surface layer are slightly thicker and the organic matter content in the surface layer is slightly higher. The main difference is temperature and its effect on the available water capacity of the soils. Grand fir does not grow on the south-facing slopes because the soils are droughty.

McCall soils have moderately rapid permeability in the subsoil and rapid permeability in the substratum. The root zone extends to a depth of 60 inches or more. The available water capacity is low. Runoff is medium to very rapid, and the hazard of erosion is moderate to very severe.

The soils in this complex are used as woodland and watershed and for urban development, recreation uses, and wildlife habitat. Most of these uses depend on the maintenance of a healthy stand of timber and understory plants.

The McCall soil on south-facing slopes is suited to the production of Douglas-fir and ponderosa pine. It can produce about 2,750 cubic feet per acre (0.6 inch or more in diameter) of timber at 40 years of age, or 29,000 board feet per acre (Scribner rule) of merchantable timber, 11.6 inches or more in diameter, from an unmanaged stand at 130 years of age, based on the mean annual increment.

The McCall soil on north-facing slopes is suited to the production of grand fir, Douglas-fir, and ponderosa pine. It can produce about 11,850 cubic feet per acre (0.6 inch or more in diameter) of timber at 100 years of age, or 59,000 board feet per acre (Scribner rule) of merchantable timber, 12.6 inches or more in diameter, from an unmanaged stand at 120 years of age, based on the mean annual increment.

Timber production is restricted by the steepness of slopes and by the stones and boulders on the surface. Conventional methods can be used to harvest trees, but road construction requires grading and shaping because of the surface stones and boulders. The areas of steep soils are small and localized, and special harvesting equipment is not needed in these areas. Reforestation and site preparation should be planned carefully before trees are harvested to insure natural reproduction and to minimize soil loss.

The potential for grazing the native understory vegetation is poor to fair if the stand of trees is fully stocked. If the tree canopy is opened by logging, fire, or other disturbance, the production and quality of the understory vegetation improve, and thus the grazing potential improves. The grazing potential remains for 10 to 20 years. Proper grazing and a planned grazing system are essential to insure tree regeneration, to maintain an adequate plant cover and plant vigor, and to protect the soil by leaving an adequate amount of litter on the surface.

The principal native understory plants in areas where the canopy is more open are mallow ninebark, elk sedge, pine reedgrass, and common snowberry. Total annual air-dry herbage production ranges from about 1,000 pounds per acre in areas where the canopy is more open to 75 pounds per acre in areas where the stand is fully stocked.

Roads, skid trails, landings, and other areas where the soil has been disturbed should be seeded to adapted plant species to reduce erosion. Seeding in these areas should take place in the fall following the soil disturbance so that competition from weeds and brush is minimized. By reducing brush competition, seeding can also promote natural tree regeneration. Some adapted plant species that can be used in seeding are orchardgrass, tall fescue, pubescent wheatgrass, and intermediate wheatgrass.

These soils support vegetation that is suitable as cover and food for deer, elk, fox, coyote, skunk, hawk, squirrel, grouse, and bear. If these soils are used for wildlife habitat, planting seed crops as food for wildlife can improve the habitat.

Near the town of McCall, these soils are used for urban development. However, they are limited for urban use, as sites for roads, and for recreation facilities because of the large stones and boulders on the surface and the steepness of slopes. If these soils are used as septic tank absorption fields, the pollution of ground water and of nearby Payette Lake is a hazard because the permeability of these soils is rapid. Large stones and boulders and the hazard of cutbanks caving are limitations to excavation.

Capability subclass VIe, nonirrigated.

32—McCall-Naz complex, 5 to 40 percent slopes. This complex consists of gently sloping to steep soils that are on glaciated mountain benches and meadows surrounding Payette Lake. These soils are at an elevation of 5,000 to 6,500 feet. McCall very cobbly sandy loam, 5 to 40 percent slopes, makes up about 55 percent of this complex, and Naz sandy loam, 10 to 40 percent slopes, makes up about 20 percent. The remaining 25 percent is Jugson coarse sandy loam, Melton loam, Roseberry coarse sandy loam, and Rock outcrop.

The McCall soil is in areas of glacial deposits. This soil is very deep and somewhat excessively drained. It formed in moderately coarse textured and coarse textured cobbly and stony glacial till. The average annual precipitation is 25 inches, the average annual temperature is 39 degrees F., and the frost-free period is about 70 days.

The McCall soil typically has a 2-inch thick organic layer that overlies the surface layer. The surface layer is dark grayish brown, medium acid very cobbly sandy loam and brown, slightly acid very cobbly sandy loam about 8 inches thick. The subsoil is pale brown, slightly acid very cobbly sandy loam and very cobbly coarse sandy loam 40 inches thick. The substratum, to a depth of 60 inches or more, is light brownish gray, slightly acid very cobbly coarse sand.

The McCall soil has moderately rapid permeability in the subsoil and rapid permeability in the substratum. The root zone extends to a depth of 60 inches or more. The available water capacity is low. Runoff is medium to very rapid, and the hazard of erosion is slight to severe.

The Naz soil is in areas of residual soil material. This soil is deep and well drained. It formed in colluvium and residuum of granite, diorite, and porphyry. The average annual precipitation is 28 inches, the average annual temperature is 38 degrees F., and the frost-free period is about 60 days.

The Naz soil typically has a 1-inch thick organic layer that overlies the surface layer. The surface layer is 26 inches thick. In the upper part, it is very dark grayish brown and dark brown, slightly acid sandy loam 18 inches thick, and in the lower part it is dark grayish brown, slightly acid gravelly sandy loam 8 inches thick. The underlying material, to a depth of 60 inches, is pale brown, medium acid cobbly coarse sandy loam.

The Naz soil has rapid permeability. The root zone extends to a depth of 40 to 70 inches. The available water capacity is moderate. Runoff is medium to rapid, and the hazard of erosion is slight to severe.

The soils in this complex are used as woodland and watershed and for recreation and wildlife habitat. These uses depend on the maintenance of a healthy stand of timber and understory plants.

The McCall soil is suited to the production of grand fir, Douglas-fir, and ponderosa pine. It can produce about 11,850 cubic feet per acre (0.6 inch or more in diameter) of timber at 100 years of age, or 59,000 board feet per acre (Scribner rule) of merchantable timber, 12.6 inches or more in diameter, from an unmanaged stand at 120 years of age, based on the mean annual increment.

The Naz soil is suited to the production of ponderosa pine. It can produce about 5,050 cubic feet per acre (0.6 inch or more in diameter) of pine at 50 years of age, or 44,600 board feet per acre (Scribner rule) of merchantable timber, 11.6 inches or more in diameter, from an unmanaged stand at 120 years of age, based on the mean annual increment.

Timber production is restricted by the steepness of slopes and by the stones and boulders on the surface. Conventional methods can be used to harvest trees, but road construction requires grading and shaping because of the surface stones and boulders. The areas of steep soils are small and localized, and special harvesting equipment generally is not needed in these areas. Reforestation and site preparation should be planned carefully before trees are harvested to insure natural reproduction and to minimize soil loss.

The native understory vegetation is very sparse and is not suitable for grazing if the stand of trees is fully stocked. If the tree canopy is opened by logging, fire, or other disturbance, the understory vegetation and the potential for grazing improve. The grazing potential remains for 10 to 20 years. Grazing should be managed to insure tree regeneration and to protect the soil by leaving an adequate amount of litter on the surface.

The principal native understory plants in areas where the canopy is more open are mallow ninebark, pine reedgrass, and common snowberry. Total annual air-dry herbage production ranges from about 1,000 pounds per acre in areas where the canopy is more open to 75 pounds per acre in areas where the stand is fully stocked.

Roads, skid trails, landings, and other areas where the soil has been disturbed should be seeded to adapted plant species to reduce erosion. Seeding in these areas should take place in the fall following the soil disturbance so that competition from weeds and brush is minimized. By reducing brush competition, seeding can also promote natural tree regeneration. Some adapted plant species that can be used in seeding are orchardgrass, timothy, tall fescue, and white dutch clover.

These soils support vegetation that is suitable as cover and food for grouse, squirrel, snowshoe hare, songbirds, hawk, fox, coyote, skunk, weasel, bear, deer, and elk. If these soils are used for wildlife habitat, planting seed crops as food for wildlife can improve the habitat.

These soils are limited for urban and recreation uses by the steepness of slopes, boulders, stones, and rock outcrops.

Capability subclass VIe, nonirrigated.

33—McCall-Rock outcrop complex, 40 to 60 percent slopes. This complex consists of steep soils and areas of Rock outcrop on glaciated mountains surrounding the Payette Lakes. The elevation is 5,000 to 6,500 feet.

McCall very cobbly sandy loam makes up about 65 percent of this complex. Rock outcrop makes up about I5 percent, and Naz sandy loam makes up about 10 percent of the complex. The remaining 10 percent of the complex consists of Jugson coarse sandy loam and a soil that is similar to Toiyabe loamy sand except that it has an organic layer 2 to 4 inches thick and has bedrock within a depth of 10 inches.

The McCall soil is in areas of glacial deposits. This soil is very deep and somewhat excessively drained. It formed in moderately coarse textured and coarse textured, cobbly and stony glacial till. The average annual precipitation is 25 inches, the average annual temperature is 39 degrees F., and the frost-free period is about 70 days.

The McCall soil typically has a 2-inch thick organic layer that overlies the surface layer. The surface layer is dark grayish brown, medium acid very cobbly sandy loam and brown, slightly acid very cobbly sandy loam about 8 inches thick. The subsoil is pale brown, slightly acid very cobbly sandy loam 40 inches thick. The substratum, to a depth of 60 inches or more, is light brownish gray, slightly acid very cobbly coarse sand.

The McCall soil has moderately rapid permeability in the subsoil and rapid permeability in the substratum. The root zone extends to a depth of 60 inches or more. The available water capacity is low. Runoff is very rapid, and the hazard of erosion is severe or very severe.

Rock outcrop consists of areas that have large surface boulders and exposed granitic bedrock.

The Naz soil is in areas of residual soil material. This soil is deep and well drained. It formed in colluvium and residuum of granite, diorite, and porphyry. The average annual precipitation is 28 inches, the average annual temperature is 38 degrees F., and the frost-free period is about 60 days.

The Naz soil typically has a 1-inch thick organic layer that overlies the surface layer. The surface layer is 26 inches thick. It is very dark grayish brown and dark brown, slightly acid sandy loam 18 inches thick in the upper part and dark grayish brown, slightly acid gravelly sandy loam 8 inches thick in the lower part. The underlying material, to a depth of 60 inches, is pale brown, medium acid, cobbly coarse sandy loam.

The Naz soil has rapid permeability. The root zone extends to a depth of 40 to 70 inches. The available water capacity is moderate. Runoff is very rapid, and the hazard of erosion is severe or very severe.

The soils in this complex are used as woodland and watershed and for recreation uses and wildlife habitat. These uses depend on the maintenance of a good stand of timber and understory plants.

The McCall soil is suited to the production of grand fir, Douglas-fir, and ponderosa pine. It can produce about 11,850 cubic feet per acre (0.6 inch or more in diameter) of timber at 100 years of age, or 59,000 board feet per acre (Scribner rule) of merchantable timber, 12.6 inches or more in diameter, from an unmanaged stand at 120 years of age, based on the mean annual increment.

The Naz soil is suited to the production of ponderosa pine. It can produce about 5,050 cubic feet per acre (0.6 inch or more in diameter) of timber at 50 years of age, or 44,600 board feet per acre (Scribner rule) of merchantable timber, 11.6 inches or more in diameter, from an unmanaged stand at 120 years of age, based on the mean annual increment.

Timber production is restricted by the many rock outcrops. Harvesting is limited by the steep slopes and poor accessibility to the areas. The topography severely restricts timber production because of the complex pattern of rock outcrops, surface boulders, and small steep areas of productive soils. Road construction is difficult and costly because there are no suitable sites for roads. Conventional methods cannot be used to harvest trees. Reforestation must be planned carefully to reduce competition from undesirable understory plants.

The native understory vegetation on the McCall and Naz soils is very sparse and is not suitable for grazing if the stand of trees is fully stocked. If the tree canopy is opened by logging, fire, or other disturbance, the understory vegetation and the potential for grazing improve. The grazing potential remains for 10 to 20 years. Grazing should be managed to insure tree regeneration and to protect the soil by leaving an adequate amount of litter on the surface. The steep slopes severely restrict the movement of livestock and the accessibility to forage.

The principal native understory plants in areas where the canopy is more open are mallow ninebark, pine reedgrass, and common snowberry. Total annual air-dry herbage production ranges from about 850 pounds per acre in areas where the canopy is more open to 75 pounds per acre in areas where the stand is fully stocked.

Roads, skid trails, landings, and other areas where the soil has been disturbed should be seeded to adapted plant species to reduce erosion. Seeding in these areas should take place in the fall following the soil disturbance so that competition from weeds and brush is minimized. By reducing brush competition, seeding can also promote natural tree regeneration. Some adapted plant species that can be used in seeding are orchardgrass, timothy, tall fescue, and white dutch clover.

These soils support vegetation that is suitable as cover and food for grouse, squirrel, snowshoe hare, songbirds, hawk, fox, coyote, skunk, weasel, bear, deer, and elk. If these soils are used for wildlife habitat, planting seed crops as food for wildlife can improve the habitat.

These soils are limited for urban and recreational development by the steep slopes, the surface boulders and stones, and the rock outcrops.

Capability subclass VIIe, nonirrigated.

34—Melton loam. This is a very deep, poorly drained, level to very gently sloping soil. This soil formed in glacial outwash. It is on stream bottoms, alluvial fans, and outwash plains in the valleys at an elevation of 4,800 to 5,100 feet. The average annual precipitation is 23 inches, the average annual temperature is 38 degrees F., and the frost-free period is about 68 days.

Included in mapping are small areas of Blackwell clay loam, Blackwell mucky silt loam, Blackwell Variant silt loam, Cabarton silty clay loam, Gestrin loam, Roseberry coarse sandy loam, and a soil that is similar to this Melton soil except that it has sand, gravel, or cobbles at a depth between 20 and 30 inches.

Typically, the surface layer is dark grayish brown, strongly acid loam 10 inches thick. The underlying material, to a depth of 25 inches, is grayish brown, very strongly acid loam; and to a depth of 30 inches it is brown, very strongly acid, gravelly sandy loam. Below this, cobbly outwash that consists of light grayish brown and grayish brown loamy sand and cobblestones extends to a depth of 60 inches or more. Mottles are at a depth between 10 and 20 inches.

Permeability is moderate in the surface layer and rapid below a depth of 30 to 35 inches. The root zone extends to a depth of 60 inches or more. The available water capacity is moderate. Runoff is slow. The hazard of erosion is slight, or there is no hazard. The water table is at a depth between 1 and 2 feet from midspring to midsummer.

This soil is used as rangeland and watershed and for wildlife habitat and recreation uses. The natural plant community is mainly sedges, rushes, redtop, tufted hairgrass, and willows. Proper grazing use and a planned grazing system are needed to maintain an adequate plant cover and to improve grazing efficiency, plant vigor, and wildlife habitat.

Summer grazing is the most important use of this soil. Drainage is possible, but it is difficult because of the low position of this soil on the landscape. Using shallow ditches to remove excess surface water can help to improve plant growth. If drained, this soil can be cultivated and seeded to adapted grasses and legumes.

This soil supports vegetation that is suitable as food for ducks, geese, and other waterfowl. Uncultivated and unharvested areas provide excellent cover for wildlife. The short growing season limits the growth of grain or seed crops. Other wildlife in the area include grouse, snowshoe hare, squirrel, songbirds, fisher, mink, muskrat, beaver, hawk, fox, skunk, and weasel. The population of some of these animals is small; leaving some areas unharvested or growing seed crops as food for wildlife can help to increase the population.

This soil is limited for urban uses, roads, and recreation facilities by the hazards of wetness and flooding.

Capability subclass Vw, irrigated and nonirrigated.

35—Naz sandy loam, 40 to 60 percent slopes. This is a deep, well drained, steep soil. This soil formed in residuum and colluvium that derived from granite, diorite, and porphyry. It is on south-facing slopes on mountains surrounding Payette Lake and in the southeastern part of the survey area. The elevation is 5,000 to 7,200 feet. The average annual precipitation is 25 inches, the average annual temperature is 39 degrees F., and the frost-free period is about 60 days.

Included in mapping are small areas of Coski sandy loam, Ligget sandy loam, and McCall very cobbly sandy loam. Also included are areas of stony and gravelly soils.

The Naz soil typically has a 1-inch thick organic layer that overlies the surface layer. The surface layer is 26 inches thick. It is very dark grayish brown and dark brown, slightly acid sandy loam in the upper part and dark grayish brown, slightly acid gravelly sandy loam in the lower part. The underlying material, to a depth of 60 inches, is pale brown, medium acid cobbly coarse sandy loam.

Permeability is rapid. The root zone extends to a depth between 40 and 70 inches. The available water capacity is moderate. Runoff is rapid or very rapid, and the hazard of erosion is severe or very severe.

This soil is used as woodland and watershed and for recreation uses and wildlife habitat. These uses depend on the maintenance of a good stand of timber and understory plants.

This soil is suited to the production of ponderosa pine. It can produce about 5,050 cubic feet per acre (0.6 inch or more in diameter) of pine at 50 years of age, or 44,600 board feet per acre (Scribner rule) of merchantable timber, 11.6 inches or more in diameter, from an unmanaged stand at 120 years of age, based on the mean annual increment.

Timber harvest is restricted by the steep slopes. Slopes generally are too steep for cross-slope operations using conventional equipment such as rubber-tired skidders and crawlers. Special equipment that causes a minimum of soil disturbance should be used in harvesting trees. Reforestation should be planned carefully to reduce competition from undesirable understory plants.

The native understory vegetation is very sparse and is not suitable for grazing if the stand of trees is fully stocked. If the tree canopy is opened by logging, fire, or other disturbance, the understory vegetation improves and has limited potential for grazing. Grazing should be managed to insure tree regeneration, to maintain an adequate plant cover and plant vigor, and to protect the soil by leaving an adequate amount of litter on the surface. The steep slopes severely restrict the movement of livestock and the accessibility to forage.

The principal native understory plants in areas where the canopy is more open are pine reedgrass, common snowberry, lupine, mallow ninebark, and California brome. Total annual air-dry herbage production ranges from about 1,000 pounds per acre in areas where the canopy is more open to 200 pounds per acre in areas where the stand is fully stocked.

Roads, skid trails, landings, and other areas where the soil has been disturbed should be seeded to adapted plant species to reduce erosion. Seeding in these areas should take place in the fall following the soil disturbance so that competition from weeds and brush is minimized. By reducing brush competition, seeding can also promote natural tree regeneration. Some adapted plant species that can be used in seeding are orchardgrass, tall fescue, timothy, and white dutch clover.

This soil supports vegetation that is suitable as food and cover for grouse, snowshoe hare, squirrel, songbirds, hawk, fox, coyote, skunk, bear, deer, and elk. If these soils are used for wildlife habitat, planting seed crops as food for wildlife can improve the habitat.

This soil is limited for urban uses, roads, and recreation facilities by the steep slopes.

Capability subclass VIIe, nonirrigated.

36—Nisula loam, 2 to 4 percent slopes. This is a very deep, well drained, very gently sloping soil. This soil formed in old alluvium that derived from basaltic and granitic sources. It is on alluvial fans and colluvial foot slopes mainly along the west side of Cascade Reservoir. The elevation is 4,800 to 5,300 feet. The average annual precipitation is 25 inches, the average annual temperature is 40 degrees F., and the frost-free period is about 68 days.

Included in mapping are small areas of Donnel sandy loam, Demast loam, and Swede silt loam. Also included are areas where this Nisula soil has slopes of less than 2 percent.

Typically, the surface layer is dark brown and brown, medium acid loam 12 inches thick. The upper part of the subsoil is dark yellowish brown, medium acid, heavy loam 13 inches thick; the middle part is yellowish brown and light yellowish brown, medium acid clay loam 26 inches thick; and the lower part is brown, medium acid sandy clay loam to a depth of 60 inches or more.

Permeability is moderately slow. The root zone extends to a depth of 60 inches or more. The available water capacity is very high. Runoff is slow, and the hazard of erosion is slight.

This soil is used as woodland and watershed and for urban development, recreation uses, and wildlife habitat. The stand of timber and the understory plants on this soil need to be maintained for these uses.

This soil is suited to the production of grand fir and Douglas-fir. It can produce about 11,850 cubic feet per acre (0.6 inch or more in diameter) of timber at 100 years of age, or 70,500 board feet per acre (Scribner rule) of merchantable timber, 12.6 inches or more in diameter, from an unmanaged stand at 140 years of age, based on the mean annual increment.

Timber production is restricted by the moderately slow permeability in the subsoil. In harvesting trees, conventional methods that make use of rubber-tired skidders and crawlers can be used but are restricted during rainy periods in winter and spring. When the soil is wet, equipment has poor traction and ruts form in the roads. Reforestation should be planned carefully to reduce competition from undesirable understory plants.

The native understory vegetation is very sparse and is not suitable for grazing if the stand of trees is fully stocked. If the tree canopy is opened by logging, fire, or other disturbance, the understory vegetation and the potential for grazing improve. The grazing potential remains for 10 to 20 years. Grazing should be managed to insure tree regeneration and to protect the soil by leaving an adequate amount of litter on the surface.

The principal native understory plants in areas where the canopy is more open are elk sedge, heartleaf arnica, pine reedgrass, and common snowberry. Total annual air-dry herbage production ranges from about 800 pounds per acre in areas where the canopy is more open to 100 pounds per acre in areas where the stand is fully stocked.

Roads, skid trails, landings, and other areas where the soil has been disturbed should be seeded to adapted species to reduce erosion. Seeding in these areas should take place in the fall following the soil disturbance so that competition from weeds and brush is minimized. By reducing brush competition, seeding can also promote natural tree regeneration. Some adapted plant species that can be used in seeding are orchardgrass, timothy, tall fescue, and white dutch clover.

This soil supports vegetation that is suitable as food and cover for grouse, squirrel, snowshoe hare, songbirds, hawk, fox, coyote, skunk, weasel, deer, bear, and elk. If these soils are used for wildlife habitat, planting seed crops as food for wildlife can improve the habitat.

This soil is limited for urban development by the moderate shrink-swell potential. This limitation should be considered in the design of foundations. The moderately slow permeability is a limitation to most recreation facilities.

Capability subclass IVc, nonirrigated.

37—Nisula loam, 4 to 12 percent slopes. This is a very deep, well drained, gently sloping to moderately sloping soil. This soil formed in old alluvium that derived from basaltic and granitic sources. It is on alluvial fans and colluvial foot slopes mainly along the west side of Cascade reservoir. The elevation is 4,800 to 5,300 feet. The average annual precipitation is 25 inches, the average annual temperature is 40 degrees F., and the frost-free period is about 68 days.

Included in mapping are small areas of Donnel sandy loam, Demast loam, and Swede silt loam.

Typically, the surface layer is dark brown and brown, medium acid loam 12 inches thick. The upper part of the subsoil is dark yellowish brown, medium acid, heavy loam 13 inches thick; the middle part is yellowish brown and light yellowish brown, medium acid clay loam 26 inches thick; and the lower part is brown, medium acid sandy clay loam to a depth of 60 inches or more.

Permeability is moderately slow. The root zone extends to a depth of 60 inches or more. The available water capacity is very high. Runoff is medium, and the hazard of erosion is slight to moderate.

This soil is used as woodland and watershed and for urban development, recreation uses, and wildlife habitat. Most of these uses depend on the maintenance of a healthy stand of timber and understory plants.

This soil is suited to the production of grand fir and Douglas-fir. It can produce about 11,850 cubic feet per acre (0.6 inch or more in diameter) of timber at 100 years of age, or 70,500 board feet per acre (Scribner rule) of merchantable timber, 12.6 inches or more in diameter, from an unmanaged stand at 140 years of age, based on the mean annual increment.

Timber production is restricted by the hazard of erosion and the moderately slow permeability in the subsoil. When the soil is wet, equipment has poor traction and ruts form quickly in the roads. In harvesting trees, conventional methods can be used but are restricted during rainy periods in winter and spring. Reforestation should be planned carefully to reduce competition from undesirable understory plants.

The native understory vegetation is very sparse and is not suitable for grazing if the stand of trees is fully stocked. If the tree canopy is opened by logging, fire, or other disturbance, the understory vegetation and the potential for grazing improve. The grazing potential remains for 10 to 20 years. Grazing should be managed to insure tree regeneration and to protect the soil by leaving an adequate amount of litter on the surface.

The principal native understory plants in areas where the canopy is more open are elk sedge, heartleaf arnica, pine reedgrass, and common snowberry. Total annual air-dry herbage production ranges from about 800 pounds per acre in areas where the canopy is more open to 100 pounds per acre in areas where the stand is fully stocked.

Roads, skid trails, landings, and other areas where the soil has been disturbed should be seeded to adapted plant species to reduce erosion. Seeding in these areas should take place in the fall following the soil disturbance so that competition from weeds and brush is minimized. By reducing brush competition, seeding can also promote natural tree regeneration. Some adapted plant species that can be used in seeding are orchardgrass, timothy, tall fescue, and white dutch clover.

This soil supports vegetation that is suitable as food and cover for grouse, squirrel, snowshoe hare, songbirds, hawk, fox, coyote, skunk, weasel, deer, bear, and elk. If this soil is used for wildlife habitat, planting seed crops as food can improve the habitat.

This soil is limited for urban uses by the moderate shrink-swell potential and the steepness of slopes. These limitations should be considered in the design of foundations. The moderately slow permeability and the steepness of slopes are limitations to most recreation uses.

Capability subclass IVe, nonirrigated.

38—Nisula loam, 12 to 20 percent slopes. This is a very deep, well drained, strongly sloping soil. This soil formed in old alluvium that derived from basaltic and granitic sources. It is on alluvial fans and colluvial foot slopes mainly along the west side of Cascade reservoir. The elevation is 4,800 to 5,300 feet. The average annual precipitation is 25 inches, the average annual temperature is 40 degrees F., and the frost-free period is about 68 days.

Included in mapping are small areas of Demast loam and Swede silt loam.

Typically, the surface layer is dark brown and brown, medium acid loam 12 inches thick. The upper part of the subsoil is dark yellowish brown, medium acid heavy loam 13 inches thick; the middle part is yellowish brown and light yellowish brown, medium acid clay loam 26 inches thick; and the lower part is brown, medium acid sandy clay loam to a depth of 60 inches or more.

Permeability is moderately slow. The root zone extends to a depth of 60 inches or more. The available water capacity is very high. Runoff is medium, and the hazard of erosion is moderate.

This soil is used as woodland and watershed and for limited urban development, recreation uses, and wildlife habitat. Most of these uses depend on the maintenance of a healthy stand of timber and understory plants.

This soil is suited to the production of grand fir and Douglas-fir. It can produce about 11,850 cubic feet per acre (0.6 inch or more in diameter) of timber at 100 years of age, or 70,500 board feet per acre (Scribner rule) of merchantable timber, 12.6 inches or more in diameter, from an unmanaged stand at 140 years of age, based on the mean annual increment.

Timber production is restricted by the moderately slow permeability in the subsoil. In harvesting trees, conventional methods that make use of rubber-tired skidders and crawlers can be used but are restricted during rainy periods in winter and spring. When the soil is wet, equipment has poor traction and ruts form in the roads. Reforestation should be planned carefully to reduce competition from undesirable understory plants.

The native understory vegetation is very sparse and is not suitable for grazing if the stand of trees is fully stocked. If the tree canopy is opened by logging, fire, or other disturbance, the understory vegetation and the potential for grazing improve. The grazing potential remains for 10 to 20 years. Grazing should be managed to insure tree regeneration and to protect the soil by leaving an adequate amount of litter on the surface.

The principal native understory plants in areas where the canopy is more open are elk sedge, heartleaf arnica, pine reedgrass, and common snowberry. Total annual air-dry herbage production ranges from about 800 pounds per acre in areas where the canopy is more open to 100 pounds per acre in areas where the stand is fully stocked.

Roads, skid trails, landings, and other areas where the soil has been disturbed should be seeded to adapted plant species to reduce erosion. Seeding in these areas should take place in the fall following the soil disturbance so that competition from weeds and brush is minimized. By reducing brush competition, seeding can also promote natural tree regeneration. Some adapted plant species that can be used in seeding are orchardgrass, timothy, tall fescue, and white dutch clover.

This soil supports vegetation that is suitable as food and cover for grouse, squirrel, snowshoe hare, songbirds, hawk, fox, coyote, skunk, weasel, deer, bear, and elk. If this soil is used for wildlife habitat, planting seed crops as food for wildlife can help to improve the habitat.

This soil is limited for urban uses by the moderate shrink-swell potential and the steepness of slopes. These limitations should be considered in the design of foundations. Slope is a limitation to most recreation facilities.

Capability subclass VIe, nonirrigated.

39—Nisula loam, 30 to 60 percent slopes. This is a very deep, well drained, steep soil. This soil formed in old alluvium that derived from basaltic and granitic sources. It is on alluvial fans and colluvial foot slopes mainly along the west side of Cascade Reservoir. The elevation is 4,800 to 5,300 feet. The average annual precipitation is 25 inches, the average annual temperature is 40 degrees F., and the frost-free period is about 68 days.

Included in mapping are small areas of Demast loam and areas that have open stands of ponderosa pine where the soil is similar to this Nisula soil.

Typically, the surface layer is dark brown and brown, medium acid loam 12 inches thick. The upper part of the subsoil is dark yellowish brown, medium acid, heavy loam 13 inches thick; the middle part is yellowish brown and light yellowish brown, medium acid clay loam 26 inches thick; and the lower part is brown, medium acid sandy clay loam to a depth of 60 inches or more.

Permeability is moderately slow. The root zone extends to a depth of 60 inches or more. The available water capacity is very high. Runoff is very rapid, and the hazard of erosion is severe or very severe.

This soil is used as woodland and watershed and for recreation uses and wildlife habitat. These uses depend on the maintenance of a healthy stand of timber and understory plants.

This soil is suited to the production of grand fir and Douglas-fir. It can produce about 11,850 cubic feet per acre (0.6 inch or more in diameter) of timber at 100 years of age, or 70,500 board feet per acre (Scribner rule) of merchantable timber, 12.6 inches or more in diameter, from an unmanaged stand at 140 years of age, based on the mean annual increment.

Timber production is restricted by the steep slopes, erosion, and the moderately slow permeability of the subsoil. When the soil is wet, equipment has poor traction and ruts form quickly in roads. In harvesting trees, conventional methods that make use of rubber-tired skidders and crawlers cannot be used. Special equipment that causes a minimum of soil disturbance should be used in harvesting trees. Reforestation after harvest must be managed carefully to reduce competition from undesirable understory plants.

The native understory vegetation is very sparse and is not suitable for grazing if the stand of trees is fully stocked. If the canopy is opened by logging, fire, or other disturbance, the understory vegetation and the potential for grazing improve. The grazing potential remains for 10 to 20 years. Grazing should be managed to insure tree regeneration and to protect the soil by leaving an adequate amount of litter on the surface. The steep slopes severely restrict the movement of livestock and the accessibility to forage.

The principal native understory plants in areas where the canopy is more open are elk sedge, heartleaf arnica, pine reedgrass, and common snowberry. Total annual air-dry herbage production ranges from about 800 pounds per acre in areas where the canopy is more open to 100 pounds per acre in areas where the stand is fully stocked.

Roads, skid trails, landings, and other areas where the soil has been disturbed should be seeded to adapted plant species to reduce erosion. Seeding in these areas should take place in the fall following the soil disturbance so that competition from weeds and brush is minimized. By reducing brush competition, seeding can also promote natural tree regeneration. Some adapted plant species that can be used in seeding are orchardgrass, timothy, tall fescue, and white dutch clover.

This soil supports vegetation that is suitable as food and cover for grouse, squirrel, snowshoe hare, songbirds, hawk, fox, coyote, skunk, weasel, deer, bear, and elk. If this soil is used for wildlife habitat, planting seed crops as food for wildlife can improve the habitat.

This soil is limited for urban and recreational development by the steep slopes.

Capability subclass VIIe, nonirrigated.

40—Pits, gravel. This is a miscellaneous area where pits were excavated to remove gravel. Some pits are filled with water and can be developed as fish ponds or can provide a source of water for wildlife.

Capability class VIII, nonirrigated.

41—Pyle-Koppes complex, 20 to 40 percent slopes. This complex consists of moderately steep to steep soils on south-facing slopes of mountains in the eastern part of the survey area. These soils are at an elevation of 5,000 to 6,500 feet. Pyle loamy coarse sand makes up about 45 percent of this complex, and Koppes coarse sandy loam makes up 35 percent. The remaining 20 percent of the complex is Bryan coarse sandy loam, Ligget sandy loam, Quartzburg loamy coarse sand, Toiyabe loamy coarse sand, a soil that is similar to Bryan soils but that is loam in the upper part of the profile, a soil that has a gravelly loam surface layer and a coarse sandy loam substratum, and a loamy soil that has a substratum of gravelly coarse sandy loam.

The Pyle soil is on ridgetops and saddles on mountains. This soil is moderately deep and somewhat excessively drained. It formed in residuum of granodiorite. The average annual precipitation is 30 inches, the average annual temperature is 39 degrees F., and the frost-free period is about 60 days.

The Pyle soil typically has a 1-inch thick organic layer that overlies the surface layer. The surface layer is grayish brown, neutral loamy coarse sand 4 inches thick. The underlying material, to a depth of 14 inches, is pale brown, slightly acid loamy coarse sand; to a depth of 20 inches it is pale brown, medium acid coarse sand; and, to a depth of 33 inches, it is very pale brown, slightly acid gravelly sand. Decomposing granodiorite is at a depth of 33 inches.

The Pyle soil has very rapid permeability. The root zone extends to a depth between 20 and 40 inches. The available water capacity is very low. Runoff is rapid or very rapid, and the hazard of erosion is moderate or severe.

The Koppes soil is in swales and concave positions on mountainsides. This soil is very deep and well drained. It formed in residuum of granite. The average annual precipitation is 29 inches, the average annual temperature is 39 degrees F., and the frost-free period is about 60 days.

Typically, the surface layer is grayish brown, slightly acid coarse sandy loam 13 inches thick. The underlying material, to a depth of 44 inches, is pale brown, slightly acid, gravelly loamy coarse sand and loamy coarse sand; and to a depth of 60 inches or more, it is pale brown, neutral gravelly loamy coarse sand and gravelly sand.

The Koppes soil has rapid permeability. The root zone extends to a depth of 60 inches or more. The available water capacity is low. Runoff is rapid or very rapid, and the hazard of erosion is moderate or severe.

The soils in this complex are used as woodland and watershed and for wildlife habitat and recreation. The stand of timber and the understory plants on these soils need to be maintained for these uses.

The Pyle soil is suited to the production of Douglas-fir and ponderosa pine. It can produce about 2,750 cubic feet per acre (0.6 inch or more in diameter) of timber at 40 years of age, or 33,800 board feet per acre (Scribner rule) of merchantable timber, 11.6 inches or more in diameter, from an unmanaged stand at 150 years of age, based on the mean annual increment.

Timber production is restricted by the very low available water capacity and the moderate depth of this soil. Harvesting is restricted by the hazard of erosion and the moderate depth of the soil. In harvesting trees, conventional equipment such as rubber-tired skidders and crawlers can be used. Road construction requires the excavation of bedrock because of the moderate depth of this soil. Stands of cut-over timber commonly are understocked because of the high seedling mortality during hot, dry periods in summer. Reforestation and site preparation should be planned carefully before harvesting trees to insure natural reproduction. Shade from mature trees can help to reduce seedling mortality.

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

Timber production is restricted by the low available water capacity. In harvesting trees, conventional methods that make use of rubber-tired skidders and crawlers can be used. Reforestation and site preparation should be planned carefully before harvesting trees to insure natural reproduction and to minimize soil loss.

The native understory vegetation on these soils has fair potential for grazing if the stand of trees is fully stocked. If the tree canopy is opened by logging, fire, or other disturbance, the production and quality of the understory vegetation improve, and thus the grazing potential improves. The grazing potential remains for 10 to 20 years. Proper grazing and a planned grazing system are essential to insure tree regeneration, to maintain adequate plant cover and plant vigor, and to protect the soil by leaving an adequate amount of litter on the surface.

The principal native understory plants in areas where the canopy is more open are elk sedge, pine reedgrass, mallow ninebark, and common snowberry. Total annual air-dry herbage production ranges from about 1,000 pounds per acre in areas where the canopy is more open to 500 pounds per acre in areas where the stand is fully stocked.

Roads, skid trails, landings, and other areas where the soil has been disturbed should be seeded to adapted plant species to reduce erosion. Seeding in these areas should take place in the fall following the soil disturbance so that competition from weeds and brush is minimized. By reducing brush competition, seeding can also promote natural tree regeneration. Some adapted plant species that can be used in seeding are orchardgrass, tall fescue, pubescent wheatgrass, and intermediate wheatgrass.

These soils support vegetation that is suitable as food and cover for grouse, squirrel, snowshoe hare, songbirds, hawk, fox, coyote, skunk, weasel, bear, deer, and elk. If these soils are used for wildlife habitat, planting seed crops as food for wildlife can improve the habitat.

These soils are limited for urban and recreation uses by the steepness of slopes and the moderate depth of the Pyle soil.

Capability subclass VIe, nonirrigated.

42—Pyle-Koppes complex, 40 to 60 percent slopes. This complex consists of steep soils that are on south-facing slopes on mountains in the eastern part of the survey area. These soils are at an elevation of 4,400 to 6,500 feet. Pyle loamy coarse sand makes up about 50 percent of this complex, and Koppes coarse sandy loam makes up 30 percent. The remaining 20 percent of the complex is Bryan coarse sandy loam, Ligget sandy loam, Quartzburg loamy coarse sand, Toiyabe loamy coarse sand, and a soil that is gravelly coarse sandy loam throughout.

The Pyle soil is on ridgetops and saddles on mountains. This soil is moderately deep and somewhat excessively drained. It formed in residuum of granodiorite. The average annual precipitation is 30 inches, the average annual temperature is 39 degrees F., and the frost-free period is about 60 days.

The Pyle soil typically has a 1-inch thick organic layer that overlies the surface layer. The surface layer is grayish brown, neutral loamy coarse sand 4 inches thick. The underlying material, to a depth of 14 inches, is pale brown, slightly acid loamy coarse sand; to a depth of 20 inches, it is pale brown, medium acid coarse sand; and to a depth of 33 inches, it is very pale brown, slightly acid gravelly sand. Decomposing granodiorite is at a depth of 33 inches.

The Pyle soil has very rapid permeability. The root zone extends to a depth between 20 and 40 inches. The available water capacity is very low. Runoff is very rapid, and the hazard of erosion is severe or very severe.

The Koppes soil is in swales and concave positions on mountainsides. This soil is very deep and well drained. It formed in residuum of granite. The average annual precipitation is 29 inches, the average annual temperature is 39 degrees F., and the frost-free period is about 60 days.

Typically, the surface layer is grayish brown, slightly acid coarse sandy loam 13 inches thick. The underlying material, to a depth of 44 inches, is pale brown, slightly acid, gravelly loamy coarse sand and loamy coarse sand; and, to a depth of 60 inches or more, it is pale brown, neutral, gravelly loamy coarse sand and gravelly sand.

The Koppes soil has rapid permeability. The root zone extends to a depth of 60 inches or more. The available water capacity is low. Runoff is very rapid, and the hazard of erosion is severe or very severe.

The soils in this complex are used as woodland and watershed and for wildlife habitat and recreation uses. The stand of timber and the understory plants on these soils need to be maintained for these uses.

The Pyle soil is suited to the production of Douglas-fir and ponderosa pine. It can produce about 2,750 cubic feet per acre (0.6 inch or more in diameter) of timber at 40 years of age, or 33,800 board feet per acre (Scribner rule) of merchantable timber, 11.6 inches or more in diameter, from an unmanaged stand at 150 years of age, based on the mean annual increment.

Timber production is restricted by the very low available water capacity and the moderate depth of this soil. Harvesting is restricted by the steepness of slopes, the hazard of erosion, and the moderate depth of the soil. Slopes generally are too steep for cross-slope operations that make use of conventional equipment such as rubber-tired skidders and crawlers. Because of the moderate depth of this soil, road construction requires the excavation of bedrock. Special equipment that causes a minimum of soil disturbance should be used in harvesting trees. Stands of cut-over timber commonly are understocked because of the high seedling mortality rate during hot, dry periods in summer. Reforestation and site preparation should be planned carefully before trees are harvested to insure natural reproduction. Shade from mature trees can help to reduce seedling mortality.

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

Timber production is restricted by the very low available water capacity of this soil. Harvesting is restricted by the steepness of slopes and the hazard of erosion. Slopes generally are too steep for cross-slope operations using conventional equipment such as rubber-tired skidders and crawlers. Special equipment that causes a minimum of soil disturbance should be used in harvesting trees. Reforestation and site preparation should be planned carefully before trees are harvested to insure natural reproduction.

The potential for grazing the native understory vegetation is fair if the stand of trees is fully stocked. If the tree canopy is opened by logging, fire, or other disturbance, the production and quality of the understory vegetation improve, and thus the grazing potential improves. The grazing potential remains improved for 10 to 20 years. Proper grazing and a planned grazing system are essential to insure tree regeneration, to maintain an adequate plant cover and plant vigor, and to protect the soil by leaving an adequate amount of litter on the surface. The steep slopes severely restrict movement of livestock and accessibility to forage.

The principal native understory plants in areas where the canopy is more open are elk sedge, pine reedgrass, mallow ninebark, and common snowberry. Total annual air-dry herbage production ranges from about 1,000 pounds per acre in areas where the canopy is more open to 500 pounds per acre in areas where the stand is fully stocked.

Roads, skid trails, landings, and other areas where the soil has been disturbed should be seeded to adapted plant species to reduce erosion. Seeding in these areas should take place in the fall following the soil disturbance so that competition from weeds and brush is minimized. By reducing brush competition, seeding can also promote natural tree regeneration. Some adapted plant species that can be used in seeding are orchardgrass, tall fescue, pubescent wheatgrass, and intermediate wheatgrass.

These soils support vegetation that is suitable as food and cover for grouse, squirrel, snowshoe hare, songbirds, weasel, hawk, fox, coyote, skunk, bear, deer, and elk. If these soils are used for wildlife habitat, planting seed crops as food for wildlife can improve the habitat.

These soils are limited for urban and recreational development by the steep slopes and by the moderate depth of the Pyle soil.

Capability subclass VIIe, nonirrigated.

43—Quartzburg-Bryan complex, 20 to 40 percent slopes. This complex consists of moderately steep and steep soils that are on mountains in the southern part of the survey area. The soils are at an elevation of 4,400 to 6,500 feet. Quartzburg loamy coarse sand makes up 50 percent of this complex, and Bryan coarse sandy loam makes up 40 percent. The remaining 10 percent of the complex is Koppes coarse sandy loam, Ligget sandy loam, Pyle loamy coarse sand, and Toiyabe loamy coarse sand.

The Quartzburg soil is on ridgetops, spur ridges, and saddles on mountainsides. This soil is moderately deep and somewhat excessively drained. It formed in residuum of granite. The average annual precipitation is 30 inches, the average annual temperature is 41 degrees F., and the frost-free period is about 70 days.

The Quartzburg soil typically has a 1-inch thick organic layer that overlies the surface layer. The surface layer is grayish brown, neutral loamy coarse sand 5 inches thick. The underlying material, to a depth of 14 inches, is pale brown, neutral loamy coarse sand; and, to a depth of 22 inches, it is very pale brown, slightly acid, very gravelly loamy coarse sand. Decomposed granite is at a depth of 22 inches.

The Quartzburg soil has rapid permeability. The root zone extends to a depth between 20 and 30 inches. The available water capacity is very low. Runoff is medium or rapid, and the hazard of erosion is moderate or severe.

The Bryan soil is on convex and concave mountain slopes. This soil is very deep and well drained. It formed in residuum of granodiorite. The average annual precipitation is 30 inches, the average annual temperature is 39 degrees F., and the frost-free period is about 60 days.

The Bryan soil typically has a 3-inch thick organic layer that overlies the surface layer. The surface layer is grayish brown, slightly acid coarse sandy loam 10 inches thick. The underlying material, to a depth of 34 inches, is light gray, slightly acid loamy coarse sand and gravelly loamy coarse sand; and, to a depth of 60 inches or more, it is white, medium acid, very gravelly loamy coarse sand.

The Bryan soil has rapid permeability. The root zone extends to a depth of 60 inches or more. The available water capacity is moderate. Runoff is medium or rapid, and the hazard of erosion is moderate or severe.

The soils in this complex are used as woodland and watershed and for wildlife habitat and recreation uses. The stand of timber and the understory plants on these soils need to be maintained for these uses.

The Quartzburg soil is suited to the production of ponderosa pine and Douglas-fir. It can produce about 2,750 cubic feet per acre (0.6 inch or more in diameter) of timber at 40 years of age, or 33,800 board feet per acre (Scribner rule) of merchantable timber, 11.6 inches or more in diameter, from an unmanaged stand at 150 years of age, based on the mean annual increment.

Timber production on the Quartzburg soil is restricted by the very low available water capacity and the moderate depth of this soil. Harvesting is restricted by the hazard of erosion and the moderate depth of the soil. In harvesting trees, conventional equipment such as rubber-tired skidders and crawlers can be used. Because of the moderate depth of this soil, road construction requires the excavation of bedrock. Stands of cut-over timber commonly are understocked because of the high rate of seedling mortality during hot, dry periods in summer. Reforestation and site preparation should be planned carefully before trees are harvested to insure natural reproduction. Shade from mature trees can help to reduce seedling mortality.

The Bryan soil is suited to the production of grand fir, Douglas-fir, and ponderosa pine. It can produce about 11,500 cubic feet per acre (0.6 inch or more in diameter) of timber at 110 years of age, or 41,000 board feet per acre (Scribner rule) of merchantable timber, 12.6 inches or more in diameter, from an unmanaged stand at 140 years of age, based on the mean annual increment. Grand fir is the dominant species on this soil; however, this species was stunted about 40 years ago, and productivity has been reduced.

Timber production is restricted by the steepness of slopes and the hazard of erosion. In harvesting trees, conventional methods that make use of rubber-tired skidders and crawlers can be used, but roads, skid trails, and landings should be managed carefully to reduce competition from undesirable understory plants.

The potential for grazing the native understory vegetation on the Quartzburg soil is fair if the stand of trees is fully stocked. If the tree canopy is opened by logging, fire, or other disturbance, the production and quality of the understory vegetation improve.

The principal native understory plants in areas where the canopy is more open are mallow ninebark, elk sedge, pine reedgrass, and snowbrush ceanothus. Total annual air-dry herbage production ranges from about 600 pounds per acre in areas where the canopy is more open to 300 pounds per acre in areas where the stand is fully stocked.

The native understory vegetation on the Bryan soil is very sparse and is not suitable for grazing if the stand of trees is fully stocked. If the tree canopy is opened by logging, fire, or other disturbance, the understory vegetation improves and has limited potential for grazing.

The principal native understory plants in areas where the canopy is more open are beargrass, pachystima, and goldthread. Total annual air-dry herbage production ranges from about 1,000 pounds per acre in areas where the canopy is more open to 100 pounds per acre in areas where the stand is fully stocked.

The grazing potential of these soils remains improved for 10 to 20 years after the tree stand is opened up. Grazing should be managed to insure tree regeneration and to protect the soil by leaving an adequate amount of litter on the surface. The steep slopes severely restrict the movement of livestock and accessibility to forage.

Roads, skid trails, landings, and other areas where the soil has been disturbed should be seeded to adapted plant species to reduce erosion. Seeding in these areas should take place in the fall following the soil disturbance so that competition from weeds and brush is minimized. By reducing brush competition, seeding can also promote natural tree regeneration. Some adapted plant species that can be used in seeding are orchardgrass, timothy, tall fescue, and white dutch clover.

These soils support vegetation that is suitable as food and cover for grouse, squirrel, snowshoe hare, songbirds, hawk, fox, coyote, skunk, bear, deer, and elk. If these soils are used for wildlife habitat, planting seed crops as food for wildlife can improve the habitat.

These soils are limited for urban uses and recreation facilities by the steepness of slopes and the moderate depth of the Quartzburg soil.

Capability subclass VIe, nonirrigated.

44—Quartzburg-Coski complex, 40 to 60 percent slopes. This complex consists of steep soils that are on mountains in the southern part of the survey area. These soils are at an elevation of 5,000 to 6,500 feet. Quartzburg loamy coarse sand makes up about 40 percent of this complex, and Coski sandy loam makes up 40 percent. The remaining 20 percent of the complex is Bryan coarse sandy loam, Koppes coarse sandy loam, Pyle loamy coarse sand, and Toiyabe loamy coarse sand.

The Quartzburg soil is on ridgetops, spur ridges, and saddles on mountainsides. This soil is moderately deep and somewhat excessively drained. It formed in residuum of granite. The average annual precipitation is 30 inches, the average annual temperature is 41 degrees F., and the frost-free period is about 70 days.

The Quartzburg soil typically has a 1-inch thick organic layer that overlies the surface layer. The surface layer is grayish brown, neutral loamy coarse sand 5 inches thick. The underlying material, to a depth of 14 inches, is pale brown, neutral loamy coarse sand; and, to a depth of 22 inches, it is very pale brown, slightly acid, very gravelly loamy coarse sand. Decomposed granite is at a depth of 22 inches.

The Quartzburg soil has rapid permeability. The root zone extends to a depth of 20 to 30 inches. The available water capacity is very low. Runoff is very rapid, and the hazard of erosion is severe or very severe.

The Coski soil is on convex slopes and benches on mountainsides. This soil is very deep and well drained. It formed in residuum and colluvium that derived from granite. The average annual precipitation is 29 inches, the average annual temperature is 39 degrees F., and the frost-free period is about 60 days.

Typically, the surface layer is dark grayish brown and brown, medium acid sandy loam 15 inches thick. The subsoil is brown, slightly acid coarse sandy loam 13 inches thick. The upper part of the substratum is pale brown, medium acid, gravelly coarse sandy loam 10 inches thick; the middle part is very pale brown, medium acid, very gravelly loamy coarse sand 11 inches thick; and the lower part, to a depth of 60 inches or more, is white, strongly acid, gravelly coarse sand.

The Coski soil has moderately rapid permeability in the subsoil and very rapid permeability in the substratum. The root zone extends to a depth of 60 inches or more. The available water capacity is moderate. Runoff is very rapid, and the hazard of erosion is severe or very severe.

These soils are used as woodland and watershed and for wildlife habitat and recreation. The stand of timber and the understory plants on these soils need to be maintained for these uses.

The Quartzburg soil is suited to the production of ponderosa pine. It can produce about 2,750 cubic feet per acre (0.6 inch or more in diameter) of timber at 40 years of age, or 33,800 board feet per acre (Scribner rule) of merchantable timber, 11.6 inches or more in diameter, from an unmanaged stand at 150 years of age, based on the mean annual increment.

Timber production on the Quartzburg soil is restricted by the very low available water capacity and the moderate depth of this soil. Harvesting is restricted by the steepness of slopes, the hazard of erosion, and the moderate depth of the soil. Slopes generally are too steep for cross-slope operations using conventional equipment such as rubber-tired skidders or crawlers. Road construction requires the excavation of bedrock because of the moderate depth of this soil. Special equipment that causes a minimum of soil disturbance should be used in harvesting trees. Stands of cut-over timber commonly are understocked because of the high seedling mortality rate during hot, dry periods in summer. Reforestation and site preparation should be planned carefully before trees are harvested to insure natural reproduction. Shade from mature trees can help to reduce seedling mortality.

The Coski soil is suited to the production of Douglas-fir ponderosa pine. It can produce about 5,050 cubic feet per acre (0.6 inch or more in diameter) of timber at 50 years of age, or 44,600 board feet per acre (Scribner rule) of merchantable timber, 11.6 inches or more in diameter, from an unmanaged stand at 120 years of age, based on the mean annual increment.

Timber production is restricted by the steepness of slopes and the hazard of erosion. Slopes generally are too steep for cross-slope operations that make use of conventional equipment such as rubber-tired skidders and crawlers. Special equipment that causes a minimum of soil disturbance should be used in harvesting trees. Reforestation after harvest must be managed carefully to reduce competition from undesirable understory plants.

The potential for grazing the native understory vegetation on the Quartzburg and Coski soils is poor to fair if the stand of trees is fully stocked. If the tree canopy is opened by logging, fire, or other disturbance, the production and quality of the understory vegetation improve, and thus the grazing potential improves. The grazing potential remains for 10 to 20 years. Proper grazing and a planned grazing system are essential to insure tree regeneration, to maintain an adequate plant cover and plant vigor, and to protect the soil by leaving an adequate amount of litter on the surface. The steep slopes severely restrict the movement of livestock and accessibility to forage.

The principal native understory plants in areas where the canopy is more open are mallow ninebark, pine reedgrass, and snowbrush ceanothus. Total annual air-dry herbage production ranges from about 1,200 pounds per acre in areas where the canopy is more open to 300 pounds per acre in areas where the stand is fully stocked.

Roads, skid trails, landings, and other areas where the soil has been disturbed should be seeded to adapted plant species to reduce erosion. Seeding in these areas should take place in the fall following the soil disturbance so that competition from weeds and brush is minimized. By reducing brush competition, seeding can also promote natural tree regeneration. Some adapted plant species that can be used in seeding are orchardgrass, tall fescue, pubescent wheatgrass, and intermediate wheatgrass.

These soils support vegetation that is suitable as cover and food for grouse, squirrel, snowshoe hare, songbirds, hawk, fox, coyote, skunk, deer, and elk. If these soils are used for wildlife habitat, planting seed crops as food for wildlife can improve the habitat.

These soils are limited for urban uses and recreation facilities by the steep slopes and the moderate depth of the Quartzburg soil.

Capability subclass VIIe, nonirrigated.

45—Quartzburg Variant loam, 30 to 60 percent slopes. This is a moderately deep, well drained, steep soil. This soil formed in residuum of granite. It is on mountains at an elevation of 5,200 to 6,000 feet. The average annual precipitation is 30 inches, the average annual temperature is 41 degrees F., and the frost-free period is about 70 days.

Included in mapping are small areas of McCall very cobbly sandy loam, Shellrock loamy coarse sand, Jugson coarse sandy loam, and Naz sandy loam. Also included are areas where slopes are less than 30 percent.

The Quartzburg Variant soil typically has a 1-inch thick organic layer that overlies the surface layer. The surface layer is yellowish brown, slightly acid loam 9 inches thick. The subsoil is light yellowish brown, medium acid sandy loam and very gravelly coarse sandy loam 15 inches thick. The substratum is yellowish brown, slightly acid loamy sand 6 inches thick. Granite bedrock is at a depth of 30 inches.

Permeability is moderately rapid in the subsoil and rapid in the substratum. The root zone is at a depth between 20 and 40 inches. The available water capacity is very low. Runoff is very rapid, and the hazard of erosion is high or very high.

These soils are used as woodland and watershed and for wildlife habitat and recreation uses. The stand of trees and the understory plants on these soils need to be maintained for these uses.

This soil is suited to the production of ponderosa pine. It can produce about 2,750 cubic feet per acre (0.6 inch or more in diameter) of pine at 40 years of age, or 33,800 board feet per acre (Scribner rule) of merchantable timber, 11.6 inches or more in diameter, from an unmanaged stand at 150 years of age, based on the mean annual increment.

Timber production is restricted by the very low available water capacity and the moderate depth of this soil. Harvesting is restricted by the steepness of slopes, the hazard of erosion, and the moderate depth of the soil. Slopes generally are too steep for cross-slope operations using conventional equipment such as rubber-tired skidders and crawlers. Because of the moderate depth of this soil, road construction requires the excavation of bedrock. Special equipment that causes a minimum of soil disturbance should be used in harvesting trees. Stands of cut-over timber commonly are understocked because of the high seedling mortality rate during hot, dry periods in summer. Reforestation and site preparation should be planned carefully before harvesting trees to insure natural reproduction. Shade from mature trees can help to reduce seedling mortality.

The potential for grazing the native understory vegetation is poor to fair if the stand of trees is fully stocked. If the tree canopy is opened by logging, fire, or other disturbance, the production and quality of the understory vegetation improve, and thus the grazing potential improves. This grazing potential remains improved for 10 to 20 years. Proper grazing and using a planned grazing system are essential to insure tree regeneration, to maintain an adequate plant cover and plant vigor, and to protect the soil by leaving an adequate amount of litter on the surface. The steep slopes severely restrict the movement of livestock and accessibility to forage.

The principal native understory plants in areas where the tree canopy is more open are elk sedge, pine reedgrass, low Oregon-grape, and snowbrush ceanothus. Total annual air-dry herbage production ranges from about 1,200 pounds per acre in areas where the canopy is more open to 550 pounds per acre in areas where the stand is fully stocked.

Roads, skid trails, landings, and other areas where the soil has been disturbed should be seeded to adapted plant species to reduce erosion. Seeding in these areas should take place in the fall following the soil disturbance so that competition from weeds and brush is minimized. By reducing brush competition, seeding can also promote natural tree regeneration. Some adapted plant species that can be used in seeding are orchardgrass, tall fescue, pubescent wheatgrass, and intermediate wheatgrass.

This soil supports vegetation that is suitable as food and cover for grouse, squirrel, snowshoe hare, hawk, fox, coyote, skunk, songbirds, deer, elk, and bear. If this soil is used for wildlife habitat, planting seed crops as food for wildlife can improve the habitat.

This soil is limited for urban uses, roads, and recreation facilities by the steep slopes and the moderate depth of the soil.

Capability subclass VIIe, nonirrigated.

46—Rock outcrop. Rock outcrop consists of large areas north and northeast of Payette Lake where glaciers removed the soil material, leaving the bedrock, mainly granite, exposed (fig. 3). Soil formation has begun in some areas where vegetation is growing in cracks in the rock and in small low areas where thin deposits of sandy material that derived from decomposing granite have accumulated.

Capability class VIII, nonirrigated.

47—Roseberry coarse sandy loam. This is a very deep, poorly drained, level to very gently sloping soil. This soil formed in alluvium and glacial outwash mainly from granitic sources. It is on glacial outwash plains and stream bottoms on the valley floor at an elevation of

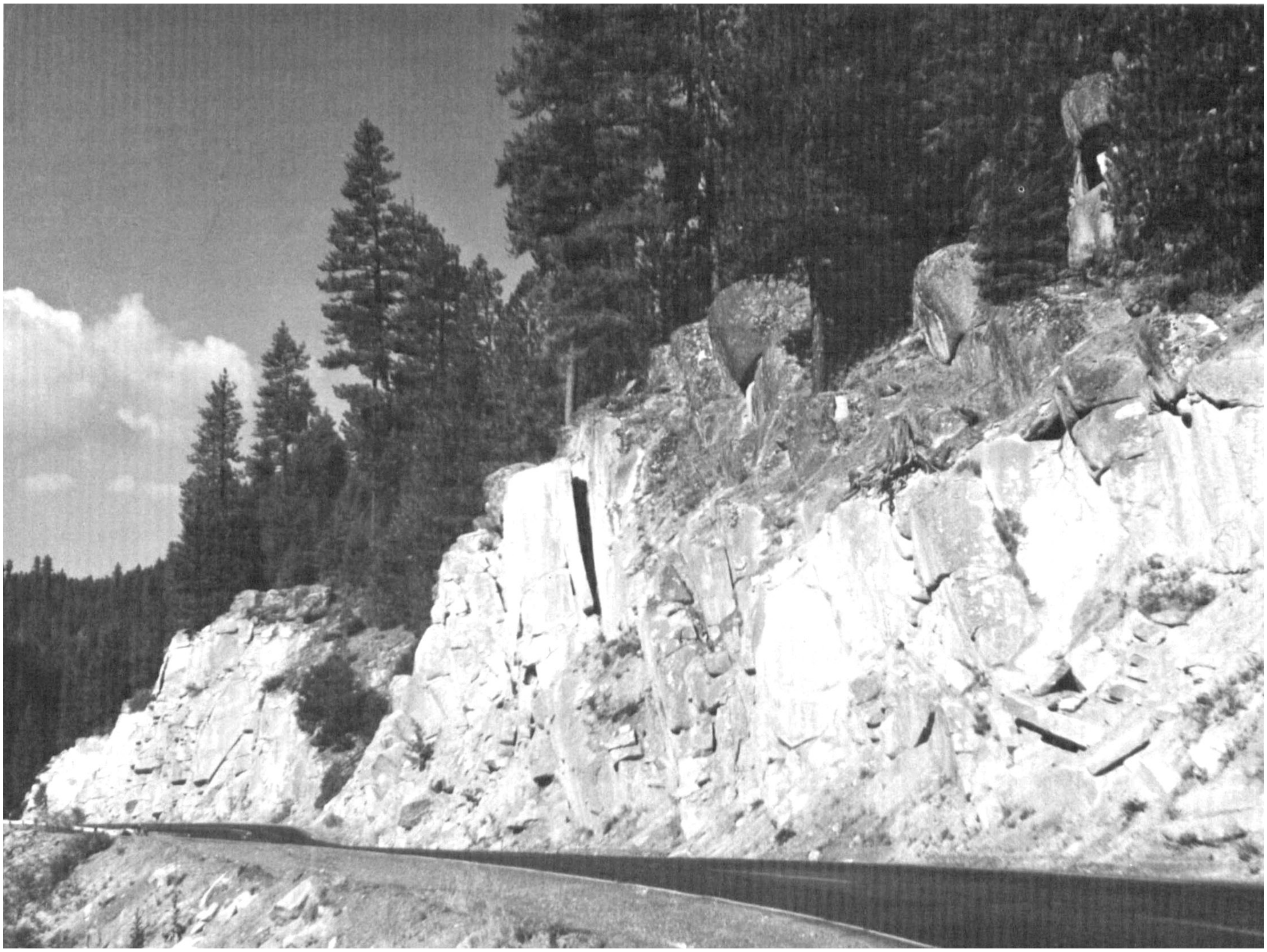


Figure 3.—An area of Rock outcrop near McCall. Note the tree roots in cracks in the granite bedrock that were exposed when the road cut was made.

4,800 to 5,000 feet. The average annual precipitation is 23 inches, the average annual temperature is 40 degrees F., and the frost-free period is about 70 days.

Included in mapping are small areas of Melton loam, Donnel sandy loam, Kangas coarse sandy loam, Jurvannah sandy loam, and a soil that is similar to Roseberry soils except that it has sand and gravel within a depth of 40 inches. Also included are escarpment areas where the soils are similar to this Roseberry soil except that they have slopes that range to 40 percent.

Typically, the surface layer is dark gray and gray, medium acid coarse sandy loam 13 inches thick. The underlying material, to a depth of 35 inches, is light brownish gray and pale brown, medium acid loamy coarse sand; to a depth of 55 inches, it is light brownish gray, medium acid coarse sand; and, to a depth of 60 inches or more, it is light brownish gray, medium acid fine sandy loam.

Permeability is moderately rapid. The root zone extends to a depth of 60 inches or more. The available water capacity is moderate. Runoff is slow; the hazard of erosion is slight, or there is no hazard. The high water table is at a depth between 1 and 2 feet from midspring to midsummer.

These soils are used for hay, pasture, wildlife habitat, recreation uses, limited woodland, and watershed. The natural plant community is mainly pine reedgrass, sedges, and related plants. In some areas, lodgepole pine is used for posts and poles. Some of these areas have been cleared and are cultivated or are used for grazing. Hay and pasture are the most important uses of this soil. Oats are grown in some areas. The short growing season and wetness limit the choice and productivity of crops. Land leveling, seeding, weed control, drainage, pasture and hayland management, and irrigation management are needed. A suitable crop rotation consists of hay or pasture that is maintained as long as the stand is productive, 1 or 2 years of oats, and seeding to adapted grasses and legumes. Lime and fertilizer, as recommended by soil tests, should be applied in one to three small applications to avoid loss through leaching. Border irrigation is suitable. Water should be carefully applied to avoid raising the water table.

In some areas, Roseberry soils are in lodgepole pine, which is used mainly for poles. Grand fir is the climax tree on this soil. In most areas, the trees are being removed to develop the areas as pasture.

This soil supports vegetation that is suitable as food and cover for ducks, geese, and other waterfowl. The short growing season limits the growth of seed crops. Other wildlife in the area include grouse, rabbit, squirrel, hawk, fox, skunk, weasel, and, to a lesser extent, fisher, mink, muskrat, and beaver. The population of some of these birds and animals is small; leaving some areas unharvested or growing seed crops as food for wildlife can help to increase the wildlife population.

This soil is limited for urban uses, dams, roads, and recreation facilities by the hazards of wetness and flooding.

Capability subclass IVw, irrigated and nonirrigated.

48—Roseberry-Melton complex. This complex consists of level and nearly level soils that are on stream bottoms throughout the survey area. These soils are at an elevation of 4,800 to 5,000 feet. Roseberry coarse sandy loam makes up about 40 percent of this complex, Melton loam makes up 30 percent, and Jurvannah sandy loam makes up 20 percent. The remaining 10 percent is Donnel sandy loam, Kangas coarse sandy loam and fine gravelly loamy coarse sand, and Blackwell clay loam.

The Roseberry soil is on low stream terraces. This soil is very deep and poorly drained. It formed in coarse textured glacial outwash. The average annual precipitation is 23 inches, the average annual temperature is 40 degrees F., and the frost-free period is about 70 days.

Typically, the surface layer is dark gray and gray, medium acid coarse sandy loam 13 inches thick. The underlying material, to a depth of 35 inches, is light brownish gray and pale brown, medium acid loamy coarse sand; to a depth of 55 inches it is light brownish gray, medium acid coarse sand; and to a depth of 60 inches or more, it is light brownish gray, medium acid fine sandy loam.

The Roseberry soil has moderately rapid permeability. The root zone extends to a depth of 60 inches or more. The available water capacity is moderate. Runoff is slow; the hazard of erosion is slight, or there is no hazard. The high water table is at a depth of 1 to 2 feet from midspring to midsummer.

The Melton soil is in drainage channels. This soil is very deep and poorly drained. It formed in alluvium or glacial outwash that derived mainly from granitic sources. The average annual precipitation is 23 inches, the average annual temperature is 38 degrees F., and the frost-free period is about 70 days.

Typically, the surface layer is dark grayish brown, strongly acid loam 10 inches thick. The underlying material, to a depth of 25 inches, is grayish brown, very strongly acid loam; and, to a depth of 30 inches, it is brown, very strongly acid, gravelly sandy loam. Below this, cobbly outwash that consists of light grayish brown and grayish brown loamy sand and cobblestones extends to a depth of 60 inches or more. Mottles are at a depth between 10 and 20 inches.

The Melton soil has moderate permeability in the surface layer and rapid permeability below a depth of 30 to 35 inches. The root zone extends to a depth of more than 60 inches. The available water capacity is moderate. Runoff is very slow. The hazard of erosion is slight, or there is no hazard. The high water table is at a depth between 12 and 24 inches from midspring to midsummer.

The Jurvannah soil is on old gravel bars. This soil is very deep and poorly drained. It formed in alluvium that derived from granitic sources. The average annual precipitation is 23 inches, the average annual temperature is 39 degrees F., and the frost-free period is about 60 days.

Typically, the surface layer is grayish brown, medium acid sandy loam 6 inches thick. The underlying material, to a depth of 10 inches, is very pale brown, medium acid sand; to a depth of 22 inches, it is white and brownish yellow, medium acid gravelly sand; and, to a depth of 60 inches or more, it is pink and yellowish red and very pale brown and pale brown, slightly acid, very gravelly sand.

The Jurvannah soil has very rapid permeability. The root zone extends to a depth of more than 60 inches. The available water capacity is very low. Runoff is slow. The hazard of erosion is slight, or there is no hazard. The high water table is at a depth of 18 to 36 inches in midspring to midsummer.

This complex is used as rangeland, limited woodland, and watershed and for wildlife habitat, recreation uses, and hay. The native plant community is Nebraska sedge, sedge, rush, tufted hairgrass, redtop, and Kentucky bluegrass. Proper grazing use is essential to maintain an adequate plant cover. Using a planned grazing system can help to improve grazing efficiency, plant vigor, and wildlife habitat.

Summer grazing is the most important use of these soils. Drainage of these soils is possible, but it is difficult because of the low position of these soils on the landscape. Using shallow ditches to remove excess surface water can improve plant growth. If drained, the soils can be cultivated and seeded to adapted grasses and legumes.

Lodgepole pine trees are growing in some areas of the Roseberry soil and are harvested mainly for use as posts or poles. In some areas, the trees have been cleared, and these soils can be used for grazing.

These soils support vegetation that is suitable as food and cover for mink, muskrat, and beaver and for ducks, geese, and other waterfowl. Other wildlife in the area include grouse, snowshoe hare, squirrel, hawk, fox, skunk, weasel, and songbirds. Cover for wildlife is very good. Areas that are cultivated to seed or grain crops are limited; these crops need to be planted in other areas as food for wildlife.

These soils are limited for urban uses and recreation facilities because wetness and flooding are hazards.

Capability subclass Vw, irrigated and nonirrigated.

49—Shellrock loamy coarse sand, 12 to 35 percent slopes. This is a deep, somewhat excessively drained, strongly sloping to steep soil. This soil formed in residuum of granite. It is on ridgetops and south-facing slopes on mountains surrounding the valley at an elevation of 5,000 to 7,000 feet. The average annual precipitation is 27 inches, the average annual temperature is 41 degrees F., and the frost-free period is about 70 days.

Included in mapping are small areas of Quartzburg loamy coarse sand, Takeuchi coarse sandy loam, and Jugson coarse sandy loam. Also included are soils that have a coarse sandy loam surface layer and areas of Rock outcrop.

Typically, the surface layer is dark grayish brown, slightly acid and neutral, loamy coarse sand 6 inches thick. The underlying material, to a depth of 40 inches, is brown, slightly acid loamy coarse sand; to a depth of 56 inches it is white and very pale brown, slightly acid gravelly coarse sand. Decomposed granite is at a depth of 56 inches.

Permeability is rapid. The root zone extends to a depth of 40 to 60 inches. The available water capacity is low. Runoff is medium to rapid, and the hazard of erosion is moderate to severe.

This soil is used as woodland and watershed and for wildlife habitat and recreation. The stand of timber and the understory plants on this soil need to be maintained for these uses.

This soil is suited to the production of ponderosa pine. It can produce about 2,750 cubic feet per acre (0.6 inch or more in diameter) of pine at 40 years of age, or 33,800 board feet per acre (Scribner rule) of merchantable timber, II.6 inches or more in diameter, from an unmanaged stand at 150 years of age, based on the mean annual increment.

Timber production is restricted by the very low available water capacity of this soil. Harvesting is restricted by the hazard of erosion. In harvesting trees, conventional equipment such as rubber-tired skidders and crawlers can be used. Stands of cut-over timber commonly are understocked because of the high seedling mortality rate during hot, dry periods in summer. Reforestation and site preparation should be planned carefully before trees are harvested to insure natural reproduction. Shade from mature trees can help to reduce seedling mortality.

The potential for grazing the native understory vegetation is poor to fair if the stand of trees is fully stocked. If the tree canopy is opened by logging, fire, or other disturbance, production and quality of the understory vegetation improve, and thus, the grazing potential improves. This grazing potential remains for 10 to 20 years. Proper grazing and a planned grazing system are essential to insure tree regeneration, to maintain an adequate plant cover and plant vigor, and to protect the soil by leaving an adequate amount of litter on the surface.

The principal native understory plants in areas where the canopy is more open are bluebunch wheatgrass, pine reedgrass, common snowberry, and snowbrush ceanothus. Total annual air-dry herbage production ranges from about 1,000 pounds per acre in areas where the canopy is more open to 400 pounds per acre in areas where the stand is fully stocked.

Roads, skid trails, landings, and other areas where the soil has been disturbed should be seeded to adapted plant species to reduce erosion. Seeding in these areas should take place in the fall following the soil disturbance so that competition from weeds and brush is minimized. By reducing brush competition, seeding can also promote natural tree regeneration. Some adapted species that can be used in seeding are orchardgrass, tall fescue, pubescent wheatgrass, and intermediate wheatgrass.

This soil supports vegetation that is suitable as food and cover for grouse, snowshoe hare, squirrel, songbirds, hawk, weasel, fox, coyote, skunk, bear, deer, and elk. If this soil is used for wildlife habitat, planting seed crops as food for wildlife can improve the habitat.

This soil is limited for urban uses, roads, and recreation facilities by the steepness of slopes.

Capability subclass VIe, nonirrigated.

50—Shellrock loamy coarse sand, 35 to 60 percent slopes. This is a deep, somewhat excessively drained, steep soil. This soil formed in residuum of granite. It is on ridgetops and south-facing slopes on mountains surrounding the valley at an elevation of 5,000 to 7,000 feet. The average annual precipitation is 27 inches, the average annual temperature is 41 degrees F., and the frost-free period is about 70 days.

Included in mapping are small areas of Quartzburg loamy coarse sand, Takeuchi coarse sandy loam, and Jugson coarse sandy loam. Also included are areas of soils that have a coarse sandy loam surface layer and areas of Rock outcrop.

Typically, the surface layer is dark grayish brown, slightly acid and neutral, loamy coarse sand 6 inches thick. The underlying material, to a depth of 40 inches, is brown, slightly acid loamy coarse sand; to a depth of 56 inches, it is white and very pale brown, slightly acid, gravelly coarse sand. Decomposed granite is at a depth of 56 inches.

Permeability is rapid. The root zone extends to a depth of 40 to 60 inches. The available water capacity is low. Runoff is very rapid, and the hazard of erosion is severe to very severe.

This soil is used as woodland and watershed and for wildlife habitat and recreation. The stand of timber and the understory plants on this soil need to be maintained for these uses.

This soil is suited to the production of ponderosa pine. It can produce about 2,750 cubic feet per acre (0.6 inch or more in diameter) of pine at 40 years of age, or 33,800 board feet per acre (Scribner rule) of merchantable timber, 11.6 inches or more in diameter, from an unmanaged stand at 150 years of age, based on the mean annual increment.

Timber production is restricted by the very low available water capacity of this soil. Harvesting is restricted by the steepness of slopes and the hazard of erosion. Slopes generally are too steep for cross-slope operations using conventional equipment such as rubber-tired skidders and crawlers. Special equipment that causes a minimum of soil disturbance should be used in harvesting trees. Stands of cut-over timber commonly are understocked because of the high seedling mortality rate during hot, dry periods in summer. Reforestation and site preparation should be planned carefully before trees are harvested to insure natural reproduction. Shade from mature trees can help to reduce seedling mortality.

The potential for grazing the native understory vegetation is poor to fair if the stand of trees is fully stocked. If the tree canopy is opened by logging, fire, or other disturbance, the production and quality of the understory vegetation improve, and thus the grazing potential improves. This grazing potential remains for 10 to 20 years. Proper grazing and a planned grazing system are essential to insure tree regeneration, to maintain an adequate plant cover and plant vigor, and to protect the soil by leaving an adequate amount of litter on the surface. The steep slopes severely restrict the movement of livestock and accessibility to forage.

The principal native understory plants in areas where the canopy is more open are bluebunch wheatgrass, pine reedgrass, common snowberry, and snowbrush ceanothus. Total annual air-dry herbage production ranges from about 1,000 pounds per acre in areas where the canopy is more open to 400 pounds per acre in areas where the stand is fully stocked.

Roads, skid trails, landings, and other areas where the soil has been disturbed should be seeded to adapted plant species to reduce erosion. Seeding in these areas should take place in the fall following the soil disturbance so that competition from weeds and brush is minimized. By reducing brush competition, seeding can also promote natural tree regeneration. Some adapted plant species that can be used in seeding are orchardgrass, tall fescue, pubescent wheatgrass, and intermediate wheatgrass.

This soil supports vegetation that is suitable as food and cover for grouse, snowshoe hare, squirrel, songbirds, hawk, weasel, fox, coyote, skunk, bear, deer, and elk. If this soil is used for wildlife habitat, planting seed crops as food for wildlife can improve the habitat.

This soil is limited for urban uses, roads, and recreation facilities by the steepness of slopes.

Capability subclass VIIe, nonirrigated.

51—Shellrock-Rock outcrop complex, 12 to 35 percent slopes. This complex consists of strongly sloping to steep soils and areas of Rock outcrop that are on south-facing slopes of granitic mountains east of Payette Lake and east of Donnelly. The elevation is 5,000 to 7,000 feet. Shellrock loamy coarse sand makes up about 50 percent of this complex, Rock outcrop makes up 30 percent, and Quartzburg loamy coarse sand makes up

15 percent. The remaining 5 percent is Jugson coarse sandy loam and Takeuchi coarse sandy loam.

The Shellrock soil is on convex slopes. This soil is deep and somewhat excessively drained. It formed in residuum of granite. The average annual precipitation is 27 inches, the average annual temperature is 41 degrees F., and the frost-free period is about 70 days.

Typically, the surface layer is dark grayish brown, slightly acid and neutral loamy coarse sand 6 inches thick. The underlying material, to a depth of 40 inches, is brown, slightly acid loamy coarse sand; and, to a depth of 56 inches, it is white and very pale brown, slightly acid gravelly coarse sand. Decomposed granite is at a depth of 56 inches.

The Shellrock soil has rapid permeability. The root zone extends to a depth of 40 to 60 inches. The available water capacity is low. Runoff is medium to rapid, and the hazard of erosion is moderate to severe.

Rock outcrop consists of areas that have boulders on the surface and outcrops of the granitic bedrock.

The Quartzburg soil is on ridgetops and surrounds the areas of Rock outcrop. This soil is moderately deep and somewhat excessively drained. It formed in residuum of granite. The average annual precipitation is 30 inches, the average annual temperature is 39 degrees F., and the frost-free period is about 60 days.

The Quartzburg soil typically has a 1-inch thick organic layer that overlies the surface layer. The surface layer is grayish brown, neutral loamy coarse sand 5 inches thick. The underlying material, to a depth of 14 inches, is pale brown, neutral loamy coarse sand; and, to a depth of 22 inches, it is very pale brown, slightly acid, very gravelly loamy coarse sand. Decomposed granite is at a depth of 22 inches.

The Quartzburg soil has rapid permeability. The root zone extends to a depth of 20 to 30 inches. The available water capacity is very low. Runoff is medium to rapid, and the hazard of erosion is moderate to severe.

These soils are used as woodland and watershed and for wildlife habitat and recreation uses. The stand of timber and the understory plants on these soils need to be maintained for these uses. Much of the area has very little or no vegetation. Brush and trees are being established in some areas of Rock outcrop.

The Shellrock soil is suited to the production of ponderosa pine. It can produce about 2,750 cubic feet per acre (0.6 inch or more in diameter) of pine at 40 years of age, or 33,800 board feet per acre (Scribner rule) of merchantable timber, 11.6 inches or more in diameter, from an unmanaged stand at 150 years of age, based on the mean annual increment.

Timber production is restricted by the very low available water capacity of this soil. Harvesting is restricted by the steepness of slopes, the hazard of erosion, and the rock outcrops.

The Quartzburg soil is suited to the production of ponderosa pine. It can produce about 2,750 cubic feet per acre (0.6 inch or more in diameter) of pine at 40 years of age, or 33,800 board feet per acre (Scribner rule) of merchantable timber, 11.6 inches or more in diameter, from an unmanaged stand at 150 years of age, based on the mean annual increment.

Timber production is restricted by the very low available water capacity and the moderate depth of this soil. Harvesting is restricted by the steepness of slopes, the hazard of erosion, and the moderate depth of the soil.

In harvesting trees, conventional equipment such as rubber-tired skidders and crawlers can be used. Because of the moderate depth of the Quartzburg soil, road construction requires the excavation of bedrock. Stands of cut-over timber commonly are understocked because of the high seedling mortality rate during hot, dry periods in summer. Reforestation and site preparation should be planned carefully before trees are harvested to insure natural reproduction. Shade from mature trees can help to reduce seedling mortality.

The potential for grazing the native understory vegetation on the Shellrock and Quartzburg soils is poor to fair if the stand of trees is fully stocked. If the tree canopy is opened by logging, fire, or other disturbance, the production and quality of the understory vegetation improve, and thus the grazing potential improves. This grazing potential remains for 10 to 20 years. Proper grazing and a planned grazing system are essential to insure tree regeneration, to maintain an adequate plant cover and plant vigor, and to protect the soils by leaving an adequate amount of litter on the surface.

The principal native understory plants in areas where the canopy is more open are elk sedge, pine reedgrass, common snowberry, and snowbrush ceanothus. Total annual air-dry herbage production ranges from about 1,000 pounds per acre in areas where the canopy is more open to 300 pounds per acre in areas where the stand is fully stocked.

Roads, skid trails, landings, and other areas where the soil has been disturbed should be seeded to adapted plant species to reduce erosion. Seeding in these areas should take place in the fall following the soil disturbance so that competition from weeds and brush is minimized. By reducing brush competition, seeding can also promote natural tree regeneration. Some adapted species that can be used in seeding are orchardgrass, tall fescue, pubescent wheatgrass, and intermediate wheatgrass.

These soils support vegetation that is suitable as food and cover for grouse, squirrel, snowshoe hare, songbirds, hawk, fox, coyote, skunk, weasel, bear, deer, and elk. If these soils are used for wildlife habitat, planting seed crops as food for wildlife can improve the habitat.

These soils are limited for urban and recreational development by the steepness of slopes, the moderate depth of the Quartzburg soil, and the rock outcrops.

Capability subclass VIe, nonirrigated.

52—Shellrock-Rock outcrop complex, 35 to 60 percent slopes. This complex consists of steep soils and areas of Rock outcrop on south-facing slopes of granitic mountains east of Payette Lake and east of Donnelly. The elevation is 5,000 to 7,000 feet. Shellrock loamy coarse sand makes up about 45 percent of this complex, and Rock outcrop makes up 45 percent. The remaining 10 percent is Quartzburg loamy coarse sand, Jugson coarse sandy loam, and Takeuchi coarse sandy loam.

The Shellrock soil is on convex slopes. This soil is deep and somewhat excessively drained. It formed in residuum of granite. The average annual precipitation is 27 inches, the average annual temperature is 41 degrees F., and the frost-free period is about 70 days.

Typically, the surface layer is dark grayish brown, slightly acid and neutral loamy coarse sand 6 inches thick. The underlying material, to a depth of 40 inches, is brown, slightly acid loamy coarse sand; and, to a depth of 56 inches, it is white and very pale brown, slightly acid gravelly coarse sand. Decomposed granite is at a depth of 56 inches.

The Shellrock soil has rapid permeability. The root zone extends to a depth of 40 to 60 inches. The available water capacity is low. Runoff is very rapid, and the hazard of erosion is severe or very severe.

Rock outcrop consists of areas that have boulders on the surface and outcrops of the granitic bedrock.

This complex is used as woodland and watershed and for wildlife habitat and recreation uses. The stand of timber and the understory plants in this complex need to be maintained for these uses. Much of the area has very little or no vegetation. Brush and trees are becoming established in some areas of Rock outcrop.

The Shellrock soil is suited to the production of ponderosa pine. It can produce about 2,750 cubic feet per acre (0.6 inch or more in diameter) of pine at 40 years of age, or 33,800 board feet per acre (Scribner rule) of merchantable timber, 11.6 inches or more in diameter, from an unmanaged stand at 150 years of age, based on the mean annual increment.

Timber production is restricted by the very low available water capacity of this soil. Harvesting is restricted by the steepness of slopes, the hazard of erosion, and the rock outcrops. Slopes generally are too steep for cross-slope operations using conventional equipment such as rubber-tired skidders and crawlers. Because of the numerous rock outcrops, a greater amount of grading and shaping is necessary in constructing roads. Special equipment that causes a minimum of soil disturbance should be used in harvesting trees. Stands of cut-over timber commonly are understocked because of the high seedling mortality rate during hot, dry periods in summer. Reforestation and site preparation should be planned carefully before trees are harvested to insure natural reproduction. Shade from mature trees can help to reduce seedling mortality.

The potential for grazing the native understory vegetation on the Shellrock soil is poor to fair if the stand of trees is fully stocked. If the tree canopy is opened by logging, fire, or other disturbance, the production and quality of the understory vegetation improve, and thus the grazing potential improves. The grazing potential remains for 10 to 20 years. Proper grazing and a planned grazing system are essential to insure tree regeneration, to maintain an adequate plant cover and plant vigor, and to protect the soil by leaving an adequate amount of litter on the surface. The steep slopes severely restrict the movement of livestock and accessibility to forage.

The principal native understory plants in areas where the canopy is more open are bluebunch wheatgrass, pine reedgrass, common snowberry, and snowbrush ceanothus. Total annual air-dry herbage production ranges from about 1,000 pounds per acre in areas where the canopy is more open to 400 pounds per acre in areas where the stand is fully stocked.

Roads, skid trails, landings, and other areas where the soil has been disturbed should be seeded to adapted plant species to reduce erosion. Seeding in these areas should take place in the fall following the soil disturbance so that competition from weeds and brush is minimized. By reducing brush competition, seeding can also promote natural tree regeneration. Some adapted plant species that are suited to seeding are orchardgrass, tall fescue, pubescent wheatgrass, and intermediate wheatgrass.

The Shellrock soil supports vegetation that is suitable as food and cover for grouse, squirrel, snowshoe hare, songbirds, hawk, fox, coyote, skunk, weasel, bear, deer, and elk. If the areas of this complex are used as wildlife habitat, planting seed crops as food for wildlife can improve the habitat.

This complex is limited for urban uses and recreation facilities by the steep slopes and the rock outcrops.

Capability subclass VIIe, nonirrigated.

53—Sudduth Variant loam, 3 to 20 percent slopes. This is a very deep, moderately well drained, very gently sloping to strongly sloping soil. This soil formed in residuum of basalt. It is on foothills surrounding the valley at an elevation of 4,800 to 5,300 feet. The average annual precipitation is 25 inches, the average annual temperature is 40 degrees F., and the frost-free period is about 70 days.

Included in mapping are small areas of Swede silt loam and Nisula loam. Also included are areas of Demast loam.

Typically, the surface layer is dark grayish brown, slightly acid and neutral loam 16 inches thick. The upper part of the subsoil is dark grayish brown, neutral clay loam 6 inches thick, and the lower part is brown, neutral and slightly acid silty clay loam 19 inches thick. The substratum, to a depth of 60 inches or more, is very pale brown, slightly acid clay loam.

Permeability is slow. The root zone extends to a depth of 60 inches or more. The available water capacity is moderate. Runoff is slow or medium, and the hazard of erosion is slight or moderate. A high water table is at a depth between 3 and 6 feet from late in spring to midsummer.

This soil is used as rangeland and watershed and for wildlife habitat and recreation uses. In some areas it is used for hay and as pasture. In disturbed areas where this soil does not have a grass cover, lodgepole pine and ponderosa pine can be established naturally.

This soil has good potential for grazing. The principal native forage plants include slender wheatgrass, bluebunch wheatgrass, beardless wheatgrass, big bluegrass, great basin wildrye, and Idaho fescue.

Some adapted plant species that are suited to seeding are orchardgrass, tall fescue, pubescent wheatgrass, and intermediate wheatgrass. Seeding should take place in the fall so that competition from weeds and brush is minimized.

Grazing should be managed to protect and maintain plant vigor and to protect the soil by leaving an adequate amount of litter on the surface.

This soil is used, to a limited extent, as pasture and for hay. The short growing season limits the choice and productivity of crops. Seeding, pasture and hayland management, and irrigation management are needed. A vegetative cover needs to be maintained on the strongly sloping soils to prevent erosion. A suitable crop rotation consists of hay or pasture that is maintained as long as the stand is productive, 1 or 2 years of oats, and then seeding to adapted grasses and legumes. To obtain an optimum yield, lime and fertilizer should be applied on the basis of soil tests. Sprinkler irrigation is a suitable system. The use of contour or cross-slope tillage can help to prevent erosion.

This soil supports vegetation that is suitable as food for grouse, squirrel, songbirds, snowshoe hare, hawk, fox, coyote, skunk, deer, bear, and elk. Most areas of this soil are adjacent to areas of timber, which can provide wildlife cover. If this soil is used for wildlife habitat, planting seed crops can improve the production of food for wildlife.

This soil is limited for urban uses, roads, and recreation facilities by the high shrink-swell potential and the steepness of slopes. These limitations should be considered in the design of foundations.

Capability subclass VIe, irrigated and nonirrigated.

54—Swede silt loam, 2 to 4 percent slopes. This is a very deep, well drained, very gently sloping soil. This soil formed in mixed basaltic and granitic alluvium. It is on alluvial fans and colluvial foot slopes mainly along the western edge of the valley. The elevation is 4,800 to 5,300 feet. The average annual precipitation is 25 inches, the average annual temperature is 41 degrees F., and the frost-free period is about 68 days.

Included in mapping are small areas of Gestrin loam, Nisula loam, and Takeuchi coarse sandy loam.

Typically, the surface layer is 9 inches thick. It is grayish brown, slightly acid silt loam in the upper part and brown, slightly acid silt loam in the lower part. The subsoil extends to a depth of 60 inches or more. In the upper part, to a depth of 52 inches, it is brown, pale brown, and very pale brown, slightly acid silty clay loam; and in the lower part it is very pale brown, slightly acid, fine gravelly silty clay loam.

Permeability is moderately slow. The root zone extends to a depth of 60 inches or more. The available water capacity is very high. Runoff is slow, and the hazard of erosion is slight.

This soil is used as woodland and watershed and for urban development, recreation uses, and wildlife habitat. The stand of timber and the understory plants on this soil need to be maintained for these uses. Some areas have been cleared and are used for hay, pasture, or oats.

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

Timber production is restricted by the moderately slow permeability in the subsoil. In harvesting trees, conventional methods that make use of rubber-tired skidders and crawlers can be used but generally are restricted during rainy periods in winter and spring. When the soil is wet, equipment has poor traction and ruts form in the roads. Reforestation should be planned carefully to reduce competition from undesirable understory plants.

The potential for grazing the native understory vegetation is fair to good if the stand of trees is fully stocked. If the tree canopy is opened by logging, fire, or other disturbance, the production and quality of the understory vegetation improve, and thus the grazing potential improves. This grazing potential remains for 10 to 20 years. Proper grazing and a planned grazing system are essential to insure tree regeneration, to maintain adequate plant cover and plant vigor, and to protect the soil by leaving an adequate amount of litter on the surface.

The principal native understory plants in areas where the canopy is more open are elk sedge and pine reedgrass. Total annual air-dry herbage production ranges from about 1,600 pounds per acre in areas where the canopy is more open to 600 pounds per acre in areas where the stand is fully stocked.

Roads, skid trails, landings, and other areas where the soil has been disturbed should be seeded to adapted plant species to reduce erosion. Seeding in these areas should take place in the fall following the soil disturbance so that competition from weeds and brush is minimized. By reducing brush competition, seeding can also promote natural tree regeneration. Some adapted plant species that are suited to seeding are orchardgrass, tall fescue, pubescent wheatgrass, and intermediate wheatgrass.

The short growing season limits the choice and productivity of crops. Land leveling, seeding, weed control, pasture and hayland management, and irrigation management are needed. A suitable crop rotation consists of hay or pasture that is maintained as long as the stand is productive, 1 or 2 years of oats, and then seeding to adapted grasses and legumes. To obtain an optimum yield, lime and fertilizer should be applied on the basis of soil tests. A corrugation or furrow irrigation system is suitable. The length of the run should be 325 to 500 feet.

This soil supports vegetation that is suitable as food for grouse, squirrel, snowshoe hare, songbirds, hawk, fox, coyote, skunk, weasel, bear, deer, and elk. If this soil is used for wildlife habitat, trees and shrubs should be planted in cultivated areas to provide cover for wildlife.

This soil is limited for urban uses and roads by its moderate shrink-swell potential. This limitation should be considered in the design of foundations. This soil is suited to most recreation facilities; however, it is limited for playgrounds because of the steepness of slopes.

Capability subclass IVe, irrigated, and IVc, nonirrigated.

55—Swede silt loam, 4 to 12 percent slopes. This is a very deep, well drained, gently sloping and moderately sloping soil. This soil formed in mixed basaltic and granitic alluvium. It is on alluvial fans and colluvial foot slopes mainly along the western edge of the valley. The elevation is 4,800 to 5,300 feet. The average annual precipitation is 25 inches, the average annual temperature is 41 degrees F., and the frost-free period is about 68 days.

Included in mapping are small areas of Gestrin loam, Nisula loam, and Takeuchi coarse sandy loam.

Typically, the surface layer is 9 inches thick; it is grayish brown, slightly acid silt loam in the upper part and brown, slightly acid silt loam in the lower part. The subsoil extends to a depth of 60 inches or more. In the upper part, to a depth of 52 inches, it is brown, pale brown, and very pale brown, slightly acid silty clay loam, and in the lower part it is very pale brown, slightly acid, fine gravelly silty clay loam.

Permeability is moderately slow. The root zone extends to a depth of 60 inches or more. The available water capacity is very high. Runoff is medium, and the hazard of erosion is slight or moderate.

This soil is used as woodland and watershed and for urban development, recreation uses, and wildlife habitat. The stand of timber and the understory plants on this soil need to be maintained for these uses. Some areas have been cleared and are used for hay, pasture, or oats.

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

Timber production is restricted by the moderately slow permeability in the subsoil. In harvesting timber, conventional methods that make use of rubber-tired skidders and crawlers can be used but generally are restricted during rainy periods in winter and spring. When the soil is wet, equipment has poor traction and ruts form in the roads. Reforestation should be planned carefully to reduce competition from undesirable understory plants.

The potential for grazing the native understory vegetation is fair to good if the stand of trees is fully stocked. If the tree canopy is opened by logging, fire, or other disturbance, the production and quality of the understory vegetation improve, and thus the grazing potential improves. This grazing potential remains for 10 to 20 years. Proper grazing and a planned grazing system are essential to insure tree regeneration, to maintain an adequate plant cover and plant vigor, and to protect the soil by leaving an adequate amount of litter on the surface.

The principal native understory plants in areas where the canopy is more open are elk sedge and pine reedgrass. Total annual air-dry herbage production ranges from about 1,600 pounds per acre in areas where the canopy is more open to 600 pounds per acre in areas where the stand is fully stocked.

Roads, skid trails, landings, and other areas where the soil has been disturbed should be seeded to adapted plant species to reduce erosion. Seeding in these areas should take place in the fall following the soil disturbance so that competition from weeds and brush is minimized. By reducing brush competition, seeding can also promote natural tree regeneration. Some adapted plant species that can be used in seeding are orchardgrass, tall fescue, pubescent wheatgrass, and intermediate wheatgrass.

The short growing season limits the choice and productivity of crops. Land leveling, seeding, weed control, pasture and hayland management, and irrigation management are needed. A suitable crop rotation consists of hay or pasture that is maintained as long as the stand is productive, 1 or 2 years of oats, and then seeding to adapted grasses and legumes. To obtain an optimum yield, lime and fertilizer should be applied on the basis of soil tests. A corrugation or furrow irrigation system is suitable. The length of the run should be less than 325 feet. The use of contour or cross-slope tillage can help to prevent erosion.

This soil supports vegetation that is suitable as food for grouse, squirrel, snowshoe hare, songbirds, hawk, fox, coyote, skunk, weasel, bear, deer, and elk. If this soil is used for wildlife habitat, trees and shrubs should be planted in cultivated areas to provide cover for wildlife.

This soil is limited for urban uses and roads by its moderate shrink-swell potential. This limitation should be considered in the design of foundations. This soil is limited for use as sites for recreation facilities by the steepness of slopes.

Capability subclass IVe, irrigated and nonirrigated.

56—Swede silt loam, 12 to 20 percent slopes. This is a very deep, well drained, strongly sloping soil. This soil formed in mixed basaltic and granitic alluvium. It is on alluvial fans and colluvial foot slopes mainly along the western edge of the valley. The elevation is 4,800 to 5,300 feet. The average annual precipitation is 25 inches, the average annual temperature is 41 degrees F., and the frost-free period is about 68 days.

Included in mapping are small areas of Nisula loam and Takeuchi coarse sandy loam.

Typically, the surface layer is 9 inches thick; it is grayish brown, slightly acid silt loam in the upper part and brown, slightly acid silt loam in the lower part. The subsoil extends to a depth of 60 inches or more. In the upper part, to a depth of 52 inches, it is brown, pale brown, and very pale brown, slightly acid silty clay loam, and in the lower part it is very pale brown, slightly acid, fine gravelly silty clay loam.

Permeability is moderately slow. The root zone extends to a depth of 60 inches or more. The available water capacity is very high. Runoff is medium, and the hazard of erosion is moderate.

This soil is used as woodland and watershed and for urban development, recreation uses, and wildlife habitat. Most of these uses depend on the maintenance of a healthy stand of timber and understory plants. Some areas have been cleared and are used for hay, pasture, or oats.

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

Timber production is restricted by the moderately slow permeability in the subsoil. In harvesting trees, conventional methods that make use of rubber-tired skidders and crawlers can be used but generally are restricted during rainy periods in winter and spring. When the soil is wet, equipment has poor traction and ruts form in the roads. Reforestation should be planned carefully to reduce competition from undesirable understory plants.

The potential for grazing the native understory vegetation is fair to good if the stand of trees is fully stocked. If the canopy is opened by logging, fire, or other disturbance, the production and quality of the understory vegetation improve, and thus the grazing potential improves. This grazing potential remains for 10 to 20 years. Proper grazing and a planned grazing system are essential to insure tree regeneration, to maintain an adequate plant cover and plant vigor, and to protect the soil by leaving an adequate amount of litter on the surface.

The principal native understory plants in areas where the canopy is more open are elk sedge and pine reedgrass. Total annual air-dry herbage production ranges from about 1,600 pounds per acre in areas where the canopy is more open to 600 pounds per acre in areas where the stand of trees is fully stocked.

Roads, skid trails, landings, and other areas where the soil has been disturbed should be seeded to adapted plant species to reduce erosion. Seeding in these areas should take place in the fall following the soil disturbance so that competition from weeds and brush is minimized. By reducing brush competition, seeding can also promote natural tree regeneration. Some adapted plant species that can be used in seeding are orchardgrass, tall fescue, pubescent wheatgrass, and intermediate wheatgrass.

The short growing season limits the choice and productivity of crops. Land leveling, seeding, weed control, pasture and hayland management, and irrigation management are needed. A suitable crop rotation consists of hay or pasture that is maintained as long as the stand is productive, 1 or 2 years of oats, and then seeding to adapted grasses and legumes. To obtain an optimum yield, lime and fertilizer should be applied on the basis of soil tests. A sprinkler irrigation system is suitable. The use of contour or cross-slope tillage can help to prevent erosion.

This soil supports vegetation that is suitable as food for grouse, squirrel, snowshoe hare, songbirds, hawk, fox, coyote, skunk, weasel, bear, deer, and elk. This soil provides good grazing for big game animals. If this soil is used for wildlife habitat, trees and shrubs should be planted in cultivated areas to provide cover for wildlife.

This soil is limited for urban uses and roads by the moderate shrink-swell potential and the steepness of slopes. These limitations should be considered in the design of foundations. This soil is limited to use as a site for recreation facilities by the steepness of slopes.

Capability subclass VIe, irrigated and nonirrigated.

57—Takeuchi coarse sandy loam, 3 to 35 percent slopes. This is a moderately deep, well drained, very gently sloping to steep soil. This soil formed in residuum of granite. It is on ridgetops and south-facing slopes of foothills at an elevation of 4,800 to 5,100 feet. The average annual precipitation is 26 inches, the average annual temperature is 41 degrees F., and the frost-free period is about 70 days.

Included in mapping are small areas of Rock outcrop, Shellrock loamy coarse sand, and a soil that has bedrock within a depth of 20 inches. Also included are areas of soils that have slopes of 35 to 50 percent and areas of Archabal loam.

Typically, the surface layer is dark grayish brown, slightly acid coarse sandy loam 7 inches thick. The subsoil is brown, slightly acid, heavy coarse sandy loam 7 inches thick. The substratum is very pale brown, slightly acid sand 10 inches thick. Decomposed granite is at a depth of 24 inches, and hard granite is at a depth of 30 inches.

Permeability is moderately rapid in the subsoil and rapid in the substratum. The root zone extends to a depth of 20 to 40 inches. The available water capacity is very low. Runoff is medium to rapid, and the hazard of erosion is moderate to severe.

This soil is used as rangeland and watershed and for recreation uses and wildlife habitat. In a few small areas, it is used as pasture and for hay.

This soil has good potential for grazing. The principal native forage plants include bluebunch wheatgrass, Idaho fescue, western yarrow, lupine, and mountain big sagebrush. Grazing should be managed to protect and maintain plant vigor and to protect the soil by leaving an adequate amount of litter on the surface. Controlling sagebrush and seeding to adapted species can improve the yield of forage. Seeding should take place in the fall so that competition from weeds and brush is minimized. Some adapted plant species that can be used in seeding are orchardgrass, tall fescue, pubescent wheatgrass, and intermediate wheatgrass.

This soil supports vegetation that is suitable as food for grouse, snowshoe hare, squirrel, songbirds, hawk, fox, coyote, skunk, weasel, deer, and elk. This soil provides good grazing for big game animals. Cover can be improved by planting trees and shrubs. If this soil is used for wildlife habitat, planting seed crops can improve the habitat.

This soil is limited for urban uses, roads, and recreation facilities by the moderate depth to bedrock and the steep slopes. These limitations should be considered in the design of foundations.

Capability subclass VIe, nonirrigated.

58—Tica very cobbly loam, 4 to 65 percent slopes. This is a shallow, well drained, gently sloping to very steep soil. This soil formed in residuum of basalt. It is on ridgetops and side slopes of mountains throughout the survey area at an elevation of 4,800 to 6,000 feet. The average annual precipitation is 26 inches, the average annual temperature is 40 degrees F., and the frost-free period is about 60 days.

Included in mapping are small areas of Bluebell cobbly loam and Demast loam. Also included are areas of Sudduth Variant loam and a soil that is similar to this Tica soil except that it has a subsoil of loam or clay loam.

Typically, the surface layer is brown, neutral, very cobbly loam and very cobbly clay loam 13 inches thick. The subsoil is brown, slightly acid, very cobbly clay 4 inches thick. Fractured basalt bedrock that has clay in some cracks is at a depth of 17 inches.

Permeability is slow above the bedrock. The root zone extends to a depth of 10 to 20 inches. The available water capacity is very low. Runoff is medium to very rapid, and the hazard of erosion is moderate to very severe.

This soil is used as rangeland and watershed and for recreation uses and wildlife habitat.

This soil has good potential for grazing. The principal native forage plants include bluebunch wheatgrass, Idaho fescue, elk sedge, arrowleaf balsamroot, mountain big sagebrush, and common snowberry. Grazing should be managed to maintain or improve plant vigor and to protect the soil by leaving an adequate amount of litter on the surface. This soil is not suitable for seeding because of the cobbly surface layer.

This soil supports vegetation that is suitable as food for grouse, snowshoe hare, squirrel, songbirds, hawk, fox, coyote, skunk, deer, bear, and elk. This soil does not provide good cover for big game animals.

This soil is limited for urban uses and recreation facilities by the shallowness to rock, the steepness of slopes, and the surface stones.

Capability subclass VIIs, nonirrigated.

Use and management of the soils

The soil survey is a detailed inventory and evaluation of the most basic resource of the survey area—the soil. It is useful in adjusting land use, including urbanization, to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in uses of the land.

While a soil survey is in progress, soil scientists, conservationists, engineers, and others keep extensive notes about the nature of the soils and about unique aspects of behavior of the soils. These notes include data on erosion, drought damage to specific crops, yield estimates, flooding, the functioning of septic tank disposal systems, and other factors affecting the productivity, potential, and limitations of the soils under various uses and management. In this way, field experience and measured data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section is useful in planning use and management of the soils for crops and pasture, rangeland, and woodland; as sites for buildings, highways and other transportation systems, sanitary facilities, and parks and other recreation facilities; and for wildlife habitat. From the data presented, the potential of each soil for specified land uses can be determined, soil limitations to these land uses can be identified, and costly failures in houses and other structures, caused by unfavorable soil properties, can be avoided. A site where soil properties are favorable can be selected, or practices that will overcome the soil limitations can be planned.

Planners and others using the soil survey can evaluate the impact of specific land uses on the overall productivity of the survey area or other broad planning area and on the environment. Productivity and the environment are closely related to the nature of the soil. Plans should maintain or create a land-use pattern in harmony with the natural soil.

Contractors can find information that is useful in locating sources of sand and gravel, roadfill, and topsoil. Other information indicates the presence of bedrock, wetness, or very firm soil horizons that cause difficulty in excavation.

Health officials, highway officials, engineers, and many other specialists also can find useful information in this soil survey. The safe disposal of wastes, for example, is closely related to properties of the soil. Pavements, sidewalks, campsites, playgrounds, lawns, and trees and shrubs are influenced by the nature of the soil.

Crops and pasture

The major management concerns in the use of the soils for crops and pasture are described in this section. In addition, the crops or pasture plants best suited to the soil, including some not commonly grown in the survey area, are discussed; the system of land capability classification used by the Soil Conservation Service is explained; and estimated yields of the main crops and hay and pasture plants are presented for the soils suited to crops and pasture.

This section provides information about the overall agricultural potential of the survey area and about the management practices that are needed. The information is useful to equipment dealers, land improvement contractors, fertilizer companies, processing companies, planners, conservationists, and others. For each kind of soil, information about management is presented in the section "Soil maps for detailed planning." Planners of management systems for individual fields or farms should also consider the detailed information given in the description of each soil.

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 6. 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. Absence of an estimated yield indicates that the soil is not suited to the crop or the crop is not commonly grown on the soil.

The estimated yields were based mainly on the experience and records of farmers, conservationists, and extension agents. Results of field trials and demonstrations and available yield data from nearby counties were also considered.

The yields were estimated assuming that the latest soil and crop management practices were used. Hay and pasture yields were estimated for the most productive varieties of grasses and legumes suited to the climate and the soil. A few farmers may be obtaining average yields higher than those shown in table 6.

The management needed to achieve the indicated yields of the various crops depends on the kind of soil and the crop. Such management provides drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate tillage practices, including time of tillage and seedbed preparation and tilling when soil moisture is favorable; 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 residues, barnyard manure, and green-manure crops; harvesting crops with the smallest possible loss; and timeliness of all fieldwork.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown; that good quality irrigation water is uniformly applied in proper amounts as needed; and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of the soils 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 6 are grown in the survey area, but estimated yields are not included because the acreage of these crops is small. The local offices of the Soil Conservation Service and the Cooperative Extension Service can provide information about the management concerns and productivity of the soils for these crops.

Capability classes and subclasses

Capability classes and subclasses show, in a general way, the suitability of soils for most kinds of field crops. The soils are classed according to their limitations when they are used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops that require special management. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forest trees, or for engineering purposes.

In the capability system, all kinds of soil are grouped at three levels: capability class, subclass, and unit. These levels are defined in the following paragraphs. A survey area may not have soils of all classes.

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 few 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 landforms 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 too cold or too dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion, though they have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

The capability subclass is identified in the description of each soil map unit in the section "Soil maps for detailed planning."

Rangeland

Lincoln E. Burton, range conservationist, and Richard G. Tews, district conservationist, Soil Conservation Service, helped to prepare this section.

In areas that have similar climate and topography, differences in the kind and amount of vegetation that rangeland can produce are related closely to the kind of soil. Effective management is based on the relationships among soils, vegetation, and water.

Table 7 shows, for each kind of soil, the name of the range site; the total annual production of vegetation in favorable, normal, and unfavorable years; the characteristic vegetation; and the expected percentage of each species in the composition of the potential natural plant community. The following are explanations of column headings in table 7.

A *range site* is a distinctive kind of rangeland that differs from other kinds of rangeland in its ability to produce a characteristic natural plant community. Soils that produce a similar kind, amount, and proportion of range plants are grouped into range sites. For those areas where the relationship between soils and vegetation has been established, range sites can be interpreted directly from the soil map. Properties that determine the capacity of the soil to supply moisture 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 refers to the amount of vegetation that can be expected to grow annually on well managed rangeland that is supporting the potential natural plant community. 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 are such that growing conditions are substantially better than average; in a normal year these conditions are about average for the area; in an unfavorable year, growing conditions are well below average, generally because of low available soil moisture.

Dry weight refers to the total air-dry vegetation produced per acre each year by the potential natural plant community. Vegetation that is highly palatable to livestock and vegetation that is unpalatable are included. Some of the vegetation can also be grazed extensively by wildlife.

Characteristic vegetation—the grasses, grasslike plants, 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 proportion of each species is presented as the percentage, in air-dry weight, of the total annual production of herbaceous and woody plants. The amount that can be used as forage depends on the kinds of grazing animals and on the grazing season. Generally all of the vegetation produced is not used.

Range management requires, in addition to knowledge of the kinds of soil and the potential natural plant community, an evaluation of the present condition of the range vegetation in relation to its potential. 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. 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 maximum 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.

About 20 percent of the Valley Area is rangeland. This rangeland generally is used for summer grazing of livestock, mainly cattle.

Feeding livestock is difficult and expensive because of the long and occasionally severe winters. Livestock that are summer-grazed in the Valley Area generally are winter-grazed on irrigated farms, winter ranches, or feedlots in southern Idaho.

Cattle are moved into the survey area in mid to late June and are moved out in fall. The arrival date in summer is determined by the spring weather and by the amount of grass available for grazing. The departure date in fall is determined by the first frost and snowfall.

A small number of cattle that are summer-grazed in the Valley Area remain on local ranches in winter. These ranches produce the majority of their own winter feed. Grass- and oat-hay and some high-quality legume-hay are harvested for use as winter feed.

About 14,000 sheep pass through the Valley Area to and from summer rangeland on mountains. The number of sheep has declined in recent years because of labor problems and because many access trails to the high summer rangeland have been closed.

In most areas, the soils can support brush and trees because of the high rainfall. As a result, overgrazing the natural grass cover can cause trees and brush to invade the rangeland. Denuded areas are subject to severe soil erosion, and weeds such as Canada thistle, toad flax, or skeletonweed commonly invade rangeland and woodland.

Maintaining or reestablishing the potential plant community, reducing the quantity of undesirable plant species, and minimizing soil erosion are the major management concerns in the Valley Area.

Woodland management and productivity

David J. Poe, woodland conservationist, and Richard G. Tews, district conservationist, Soil Conservation Service, helped to prepare this section.

In the 1880's, when the Valley Area was settled, timber was harvested mainly for local use in fences and bridges. At the turn of the century, narrow gauge railroads were constructed to aid in harvesting the virgin stands of ponderosa pine and Douglas-fir.

Today, about 60 percent of the survey area is woodland. The woodlots range mainly from 10 to 200 acres in size. The largest individual tract is about 90,000 acres. About 18,000,000 board feet of timber is harvested annually in the Valley Area.

The woodland in the Valley Area has high potential for recreation uses. In addition, it provides grazing for livestock and habitat for wildlife. The mountainous wooded areas provide much of the irrigation water used in the Valley Area. Table 8 contains information useful to woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The ordination (woodland suitability) symbol for each soil is given. All soils bearing the same ordination symbol require the same general kinds of woodland 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 insignificant limitations or restrictions. If a soil has more than one limitation, priority in placing the soil into a limitation class is in the following order: x, w, t, d, c, s, f, and r.

In table 8 the soils are also rated for a number of factors to be considered in management. *Slight, moderate,* and *severe* are used to indicate the degree of major soil limitations.

Ratings of the *erosion hazard* indicate the risk of loss of soil in well managed woodland. The risk is *slight* if the expected soil loss is small, *moderate* if some measures are needed to control erosion during logging and road construction, and *severe* if intensive management or special equipment and methods are needed to prevent excessive loss of soil.

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 equipment; *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 that the soil affects expected mortality of planted tree seedlings. Plant competition is not considered in the ratings. Seedlings from good planting stock that are properly planted during a period of sufficient rainfall are rated. A rating of *slight* indicates that the expected mortality of the planted seedlings is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

Considered in the ratings of *windthrow hazard* are characteristics of the soil that affect the development of tree roots and the ability of the soil to hold trees firmly. A rating of *slight* indicates that trees in wooded areas are not expected to be blown down by commonly occurring winds; *moderate*, that some trees are 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 or grow if openings are made in the tree canopy. The invading plants compete with native plants or planted seedlings by impeding or preventing their growth. 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* means that plant competition is expected to prevent the establishment of a desirable stand unless the site is intensively prepared, weeded, or otherwise managed for the control of 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. Important 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 suitable for commercial wood production and that are suited to the soils.

Woodland understory vegetation

Understory vegetation consists of grasses, forbs, shrubs, and other plants. Some types of forest, under proper management, can produce enough understory vegetation to support grazing of livestock or wildlife, or both.

The quantity and quality of understory vegetation vary with the kind of soil, the age and kind of trees, the density of the canopy, and the depth and condition of the forest litter. The density of the forest canopy affects the amount of light that understory plants receive during the growing season.

Table 9 shows, for each soil suitable for woodland, the potential for producing understory vegetation. The table also lists the common names of the characteristic vegetation that grows on a specified soil and the percentage composition, by air-dry weight, of each kind of plant. The kind and percentage of understory plants listed in the table are those to be expected where canopy density is most nearly typical of forests that yield the highest production of wood crops.

The total production of understory vegetation is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year the 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.

Windbreaks and environmental plantings

Windbreaks are established to protect livestock, buildings, and yards from wind and snow. Windbreaks also help protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broad-leaved and coniferous species 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 depending on erodibility of the soil. They 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. A healthy planting stock of suitable species planted properly on a well prepared site and maintained in good condition can insure a high degree of plant survival.

Table 10 shows the height that locally grown trees and shrubs are expected to reach on various kinds of soil in 20 years. The estimates in table 10, based on measurements and observation of established plantings that have been given adequate care, can be used as a guide in planning windbreaks and screens. Additional information about planning windbreaks and screens and the planting and care of trees can be obtained from local offices of the Soil Conservation Service or the Cooperative Extension Service or from nurserymen.

Engineering

This section provides information about the use of soils for building sites, sanitary facilities, construction material, and water management. Among those who can benefit from this information are engineers, landowners, community planners, town and city managers, land developers, builders, contractors, and farmers and ranchers.

The ratings in the engineering tables are based on test data and estimated data in the "Soil properties" section. The ratings were determined jointly by soil scientists and engineers of the Soil Conservation Service using known relationships between the soil properties and the behavior of soils in various engineering uses.

Among the soil properties and site conditions identified by a soil survey and used in determining the ratings in this section were grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock that is within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure or aggregation, in-place soil density, and geologic origin of the soil material. If pertinent, data about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of absorbed cations were also considered.

On the basis of information assembled about soil properties, ranges of values can be estimated for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, shear strength, compressibility, slope stability, and other factors of expected soil behavior in engineering uses. As appropriate, these values can be applied to each major horizon of each soil or to the entire profile.

These factors of soil behavior affect construction and maintenance of roads, airport runways, pipelines, foundations for small buildings, ponds and small dams, irrigation projects, drainage systems, sewage and refuse disposal systems, and other engineering works. The ranges of values can be used to (1) select potential residential, commercial, industrial, and recreational areas; (2) make preliminary estimates pertinent to construction in a particular area; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for location of sanitary landfills, onsite sewage disposal systems, and other waste disposal facilities; (5) plan detailed onsite investigations of soils and geology; (6) find sources of gravel, sand, clay, and topsoil; (7) plan farm drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; (8) relate performance of structures already built to the properties of the kinds of soil on which they are built so that performance of similar structures on the same or a similar soil in other locations can be predicted; and (9) predict the trafficability of soils for cross-country movement of vehicles and construction equipment.

Data presented in this section are useful for land-use planning and for choosing alternative practices or general designs that will overcome unfavorable soil properties and minimize soil-related failures. Limitations to the use of these data, however, should be well understood. First, the data are generally not presented for soil material below a depth of 5 or 6 feet. Also, because of the large scale of the detailed map in this soil survey, small areas of soils that differ from the dominant soil are included in mapping. Thus, these data do not eliminate the need for onsite investigations, testing, and analysis by personnel having expertise in the specific use contemplated.

The information is presented mainly in tables. Table 11 shows, for each kind of soil, the degree and kind of limitations for building site development; table 12, for sanitary facilities; and table 14, for water management. Table 13 shows the suitability of each kind of soil as a source of construction materials.

The information in the tables, along with the soil map, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations and to construct interpretive maps for specific uses of land.

Some of the terms used in this soil survey have a special meaning in soil science. Many of these terms are defined in the Glossary.

Building site development

The degree and kind of soil limitation that affects shallow excavations, dwellings with and without a basement, small commercial buildings, and local roads and streets are indicated in table 11. A *slight* limitation indicates that soil properties generally are favorable for the specified use and that limitations are minor and easily overcome. A *moderate* limitation indicates that soil properties and site features are unfavorable for the specified use, but the limitations can be overcome or minimized by special planning and design. A *severe* limitation indicates that one or more soil properties or site features are so unfavorable or difficult to overcome that a major increase in construction effort, special design, or intensive maintenance is required. For some soils that are rated severe, costly measures may not be feasible.

Shallow excavations are made for pipelines, sewerlines, communications and power transmission lines, basements, open ditches, and cemeteries. Such digging or trenching is influenced by soil wetness caused by a seasonal high water table; the texture and consistence of soils; the tendency of soils to cave in or slough; and the presence of very firm, dense soil layers, bedrock, or large stones. In addition, excavations are affected by slope of the soil and the probability of flooding. Ratings do not apply to soil horizons below a depth of 6 feet unless otherwise noted.

In the soil series descriptions, the consistence of each soil horizon is given, and the presence of very firm or extremely firm horizons, usually difficult to excavate, is indicated.

Dwellings and *small commercial buildings* referred to in table 11 are built on undisturbed soil and have foundation loads of a dwelling no more than three stories high. Separate ratings are made for small commercial buildings without basements and for dwellings with and without basements. For such structures, soils should be sufficiently stable that cracking or subsidence of the structure from settling or shear failure of the foundation does not occur. These ratings were determined from estimates of the shear strength, compressibility, and shrink-swell potential of the soil. Soil texture, plasticity and in-place density, potential frost action, soil wetness, and depth to a seasonal high water table were also considered. Soil wetness and depth to a seasonal high water table indicate potential difficulty in providing adequate drainage for basements, lawns, and gardens. Depth to bedrock, slope, and large stones in or on the soil are also important considerations in the choice of sites for these structures and were considered in determining the ratings. Susceptibility to flooding is a serious hazard.

Local roads and streets referred to in table 11 have an all-weather surface that can carry light to medium traffic all year. They consist of a subgrade of the underlying soil material; a base of gravel, crushed rock fragments, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. The roads are graded with soil material at hand, and most cuts and fills are less than 6 feet deep.

The load supporting capacity and the stability of the soil as well as the quantity and workability of fill material available are important in design and construction of roads and streets. The classifications of the soil and the soil texture, density, shrink-swell potential, and potential frost action are indicators of the traffic supporting capacity used in making the ratings. Soil wetness, flooding, slope, depth to hard rock or very compact layers, and content of large stones affect stability and ease of excavation.

Sanitary facilities

Favorable soil properties and site features are needed for proper functioning of septic tank absorption fields, sewage lagoons, and sanitary landfills. The nature of the soil is important in selecting sites for these facilities and in identifying limiting soil properties and site features to be considered in design and installation. Also, those soil properties that affect ease of excavation or installation of these facilities will be of interest to contractors and local officials. Table 12 shows the degree and kind of limitations of each soil for such uses and for use of the soil as daily cover for landfills. It is important to observe local ordinances and regulations.

If the degree of soil limitation is expressed as *slight*, soils are generally favorable for the specified use and limitations are minor and easily overcome; if *moderate*, soil properties or site features are unfavorable for the specified use, but limitations can be overcome by special planning and design; and if *severe*, soil properties or site features are so unfavorable or difficult to overcome that major soil reclamation, special designs, or intensive maintenance is required. Soil suitability is rated by the terms *good*, *fair*, and *poor*, which mean about the same as *slight*, *moderate*, and *severe*.

Septic tank absorption fields are subsurface systems of tile or perforated pipe that distribute effluent from a septic tank into the natural soil. Only the soil horizons between depths of 18 and 72 inches are evaluated for this use. The soil properties and site features considered are those that affect the absorption of the effluent and those that affect the construction of the system.

Properties and features that affect absorption of the effluent are permeability, depth to seasonal high water table, depth to bedrock, and susceptibility to flooding. Stones, boulders, and shallowness to bedrock interfere with installation. Excessive slope can cause lateral seepage and surfacing of the effluent. Also, soil erosion and soil slippage are hazards if absorption fields are installed on sloping soils.

In some soils, loose sand and gravel or fractured bedrock is less than 4 feet below the tile lines. In these soils the absorption field does not adequately filter the effluent, and ground water in the area may be contaminated.

On many of the soils that have moderate or severe limitations for use as septic tank absorption fields, a system to lower the seasonal water table can be installed or the size of the absorption field can be increased so that performance is satisfactory.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons have a nearly level floor and cut slopes or embankments of compacted soil material. Aerobic lagoons generally are designed to hold 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. Soils that are very high in content of organic matter and those that have cobbles, stones, or boulders are not suitable. Unless the soil has very slow permeability, contamination of ground water is a hazard if the seasonal high water table is above the level of the lagoon floor. If the water table is seasonally high, seepage of ground water into the lagoon can seriously reduce the lagoon's capacity for liquid waste. Slope, depth to bedrock, and susceptibility to flooding also affect the suitability of sites for sewage lagoons or the cost of construction. Shear strength and permeability of compacted soil material affect the performance of embankments.

Sanitary landfill is a method of disposing of solid waste by placing refuse in successive layers either in excavated trenches or on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil material. Landfill areas are subject to heavy vehicular traffic. Risk of polluting ground water and trafficability affect the suitability of a soil for this use. The best soils have a loamy or silty texture, have moderate to slow permeability, are deep to a seasonal water table, and are not subject to flooding. Clayey soils are likely to be sticky and difficult to spread. Sandy or gravelly soils generally have rapid permeability, which might allow noxious liquids to contaminate ground water. Soil wetness can be a limitation because operating heavy equipment on a wet soil is difficult. Seepage into the refuse increases the risk of pollution of ground water.

Ease of excavation affects the suitability of a soil for the trench type of landfill. A suitable soil is deep to bedrock and free of large stones and boulders. If the seasonal water table is high, water will seep into trenches.

Unless otherwise stated, the limitations in table 12 apply only to the soil material within a depth of about 6 feet. If the trench is deeper, a limitation of slight or moderate may not be valid. Site investigation is needed before a site is selected.

Daily cover for landfill should be soil that is easy to excavate and spread over the compacted fill in wet and dry periods. Soils that are loamy or silty and free of stones or boulders are better than other soils. Clayey soils may be sticky and difficult to spread; sandy soils may be subject to soil blowing.

The soils selected for final cover of landfills should be suitable for growing plants. Of all the horizons, the A horizon in most soils has the best workability, more organic matter, and the best potential for growing plants. Thus, for either the area- or trench-type landfill, stockpiling material from the A horizon for use as the surface layer of the final cover is desirable.

If it is necessary to bring in soil material for daily or final cover, thickness of suitable soil material available and depth to a seasonal high water table in soils surrounding the site should be evaluated. Other factors to be evaluated are those that affect reclamation of the borrow areas. These factors include slope, erodibility, and potential for plant growth.

Construction materials

The suitability of each soil as a source of roadfill, sand, gravel, and topsoil is indicated in table 13 by ratings of good, fair, or poor. The texture, thickness, and organic-matter content of each soil horizon are important factors in rating soils for use as construction material. Each soil is evaluated to the depth observed, generally about 6 feet.

Roadfill is soil material used in embankments for roads. Soils are evaluated as a source of roadfill for low embankments, which generally are less than 6 feet high and less exacting in design than high embankments. The ratings reflect the ease of excavating and working the material and the expected performance of the material where it has been compacted and adequately drained. The performance of soil after it is stabilized with lime or cement is not considered in the ratings, but information about some of the soil properties that influence such performance is given in the descriptions of the soil series.

The ratings apply to the soil material between the A horizon and a depth of 5 to 6 feet. It is assumed that soil horizons will be mixed during excavation and spreading. Many soils have horizons of contrasting suitability within their profile. The estimated engineering properties in table 17 provide specific information about the nature of each horizon. This information can help determine the suitability of each horizon for roadfill.

Soils rated *good* are coarse grained. They have low shrink-swell potential, low frost action potential, and few cobbles and stones. They are at least moderately well drained and have slopes of 15 percent or less. Soils rated *fair* have a plasticity index of less than 15 and have other limiting features, such as moderate shrink-swell potential, moderately steep slopes, wetness, or many stones. If the thickness of suitable material is less than 3 feet, the entire soil is rated *poor*.

Sand and *gravel* are used in great quantities in many kinds of construction. The ratings in table 13 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 17.

Topsoil is used in areas where vegetation is to be established and maintained. Suitability is affected mainly by the ease of working and spreading the soil material in preparing a seedbed and by the ability of the soil material to support plantlife. Also considered is the damage that can result at the area from which the topsoil is taken.

The ease of excavation is influenced by the thickness of suitable material, wetness, slope, and amount of stones. The ability of the soil to support plantlife is determined by texture, structure, and the amount of soluble salts or toxic substances. Organic matter in the A1 or Ap horizon greatly increases the absorption and retention of moisture and nutrients. Therefore, the soil material from these horizons should be carefully preserved for later use.

Soils rated *good* have at least 16 inches of friable loamy material at their surface. They are free of stones and cobbles, are low in content of gravel, and have gentle slopes. They are low in soluble salts that can restrict plant growth. They are naturally fertile or respond well to fertilizer. They are not so wet that excavation is difficult during most of the year.

Soils rated *fair* are loose sandy soils or firm loamy or clayey soils in which the suitable material is only 8 to 16 inches thick or soils that have appreciable amounts of gravel, stones, or soluble salt.

Soils rated *poor* are very sandy soils or very firm clayey soils; soils that have suitable layers less than 8 inches thick; soils that have large amounts of gravel, stones, or soluble salt; steep soils; and poorly drained soils.

Although a rating of *good* is not based entirely on high content of organic matter, a surface horizon is generally preferred for topsoil because of its organic-matter content. This horizon is designated as A1 or Ap in the soil series descriptions. The absorption and retention of moisture and nutrients for plant growth are greatly increased by organic matter.

Water management

Many soil properties and site features that affect water management practices have been identified in this soil survey. In table 14, soil and site features that affect use are indicated for each kind of soil. This information is significant in planning, installing, and maintaining water control structures.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have a low seepage potential, which is determined by permeability and the depth to fractured or permeable bedrock or other permeable material.

Embankments, dikes, and levees require soil material that is resistant to seepage, erosion, and piping and has favorable stability, shrink-swell potential, shear strength, and compaction characteristics. Large stones and organic matter in a soil downgrade the suitability of the soil for use in embankments, dikes, and levees.

Aquifer-fed excavated ponds are bodies of water made by excavating a pit or dugout into a ground-water aquifer. Excluded are ponds that are fed by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Ratings in table 14 are for ponds that are properly designed, located, and constructed. Soil properties and site features that affect aquifer-fed ponds are depth to a permanent water table, permeability of the aquifer, quality of the water, and ease of excavation.

Drainage of soil is affected by such soil properties as permeability; texture; depth to bedrock, hardpan, or other layers that affect the rate of water movement; depth to the water table; slope; stability of ditchbanks; susceptibility to flooding; salinity and alkalinity; and availability of outlets for drainage.

Irrigation is affected by such features as slope, susceptibility to flooding, hazards of water erosion and soil blowing, texture, presence of salts and alkali, depth of root zone, rate of water intake at the surface, permeability of the soil below the surface layer, available water capacity, need for drainage, and depth to the water table.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to intercept runoff. They allow water to soak into the soil or flow slowly to an outlet. Features that affect suitability of a soil for terraces are uniformity and steepness of slope; depth to bedrock, hardpan, or other unfavorable material; large stones; permeability; ease of establishing vegetation; and resistance to water erosion, soil blowing, soil slipping, and piping.

Grassed waterways are constructed to channel runoff to outlets at a nonerosive velocity. Features that affect the use of soils for waterways are slope, permeability, erodibility, wetness, and suitability for permanent vegetation.

Recreation

Richard G. Tews, district conservationist, Soil Conservation Service, helped to prepare this section.

The Valley Area has abundant facilities for recreation throughout the year. In summer, recreation activities include water-related sports such as boating, water skiing, and fishing. Streams, lakes, and reservoirs in the Valley Area take up about 30,000 acres.

Spring, summer, and fall activities include backpacking, bicycling, golfing, horseback riding, hunting, and sightseeing.

In winter, snow-related sports include skiing, snowmobiling, ice fishing, and ice skating. There are two ski areas in the Valley Area and many miles of roads and trails.

Sites for vacation houses and recreation facilities are being developed to accommodate the year-round visitors.

The soils of the survey area are rated in table 15 according to limitations that affect their suitability for recreation uses. The ratings are based on such restrictive soil features as flooding, wetness, slope, and texture of the surface layer. Not considered in these ratings, but important in evaluating a site, are location and accessibility of the area, size and shape of the area and its scenic quality, the ability of the soil to support vegetation, access to water, potential water impoundment sites available, and either access to public sewerlines or capacity of the soil to absorb septic tank effluent. Soils subject to flooding are limited, in varying degree, for recreation use by the duration and intensity of flooding and the season when flooding occurs. Onsite assessment of height, duration, intensity, and frequency of flooding is essential in planning recreation facilities.

The degree of the limitation of the soils is expressed as slight, moderate, or severe. *Slight* means that the soil properties are generally favorable and that the limitations are minor and easily overcome. *Moderate* means that the 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 15 can be supplemented by information in other parts of this survey. Especially helpful are interpretations for septic tank absorption fields, given in table 12, and interpretations for dwellings without basements and for local roads and streets, given in table 11.

Camp areas require such site preparation as shaping and leveling for 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 for this use 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 camping sites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for use as 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 will 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 or boulders, is firm after rains, and is not dusty when dry. If shaping is required to obtain a uniform grade, the depth of the soil over bedrock or hardpan should be enough to allow necessary grading.

Paths and trails for walking, horseback riding, bicycling, and other uses should require little or no cutting and filling. The best soils for this use are those that are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once during the annual period of use. They have moderate slopes and have few or no stones or boulders on the surface.

Wildlife habitat

A wide variety of big game animals and other wildlife are in the Valley Area. Bear, elk, and deer inhabit the foothills and mountains. Smaller animals, including coyote, fox, squirrel, snowshoe hare, and weasel, live on the valley floors.

There are many species of birds in the Valley Area. These include osprey, bald eagle, and many kinds of hawk. Songbirds such as mountain bluebirds, larks, finches, and orioles are abundant in summer. Upland game birds in the area are grouse and migratory quail.

Beaver, fisher, mink, and muskrat inhabit the wetter areas. Migratory waterfowl such as ducks and geese are in the Valley Area in summer and fall.

Soils directly affect the kind and amount of vegetation that is available to wildlife as food and cover, and they affect the construction of water impoundments. The kind and abundance of wildlife that populate an area depend largely on the amount and distribution of food, cover, and water. If any one of these elements is missing, is inadequate, or is inaccessible, wildlife either are scarce or do not inhabit the area.

If the soils have the potential, wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by helping the natural establishment of desirable plants.

In table 16, the soils in the survey area are rated according to their potential to support the main kinds of wildlife habitat in the area. This information can be used in planning for parks, wildlife refuges, nature study areas, and other developments for wildlife; selecting areas that are suitable for wildlife; selecting soils that are suitable for creating, improving, or maintaining specific elements of wildlife habitat; and 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* means that the element of wildlife habitat or the kind of habitat is easily created, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected if the soil is used for the designated purpose. A rating of *fair* means that the element of wildlife habitat or kind of habitat can be created, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* means that limitations are severe for the designated element or kind of wildlife habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* means that restrictions for the element of wildlife habitat or kind of habitat are very severe and that unsatisfactory results can be expected. Wildlife habitat is impractical or even impossible to create, improve, or maintain on soils having such a rating.

The elements of wildlife habitat are briefly described in the following paragraphs.

Grain and seed crops are seed-producing annuals used by wildlife. The major soil properties 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 that are planted for wildlife food and cover. Major soil properties 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, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds, that provide food and cover for wildlife. Major soil properties 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, wheatgrass, and grama.

Coniferous plants are cone-bearing trees, shrubs, or ground cover plants that furnish habitat or supply food in the form of browse, seeds, or fruitlike cones. Soil properties that have a major effect on the growth of coniferous plants 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, or foliage used by wildlife or that provide cover and shade for some species of wildlife. Major soil properties that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and moisture. Examples of shrubs are mountain-mahogany, bitterbrush, snowberry, and big sagebrush.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites, exclusive of submerged or floating aquatics. They produce food or cover for wildlife that use wetland as habitat. Major soil properties 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, and cordgrass and rushes, sedges, and reeds.

Shallow water areas are bodies of water that have an average depth of less than 5 feet and that are useful to wildlife. They can be naturally wet areas, or they can be created by dams or levees or by water-control structures in marshes or streams. Major soil properties affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. The availability of a dependable water supply is important if water areas are to be developed. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The kinds of wildlife habitat are briefly described in the following paragraphs.

Openland habitat 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 kinds of wildlife attracted to these areas include bobwhite quail, pheasant, meadowlark, field sparrow, cottontail rabbit, and red fox.

Woodland habitat consists of areas of hardwoods or conifers, or a mixture of both, and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, deer, and bear.

Wetland habitat consists of open, marshy or swampy, shallow water areas where water-tolerant plants grow. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Rangeland habitat consists of areas of wild herbaceous plants and shrubs. Wildlife attracted to rangeland include antelope, white-tailed deer, desert mule deer, sage grouse, meadowlark, and lark bunting.

Soil properties

Extensive data about soil properties are summarized on the following pages. The two main sources of these data are the many thousands of soil borings made during the course of the survey and the laboratory analyses of selected soil samples from typical profiles.

In making soil borings during field mapping, soil scientists can identify several important soil properties. They note the seasonal soil moisture condition or the presence of free water and its depth. For each horizon in the profile, they note the thickness and color of the soil material; the texture, or amount of clay, silt, sand, and gravel or other coarse fragments; the structure, or the natural pattern of cracks and pores in the undisturbed soil; and the consistence of the soil material in place under the existing soil moisture conditions. They record the depth of plant roots, determine the pH or reaction of the soil, and identify any free carbonates.

Samples of soil material are analyzed in the laboratory to verify the field estimates of soil properties and to determine all major properties of key soils, especially properties that cannot be estimated accurately by field observation. Laboratory analyses are not conducted for all soil series in the survey area, but laboratory data for many soil series not tested are available from nearby survey areas.

The available field and laboratory data are summarized in tables. The tables give the estimated range of engineering properties, the engineering classifications, and the physical and chemical properties of each major horizon of each soil in the survey area. They also present data about pertinent soil and water features, engineering test data, and data obtained from physical and chemical laboratory analyses of soils.

Engineering properties

Table 17 gives estimates of engineering properties and classifications for the major horizons of each soil in the survey area.

Most soils have, within the upper 5 or 6 feet, horizons of contrasting properties. Table 17 gives information for each of these contrasting horizons in a typical profile. *Depth* to the upper and lower boundaries of each horizon is indicated. More information about the range in depth and about other properties in each horizon is given for each soil series in the section "Soil series and morphology."

Texture is described in table 17 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 soil material that is less than 2 millimeters in diameter. "Loam," for example, is soil material that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If a soil contains gravel or other particles coarser than sand, an appropriate modifier is added, for example, "gravelly loam." Other texture terms are defined in the Glossary.

The two systems commonly used in classifying soils for engineering use are the Unified Soil Classification System (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO) (*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, plasticity index, liquid limit, and organic-matter content. Soils are grouped into 15 classes—eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes have a dual classification symbol, for example, CL-ML.

The *AASHTO* system classifies soils according to those properties that affect their use in highway construction and maintenance. In this system a mineral soil is classified in one of seven basic groups ranging 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. At the other extreme, in group A-7, are fine-grained soils. Highly organic soils are classified in group A-8 on the basis of visual inspection.

The estimated classification, without group index numbers, is given in table 17. Also in table 17 the percentage, by weight, of rock fragments more than 3 inches in diameter is estimated for each major horizon. These estimates are determined mainly by observing volume percentage in the field and then converting that, by formula, to weight percentage.

Percentage of the soil material less than 3 inches in diameter that passes each of four sieves (U.S. standard) is estimated for each major horizon. The estimates are based on tests of soils that were sampled in the survey area and in nearby areas and on field estimates from many borings made during the survey.

Liquid limit and *plasticity index* indicate the effect of water on the strength and consistence of soil. These indexes are used in the Unified and AASHTO soil classification systems. They are also used as indicators in making general predictions of soil behavior. Range in liquid limit and in plasticity index is estimated on the basis of test data from the survey area or from nearby areas and on observations of the many soil borings made during the survey.

In some surveys, the estimates are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount across classification boundaries (1 or 2 percent), the classification in the marginal zone is omitted.

Physical and chemical properties

Table 18 shows estimated values for several soil characteristics and features that affect behavior of soils in engineering uses. These estimates are given for each major horizon, at the depths indicated, in the typical pedon of each soil. The estimates are based on field observations and on test data for these and similar soils.

Permeability is estimated on the basis of known relationships among the soil characteristics observed in the field—particularly soil structure, porosity, and gradation or texture—that influence the downward movement of water in the soil. The estimates are for vertical water movement when the soil is saturated. Not considered in the estimates is lateral seepage or such transient soil features as plowpans and surface crusts. Permeability of the soil is an important factor to be considered in planning and designing drainage systems, in evaluating the potential of soils for septic tank systems and other waste disposal systems, and in many other aspects of land use and management.

Available water capacity is rated on the basis of soil characteristics that influence the ability of the soil to hold water and make it available to plants. Important characteristics are content of organic matter, soil texture, and soil structure. Shallow-rooted plants are not likely to use the available water from the deeper soil horizons. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design of irrigation systems. In table 18 it is expressed as inches of water per inch of soil.

Soil reaction is expressed as a range in pH values. The range in pH of each major horizon is based on many field checks. For many soils, the values have been verified by laboratory analyses. Soil reaction is important in selecting the crops, ornamental plants, or other plants to be grown; in evaluating soil amendments for fertility and stabilization; and in evaluating the corrosivity of soils.

Salinity is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of the nonirrigated soils. The salinity of individual irrigated fields is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of individual fields can differ greatly from the value given in table 18. Salinity affects the suitability of a soil for crop production, its stability when used as a construction material, and its potential to corrode metal and concrete.

Shrink-swell potential depends mainly on the amount and kind of clay in the soil. Laboratory measurements of the swelling of undisturbed clods were made for many soils. For others the swelling was estimated on the basis of the kind and amount of clay in the soil and on measurements of similar soils. The size of the load and the magnitude of the change in soil moisture content also influence the swelling of soils. Shrinking and swelling of some soils can cause damage to building foundations, basement walls, roads, and other structures unless special designs are used. A high shrink-swell potential indicates that special design and added expense may be required if the planned use of the soil will not tolerate large volume changes.

Erosion factors are used to predict the erodibility of a soil and its tolerance to erosion in relation to specific kinds of land use and treatment. The soil erodibility factor (K) is a measure of the susceptibility of the soil to erosion by water. Soils having the highest K values are the most erodible. K values range from 0.10 to 0.64. To estimate annual soil loss per acre, the K value of a soil is modified by factors representing plant cover, grade and length of slope, management practices, and climate. The soil-loss tolerance factor (T) is the maximum rate of soil erosion, whether from rainfall or soil blowing, that can occur without reducing crop production or environmental quality. The rate is expressed in tons of soil loss per acre per year.

Soil and water features

Table 19 contains information helpful in planning land uses and engineering projects that are likely to be affected by soil and water features.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are placed in one of four groups on the basis of the intake of water after the soils have been wetted and have received 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 chiefly of deep, well drained to excessively drained sands or gravels. 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 that have a layer that impedes the downward movement of water or soils that have 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 clay soils 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 is the temporary covering of soil with water from overflowing streams, with runoff from adjacent slopes, and by tides. Water standing for short periods after rains or after snow melts is not considered flooding, nor is water in swamps and marshes. Flooding is rated in general terms that describe the frequency and duration of flooding and the time of year when flooding is most likely. The ratings are based on evidence in the soil profile of the effects of flooding, namely thin strata of gravel, sand, silt, or, in places, clay deposited by floodwater; irregular decrease in organic-matter content with increasing depth; and absence of distinctive soil horizons that form in soils of the area that are not subject to flooding. The ratings are also based on local information about floodwater levels in the area and the extent of flooding; and on information that relates the position of each soil on the landscape to historic floods.

The generalized description of flood hazards is of value in land-use planning and provides a valid basis for land-use restrictions. The soil data are less specific, however, than those provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table is the highest level of a saturated zone more than 6 inches thick for a continuous period of more than 2 weeks during most years. The depth to a seasonal high water table applies to undrained soils. Estimates are based mainly on the relationship between grayish colors or mottles in the soil and the depth to free water observed in many borings made during the course of the soil survey. Indicated in table 19 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. Only saturated zones above a depth of 5 or 6 feet are indicated.

Information about the seasonal high water table helps in assessing the need for specially designed foundations, the need for specific kinds of drainage systems, and the need for footing drains to insure dry basements. Such information is also needed to decide whether or not construction of basements is feasible and to determine how septic tank absorption fields and other underground installations will function. Also, a seasonal high water table affects ease of excavation.

Depth to bedrock is shown for all soils that are underlain by bedrock at a depth of 5 to 6 feet or less. For many soils, the limited depth to bedrock is a part of the definition of the soil series. The depths shown are based on measurements made in many soil borings and on other observations during the mapping of the soils. The kind of bedrock and its hardness as related to ease of excavation is also shown. Rippable bedrock can be excavated with a single-tooth ripping attachment on a 200-horsepower tractor, but hard bedrock generally requires blasting.

Potential frost action refers to the likelihood of damage to pavements and other structures by frost heaving and low soil strength after thawing. Frost action results from the movement of soil moisture into the freezing temperature zone in the soil, which causes ice lenses to form. Soil texture, temperature, moisture content, porosity, permeability, and content of organic matter are the most important soil properties that affect frost action. It is assumed that the soil is not covered by insulating vegetation or snow and is not artificially drained. Silty and clayey soils that have a high water table in winter are most susceptible to frost action. Well drained very gravelly or sandy soils are the least susceptible.

Risk of corrosion pertains to potential soil-induced chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to soil moisture, particle-size distribution, total acidity, and electrical conductivity of the soil material. The rate of corrosion of concrete is based mainly on the sulfate content, texture, and acidity of the soil. Protective measures for steel or more resistant concrete help to avoid or minimize damage resulting from the corrosion. Uncoated steel intersecting soil boundaries or soil horizons is more susceptible to corrosion than an installation that is entirely within one kind of soil or within one soil horizon.

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. In this system the classification is based on the different soil properties that can be observed in the field or those that can be inferred either from other properties that are observable in the field or from the combined data of soil science and other disciplines. The properties selected for the higher categories are the result of soil genesis or of factors that affect soil genesis. In table 20, the soils of the survey area are classified according to the system. Categories of the system are discussed in the following paragraphs.

ORDER. Ten soil orders are recognized as classes in the system. The properties used to differentiate among orders are those that reflect the kind and degree of dominant soil-forming processes that have taken place. Each order is identified by a word ending in *sol*. An example is Entisol.

SUBORDER. Each order is divided into suborders based primarily on properties that influence soil genesis and are important to plant growth or that are selected to reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquent (*Aqu*, meaning water, plus *ent*, from Entisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of expression of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and a prefix that suggests something about the properties of the soil. An example is Cryaquents (*Cry*, meaning cold, plus *aquent*, the suborder of Entisols that have an aquic moisture regime).

SUBGROUP. Each great group may be divided into three subgroups: the central (typic) concept of the great groups, which is not necessarily the most extensive subgroup; the intergrades, or transitional forms to other orders, suborders, or great groups; and the extragrades, which have some properties that are representative of the great groups 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. The adjective *Typic* identifies the subgroup that is thought to typify the great group. An example is Typic Cryaquents.

FAMILY. Families are established within a subgroup on the basis of similar physical and chemical properties that affect management. Among the properties considered in horizons of major biological activity below plow depth are particle-size distribution, mineral content, temperature regime, thickness of the soil penetrable by roots, consistence, moisture equivalent, soil slope, and permanent cracks. A family name consists of the name of a subgroup and a series of adjectives. The adjectives are the class names for the soil properties used as family differentiae. An example is sandy-skeletal, mixed, Typic Cryaquents.

SERIES. The series consists of soils that formed in a particular kind of material and have horizons that, except for texture of the surface soil or of the underlying substratum, are similar in differentiating characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineral and chemical composition.

Soil series and morphology

In this section, each soil series recognized in the survey area is described in detail. The descriptions are arranged in alphabetic order by series name.

Characteristics of the soil and the material in which it formed are discussed for each series. The soil is then compared to similar soils and to nearby soils of other series. Then a pedon, a small three-dimensional area of soil that is typical of the soil series in the survey area, is described. The detailed descriptions of each soil horizon follow standards in the Soil Survey Manual (*6*). Unless otherwise noted, colors described are for moist soil.

Following the pedon description is the range of important characteristics of the soil series in this survey area. Phases, or map units, of each soil series are described in the section "Soil maps for detailed planning."

Archabal series

The Archabal series consists of fine-loamy, mixed Typic Cryumbrepts. Archabal soils are very deep and well drained. They formed in alluvium or glacial outwash that derived mainly from granitic sources. Archabal soils are on terraces and fans, and the slopes range from 0 to 20 percent.

Archabal soils are associated on the landscape with Gestrin and Melton soils. Gestrin soils are moderately well drained. Melton soils are poorly drained.

Typical pedon of Archabal loam, 2 to 4 percent slopes, 300 feet south of the NE corner of SE1/4 sec. 23, T. 17 N., R. 3 E., about 4.5 miles north of Donnelly:

A11—0 to 4 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak thin platy structure parting to moderate very fine granular; slightly hard, very friable, slightly sticky and slightly plastic; many fine and very fine roots; strongly acid (pH 5.3); clear smooth boundary.

A12—4 to 8 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; moderate fine and very fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine and very fine roots; common very fine vesicular pores; strongly acid (pH 5.4); gradual smooth boundary.

A13—8 to 14 inches; brown (10YR 4/3) loam, very dark brown (10YR 2/2) moist; very weak medium prismatic structure parting to weak very fine and fine granular; slightly hard, very friable, slightly sticky and slightly plastic; many fine and very fine roots; common very fine vesicular pores; strongly acid (pH 5.5); clear irregular boundary.

B1t—14 to 21 inches; yellowish brown (10YR 5/4) loam, dark brown (7.5YR 3/3) moist; weak medium prismatic structure parting to weak medium subangular blocky; hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; common fine and very fine tubular pores; thin patchy dark brown (7.5YR 3/3) clay films, moist, on vertical faces of peds and lining pores; strongly acid (pH 5.5); gradual smooth boundary.

B2t—21 to 31 inches; brown (7.5YR 5/4) loam, dark brown (7.5YR 4/3) moist; weak medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few fine roots; many fine and very fine tubular pores; medium continuous dark brown (7.5YR 4/3) clay films on vertical and horizontal faces of peds and lining pores; strongly acid (pH 5.5); gradual smooth boundary.

B3t—31 to 52 inches; yellowish brown (10YR 5/4) coarse sandy loam, dark brown (7.5YR 4/3) moist; very weak medium and coarse subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine roots; many very fine and common fine tubular pores; strongly acid (pH 5.5); gradual smooth boundary.

C—52 to 60 inches; pale brown (10YR 6/3) coarse sand, dark brown (7.5YR 4/3) moist; single grain; loose; strongly acid (pH 5.4).

Loose sand or gravel is at a depth of 40 to 60 inches or more. The solum is 30 to 52 inches thick. In some pedons, large stones are common in the lower part of the profile.

The A horizon is 10 to 20 inches thick. The base saturation ranges from 35 to 50 percent. The color of the A horizon has value of 4 or 5, dry, and 2 or 3, moist, and chroma of 2 or 3.

The B2t horizon has hue of 10YR or 7.5YR; value of 5 or 6, dry, and 3 or 4, moist; and chroma of 3 or 4. The clay content ranges from 18 to 25 percent.

Blackwell series

The Blackwell series consists of fine-loamy, mixed Typic Cryaquolls. These soils are deep and poorly drained. They formed in alluvium that derived from basic and acid igneous rocks. Blackwell soils are on stream bottoms and alluvial fans, and the slopes are 0 to 2 percent.

Blackwell soils are associated on the landscape with Blackwell Variant, Gestrin, and Melton soils. Blackwell Variant soils have a sandy control section. Gestrin soils have a coarse-loamy control section. Melton soils have a fine-loamy over sandy or sandy-skeletal control section.

Typical pedon of Blackwell clay loam, 1,160 feet north and 1,700 feet east of the SW corner of sec. 24, T. 15 N., R. 3 E., about 8 miles south of Donnelly:

A11—0 to 1 1/2 inches; dark gray (10YR 4/1) silt loam, black (10YR 2/2) moist; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and fibrous roots; medium acid (pH 6.0); clear smooth boundary.

A12—1 1/2 to 2 1/2 inches; dark grayish brown (10YR 4/2) clay loam, very dark brown (10YR 2/2) moist; weak medium and thin platy and moderate medium granular structure; hard, firm, sticky and plastic; many fibrous and fine roots, most roots extend horizontally; medium acid (pH 6.0); clear smooth boundary.

A13—2 1/2 to 11 inches; very dark gray (10YR 3/1) clay loam, black (10YR 2/1) moist; weak medium and coarse subangular blocky structure parting to moderate fine subangular blocky; hard, firm, sticky and plastic; many fibrous and fine roots; medium acid (pH 6.0); gradual smooth boundary.

A14—11 to 19 inches; dark gray (10YR 4/1) sandy clay loam that approaches sandy loam or loam, black (10YR 2/1) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few fine roots; slightly acid (pH 6.3); gradual smooth boundary.

C1g—19 to 27 inches; gray (10YR 6/1) sandy clay loam, dark gray (10YR 4/1) moist; few fine distinct mottles; massive; hard, friable, slightly sticky and slightly plastic; few fine roots; very weakly cemented; slightly acid (pH 6.3); clear smooth boundary.

IIC2—27 to 60 inches; light brownish gray (10YR 6/3) stratified loamy coarse sand and sandy clay loam, dark brown (10YR 4/3) moist; single grain and massive; hard, very friable; few fine roots; slightly acid (pH 6.4).

Stratified sandy material is at a depth of 20 to 40 inches.

The A1 or Ap horizon has value of 3 or 4, dry, and 1 or 2, moist; its chroma is 1 or 2 and dominantly is 1 to 1.5.

The Cg horizon has value of 5 or 6, dry, and 3 or 4, moist. The IIC horizon has a weighted average of 18 to 35 percent clay to a depth of 40 inches or more.

Blackwell Variant

The Blackwell Variant consists of sandy, mixed Typic Cryaquolls. These soils are very deep and poorly drained. They formed in mixed alluvium. Blackwell Variant soils are on alluvial fans and low terraces, and the slopes are 0 to 3 percent.

Blackwell Variant soils are associated on the landscape with Blackwell, Gestrin, Kangas, and Melton soils. Blackwell soils have a fine-loamy control section. Gestrin soils have a coarse-loamy control section. Kangas soils are well drained to excessively drained. Melton soils have a fine-loamy over sandy or sandy-skeletal control section.

Typical pedon of Blackwell Variant silt loam, 300 feet west and 1,380 feet north of the SW corner of sec. 31, T. 13 N., R. 4 E., about 7 miles south of Cascade:

O1—1 inch to 0; grayish brown (10YR 5/2) partly decomposed organic material, very dark grayish brown (10YR 3/2) moist; very weak very fine granular structure; soft, very friable, slightly sticky; many very fine and fine roots; strongly acid (pH 5.4); abrupt smooth boundary.

A11—0 to 2 inches; dark gray (10YR 4/1) silt loam, black (10YR 2/1) moist; moderate fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine, fine, and medium roots; medium acid (pH 5.6); abrupt smooth boundary.

A12—2 to 4 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; common distinct fine reddish brown (5YR 5/4) mottles; moderate fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine, fine, and medium roots; medium acid (pH 5.7); clear smooth boundary.

A1b—4 to 7 inches; dark gray (10YR 4/1) silt loam, black (10YR 2/1) moist; weak fine and very fine granular structure; soft, firm, sticky and slightly plastic; many very fine, fine, and medium roots; slightly acid (pH 6.4); clear smooth boundary.

C1g—7 to 14 inches; light brownish gray (2.5Y 6/2) silt loam, dark grayish brown (2.5Y 4/2) moist; many prominent medium reddish brown (5YR 4/4) mottles; massive; slightly hard, friable, slightly sticky and slightly plastic; many fine and medium roots; few fine tubular pores; few iron concretions around some pores; slightly acid (pH 6.2); abrupt smooth boundary.

IIC2g—14 to 60 inches; light gray (10YR 6/1) coarse sand, gray (10YR 5/1) moist; single grain; loose; 10 percent fine gravel; slightly acid (pH 6.5).

There is an A1 horizon in most pedons, and the horizon is about 4 to 10 inches thick. There are mottles of variable contrast and size throughout the profile.

The C1g horizon ranges in texture from loam, which is nearly fine sandy loam, to silt loam. It is about 6 to 14 inches thick. Coarse sand or coarse sand and gravel are at a depth of about 10 to 14 inches.

The water table is at a depth between 1 and 2 feet from late in spring to midsummer.

Bluebell series

The Bluebell series consists of loamy-skeletal, mixed Argic Pachic Cryoborolls. These soils are moderately deep and well drained. They formed in residuum of basalt, in basaltic till, or in colluvium that derived from basalt. Bluebell soils are on foothills and mountains, and the slopes range from 5 to 35 percent.

Bluebell soils are associated on the landscape with Demast and Tica soils. Demast soils have bedrock at a depth of more than 40 inches, and their solum is less than 35 percent rock fragments. Tica soils have bedrock at a depth of 10 to 20 inches.

Typical pedon of Bluebell cobbly loam, 5 to 35 percent slopes, 600 feet east and 10 feet north of the SW corner of sec. 36, T. 16 N., R. 3 E.; about 4 miles south of Donnelly:

A1—0 to 13 inches; dark grayish brown (10YR 4/2) cobbly loam, very dark brown (10YR 2/2) moist; weak fine and very fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and very fine roots; 20 percent angular pebbles and 15 percent angular basalt cobbles; neutral (pH 6.6); gradual smooth boundary.

A3—13 to 18 inches; brown (7.5YR 5/3) cobbly loam, dark brown (7.5YR 3/2) moist; very dark brown (10YR 2/2) coatings, moist; weak fine subangular blocky structure parting to weak fine and very fine granular; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; common very fine pores; 20 percent angular pebbles and 10 percent small angular basalt cobbles; slightly acid (pH 6.4); clear smooth boundary.

B2t—18 to 25 inches; brown (7.5YR 5/3) very gravelly clay loam, dark brown (7.5YR 3/3) moist; moderate medium and fine subangular blocky structure; hard, firm, sticky and plastic; few very fine roots; many moderately thick clay films on faces of peds; 10 percent small angular basalt cobbles and 50 percent angular gravel; slightly acid (pH 6.2); gradual irregular boundary.

R—25 inches; decomposing fractured basalt bedrock; in some pedons, material from the B2t horizon extends into cracks to a depth of several feet.

Bedrock is at a depth of 20 to 40 inches.

The A1 horizon has hue of 10YR or 7.5YR, value of 3 or 4, dry, and chroma of 2 or 3. It is 20 to 35 percent gravel and 10 to 15 percent cobbles.

The B2t horizon has hue of 7.5YR and 5YR, value of 4 or 5, dry, and chroma of 2 or 3. Typically, it is very gravelly clay loam but in places is very gravelly silty clay loam. This horizon is 50 to 60 percent gravel and 10 to 15 percent cobbles.

Bryan series

The Bryan series consists of sandy, mixed Entic Cryumbrepts. These soils are very deep and well drained. They formed in colluvium and residuum of granodiorite and quartz diorite. Bryan soils are on steep foothills and mountains, and the slopes range from 20 to 60 percent.

Bryan soils are associated on the landscape with Koppes, Ligget, Naz, Pyle, and Quartzburg soils. Koppes and Naz soils have a mollic epipedon. Ligget soils have a moderately coarse or finer texture, as a weighted average, in the control section. Pyle soils have an ochric epipedon and a paralithic contact within a depth of 20 to 40 inches. Quartzburg soils have a sandy-skeletal control section.

Typical pedon of Bryan coarse sandy loam, in an area of Bryan-Pyle complex, 40 to 60 percent slopes (fig. 4), 2,060 feet east and 560 feet south of the NW corner of sec. 16, T. 11 N., R. 4 E., at the south end of Round Valley:

Figure 4.—Profile of Bryan coarse sandy loam in an area of Bryan-Pyle complex, 40 to 60 percent slopes. The vegetation is grand fir and associated understory plants. Scale is in decimeters.

O11—3 inches to 1 inch; slightly decomposed needles, leaves, twigs, and cones.

O12—1 inch to 0; very dark grayish brown, well decomposed needles, leaves, twigs, and cones; fibrous; medium acid (pH 5.6); abrupt wavy boundary.

A1—0 to 10 inches; grayish brown (10YR 5/2) coarse sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable; many very fine, few medium, and few coarse roots; many very fine interstitial pores; slightly acid (pH 6.2); clear wavy boundary.

C1—10 to 16 inches; light gray (10YR 7/2) loamy coarse sand, brown or dark brown (10YR 4/3) moist; massive; slightly hard, very friable; many very fine and few medium roots; many very fine interstitial pores; 2 percent (by volume) gravel; slightly acid (pH 6.2); clear wavy boundary.

C2—16 to 34 inches; light gray (10YR 7/2) gravelly loamy coarse sand, brown (10YR 5/3) moist; massive; slightly hard, very friable; few very fine roots; many very fine interstitial pores; two 4mm. clayey lamellae; 20 percent (by volume) gravel; slightly acid (pH 6.2); clear wavy boundary.

C3—34 to 60 inches; white (10YR 8/2) very gravelly loamy coarse sand, light brownish gray (10YR 6/2) moist; massive; slightly hard, very friable; few very fine, medium, and coarse roots; common very fine interstitial pores; three 3mm. clayey lamellae; 35 percent (by volume) gravel; medium acid (pH 6.0).

Consolidated bedrock is at a depth of 60 to 80 inches.

The A1 horizon is 10 to 14 inches thick and has value of 4 or 5, dry, and chroma of 2 or 3. The structure is very weak or weak, very fine or fine subangular blocky or granular. Reaction is slightly acid or medium acid. If there is a B horizon, it is indistinct.

The C horizon has value of 6 through 8, dry, and 4 through 6, moist, and chroma of 2 through 4. To a depth of 11 to 21 inches it ranges from gravelly coarse sandy loam to loamy coarse sand and is 10 to 35 percent rock fragments; to a depth of 40 inches or more, it ranges from loamy sand to very gravelly loamy coarse sand. Lamellae (more clayey brown bands) are throughout the C horizon, but they are insufficient in number and thickness to qualify the C horizon as an argillic horizon. The unconsolidated sand and gravel in the C horizon grade to the weakly consolidated bedrock.

Cabarton series

The Cabarton series consists of fine, montmorillonitic, Typic Cryaquolls. These soils are very deep and poorly drained. They formed in alluvium. Cabarton soils are along drainageways and on low alluvial fans, and the slopes are 0 to 3 percent.

Cabarton soils are associated on the landscape with Archabal, Blackwell, Gestrin, and Melton soils. Archabal soils are well drained. Blackwell soils have a fine-loamy control section. Gestrin soils are moderately well drained. Melton soils formed in medium textured to moderately coarse textured glacial material.

Typical pedon of Cabarton silty clay loam, 850 feet west and 1,320 feet south of the NE corner of sec. 8, T. 11 N., R. 4 E., at the southeast end of Round Valley:

A1—0 to 9 inches; light gray (10YR 5/1) silty clay loam, very dark gray (10YR 3/1) moist; strong coarse granular structure; slightly hard, friable, sticky and plastic; many medium roots; many fine interstitial pores; medium acid (pH 5.8); abrupt smooth boundary.

IIC—9 to 10 inches; light gray (10YR 7/1) silt, dark gray (10YR 4/1) moist; weak thick platy structure; slightly hard, friable, slightly sticky and slightly plastic; few medium roots; many fine vesicular pores; slightly acid (pH 6.2); abrupt wavy boundary.

IIIA1bg—10 to 30 inches; dark gray (10YR 4/1) clay, black (2.5Y 2/0) moist; strong coarse prismatic structure parting to moderate medium prismatic and moderate fine angular blocky; very hard, extremely firm, very sticky and very plastic; common 1/8-inch thick vertical coatings of IIC material extend into this horizon; few medium roots; slightly acid (pH 6.4); clear wavy boundary.

IIIC1g—30 to 49 inches; light gray (10YR 7/1) clay, grayish brown (2.5Y 5/2) moist; massive; many medium prominent dark brown (7.5YR 3/2) mottles, dark yellowish brown (10YR 4/4) moist; very hard, extremely firm, very sticky and very plastic; slightly acid (pH 6.1); clear wavy boundary.

IIIC2g—49 to 60 inches; light gray (10YR 7/1) clay loam, dark grayish brown (2.5Y 4/2) moist; massive; many medium prominent dark brown (7.5YR 3/2) mottles, dark yellowish brown (10YR 4/4) moist; hard, firm, sticky and plastic; slightly acid (pH 6.2).

A layer of ash that is 1 to about 14 inches thick is between the A1 horizon and the IIIA1bg horizon. Stratified layers consisting of bluish, gleyed, massive soil material that ranges from sand to clay are at a depth of 3 to more than 5 feet. The water table is at a depth of 0.5 foot to 1.5 feet for 3 months or more.

The A1 or Ap horizon has value of 5, dry, and 2 or 3, moist, and chroma of less than 2.

Coski series

The Coski series consists of coarse-loamy, mixed Typic Cryoborolls. These soils are very deep and well drained. They formed in residuum and colluvium that derived from granitic rock. Coski soils are on foothills, ridgetops, and mountains, and the slopes range from 20 to 60 percent.

Coski soils are associated on the landscape with Bryan, Jugson, Koppes, Naz, and Quartzburg soils. Bryan and Koppes soils are coarse textured, as a weighted average, in the control section. Jugson soils do not have a mollic epipedon. Naz soils have a mollic epipedon that is more than 16 inches thick. Quartzburg soils have a sandy-skeletal control section.

Typical pedon of Coski sandy loam, 20 to 40 percent slopes, 320 feet east and 80 feet north of the SE corner of sec. 27, T. 12 N., R. 4 E., on the ridgetop east of Round Valley:

A11—0 to 10 inches; dark grayish brown (10YR 4/2) sandy loam, very dark brown (10YR 2/2) moist; weak fine granular structure; slightly hard, very friable; common very fine roots; many very fine interstitial pores; medium acid (pH 6.0); clear wavy boundary.

A12—10 to 15 inches; brown (10YR 5/3) sandy loam, very dark grayish brown (10YR 3/2) moist; weak coarse subangular blocky structure; slightly hard, very friable; common fine and few medium roots; many fine and very fine interstitial pores; medium acid (pH 6.0); clear smooth boundary.

B2—15 to 28 inches; brown (10YR 5/3) coarse sandy loam, brown (10YR 4/3) moist; weak very coarse subangular blocky structure; slightly hard, very friable; common fine and few medium roots; many fine interstitial pores; 10 percent (by volume) gravel and cobbles; slightly acid (pH 6.2); clear smooth boundary.

C1—28 to 38 inches; pale brown (10YR 6/3) gravelly coarse sandy loam, brown (10YR 4/3) moist; massive; soft, very friable; few medium roots; many fine interstitial pores; 20 percent (by volume) gravel and cobbles; medium acid (pH 5.6); clear smooth boundary.

C2—38 to 49 inches; very pale brown (10YR 8/3) very gravelly loamy coarse sand, brown (10YR 5/3) moist; massive; soft, very friable; few fine roots; many fine interstitial pores; two 4mm. lamellae; 40 percent (by volume) gravel and cobbles; medium acid (pH 5.6); abrupt smooth boundary.

C3—49 to 60 inches; white (10YR 8/2) gravelly coarse sand, brown (10YR 5/2) moist; single grain; loose; few fine roots; many medium irregular pores; strongly acid (pH 5.2).

In some pedons there is an O horizon.

Consolidated bedrock is at a depth of 60 to 70 inches.

The A1 horizon has value of 4 or 5, dry, and 2 or 3, moist, and chroma of 2 or 3. It is slightly acid or medium acid.

The B horizon is 12 to 25 inches thick and has value of 5 through 7, dry, and 3 through 5, moist, and chroma of 2 through 4. It ranges from gravelly coarse sandy loam to sandy loam and is 7 to 13 percent clay and 10 to 35 percent rock fragments. The structure is mainly weak or very weak, medium to very coarse subangular blocky. Reaction is medium acid to slightly acid.

The C horizon ranges from gravelly coarse sandy loam, gravelly loamy coarse sand, or gravelly coarse sand to very cobbly loamy coarse sand or very cobbly coarse sand.

Demast series

The Demast series consists of fine-loamy, mixed Argic Pachic Cryoborolls. These soils are deep and well drained. They formed in colluvium and residuum that derived from basalt. Demast soils are on foothills and mountains, and the slopes range from 15 to 60 percent.

Demast soils are associated on the landscape with Bluebell, Sudduth Variant, and Tica soils. Bluebell soils have bedrock at a depth of 20 to 40 inches. Sudduth Variant soils have a B horizon that is more than 35 percent clay. Tica soils have bedrock at a depth of 10 to 20 inches.

Typical pedon of Demast loam, 30 to 60 percent slopes, 500 feet west and 1,400 feet north of the SE corner of sec. 23, T. 18 N., R. 2 E.; about 3 miles southwest of McCall:

O1—2 inches to 0; partly decomposed twigs, needles, and leaves; medium acid (pH 5.8); abrupt wavy boundary.

A11—0 to 11 inches; dark brown (10YR 3/3) loam, very dark grayish brown (10YR 3/2) moist; weak medium and fine subangular blocky structure parting to moderate fine granular; soft, very friable, slightly plastic; common fine and many very fine roots; many very fine interstitial pores; slightly acid (pH 6.2); clear wavy boundary.

A12—11 to 16 inches; brown (10YR 4/3) loam, very dark grayish brown (10YR 3/2) moist; moderate medium and fine subangular blocky structure; soft, very friable, slightly plastic; common fine and very fine roots; many very fine interstitial and few very fine vesicular pores; slightly acid (pH 6.2); clear wavy boundary.

B1—16 to 23 inches; brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; moderate medium, fine, and very fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine and very fine roots; many very fine interstitial pores and common very fine vesicular pores; slightly acid (pH 6.2); gradual wavy boundary.

B21t—23 to 33 inches; brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; moderate medium, fine, and very fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and common fine roots; many very fine vesicular pores; few thin clay films on faces of peds; slightly acid (pH 6.2); gradual wavy boundary.

B22t—33 to 44 inches; brown (10YR 4/3) cobbly loam that has dark yellowish brown (10YR 4/4) coatings, dark brown (10YR 3/3) moist; moderate medium, fine, and very fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine roots; many fine vesicular pores; many moderately thick clay films on faces of peds; about 30 percent cobbles; slightly acid (pH 6.2); gradual wavy boundary.

C1—44 to 60 inches; brown (10YR 4/3) cobbly loam, dark brown (10YR 3/3) moist; weak fine and very fine subangular blocky structure; slightly hard, very friable, slightly plastic; few fine roots, few very fine vesicular pores; about 30 percent cobbles; slightly acid (pH 6.5).

R—60 inches; weathered basalt bedrock.

Weathered basalt bedrock is at a depth of 40 to 60 inches. The solum typically is slightly acid, but it ranges from neutral to medium acid. Most pedons have an O horizon that is 1 to 4 inches thick.

The A horizon has hue of 10YR or 7.5YR; value of 2 or 3, moist, and 3 through 5, dry; and chroma of 2 or 3.

The B2t horizon has hue of 10YR or 7.5YR; value of 3 or 4, moist, and 4 or 5, dry; and chroma of 2 through 4. It is loam or clay loam and is 0 to 35 percent angular basaltic cobbles or gravel or both. The structure includes moderate and strong subangular blocky and moderate prismatic. The Bt horizon has 4 to 8 percent more clay than the A horizon. Few to many thin or moderately thick clay films are on faces of peds in some parts of this horizon.

Donnel series

The Donnel series consists of coarse-loamy, mixed Typic Cryumbrepts. These soils are very deep and well drained. They formed in alluvium that derived from granitic rock. Donnel soils are on alluvial fans and terraces, and the slopes range from 0 to 12 percent.

Donnel soils are associated on the landscape with Archabal, Blackwell, Melton, and Roseberry soils. Archabal soils have a fine-loamy control section. Blackwell soils are poorly drained and have a fine-loamy control section. Melton soils are poorly drained and have a fine-loamy over sandy or sandy-skeletal control section. Roseberry soils are poorly drained.

Typical pedon of Donnel sandy loam, 0 to 2 percent slopes, 1,980 feet north and 130 feet east of the SW corner of sec. 35, T. 16 N., R. 3 E.; about 3.5 miles south of Donnelly:

Ap—0 to 10 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine and very fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and few medium roots; many very fine interstitial pores; medium acid (pH 5.6); abrupt smooth boundary.

A12—10 to 15 inches; grayish brown (10YR 5/2) coarse sandy loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine tubular pores; medium acid (pH 5.6); clear smooth boundary.

B2—15 to 20 inches; pale brown (10YR 6/3) coarse sandy loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many very fine roots; common very fine tubular pores; medium acid (pH 5.8); clear smooth boundary.

C1—20 to 35 inches; very pale brown (10YR 7/4) coarse sandy loam, yellowish brown (10YR 5/4) moist; massive; soft, very friable; few very fine roots; few very fine tubular pores; slightly acid (pH 6.1); clear smooth boundary.

C2—35 to 46 inches; very pale brown (10YR 7/3) stratified sandy loam and loamy sand, light yellowish brown (10YR 6/4) moist; massive; soft, very friable; few very fine roots; few very fine tubular pores; slightly acid (pH 6.1); clear smooth boundary.

C3—46 to 60 inches; very pale brown (10YR 7/3) loamy sand, pale brown (10YR 6/3) moist; single grain; loose; medium acid (pH 6.0).

Loamy sand or sand is at a depth of 30 to 60 inches or more.

The A horizon has value of 4 or 5, dry, and 3 or 4, moist, and chroma of 2 or 3. It is loam, sandy loam, or coarse sandy loam.

The B2 horizon has value of 5 or 6, dry, and 3 or 4, moist. The clay content in the A or C horizon increases slightly in the B horizon, but the increase is not enough to qualify the B horizon as an argillic horizon.

Duston series

The Duston series consists of sandy, mixed Dystric Cryochrepts. These soils are very deep and well drained. They formed in glacial outwash and alluvium that derived from mixed mineralogy. Duston soils are on plane to irregular outwash plains, terraces, and alluvial fans, and the slopes are 0 to 4 percent.

Duston soils are associated on the landscape with Kangas, McCall, and Melton soils. Kangas soils have an A horizon that is more than 10 inches thick, and their solum is gravelly throughout. McCall soils are loamy-skeletal. Melton soils are poorly drained.

Typical pedon of Duston sandy loam, 0 to 2 percent slopes, 1,320 feet north and 1,000 feet east of the SW corner of sec. 3, T. 18 N., R. 3 E.; about 1.5 miles northeast of McCall:

O11—3 inches to 1 inch; undecomposed pine needles, twigs, leaves, and stems; slightly acid (pH 6.2).

O12—1 inch to 0; partly decomposed organic material; slightly acid (pH 6.2).

A1—0 to 2 inches; dark grayish brown (10YR 4/2) sandy loam, black (10YR 2/1) moist; weak fine subangular blocky structure parting to weak fine and fine granular; soft, very friable, slightly sticky; many fine roots; slightly acid (pH 6.3); abrupt wavy boundary.

B2ir—2 to 5 inches; brown (10YR 5/3) sandy loam, dark yellowish brown (10YR 3/4) moist; weak fine subangular blocky structure parting to weak very fine and fine granular; soft, very friable; many fine roots; slightly acid (pH 6.2); abrupt wavy boundary.

C1—5 to 9 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak very fine granular structure; soft, very friable;

many fine roots; slightly acid (pH 6.1); gradual wavy boundary.

C2—9 to 43 inches; yellowish brown (10YR 5/4) loamy sand, dark yellowish brown (10YR 3/4) moist; weak medium subangular blocky structure parting to weak fine granular; soft, very friable; many very fine roots; slightly acid (pH 6.3); gradual wavy boundary.

C3—43 to 60 inches; yellowish brown (10YR 5/4) coarse sand, brown (7.5YR 4/4) moist; single grain; loose; very few very fine roots; slightly acid (pH 6.2).

The solum is 0 to 5 percent stones and 5 to 15 percent gravel.

The A horizon has value of 4 or 5, dry, chroma of 1 or 2, and hue of 10YR or 7.5YR.

The B2ir horizon has value of 4 or 5, dry, chroma of 3 or 4, and hue of 10YR or 7.5YR. It is coarse sandy loam and sandy loam.

The C horizon is sandy loam or coarse sandy loam to a depth of 12 inches, loamy sand or loamy coarse sand between depths of 12 and 35 inches, and stratified loamy coarse sand and coarse sand below a depth of 35 inches.

Gestrin series

The Gestrin series consists of coarse-loamy, mixed Typic Cryumbrepts. These soils are very deep and moderately well drained. They formed in alluvium that derived mainly from granitic rock. Gestrin soils are on alluvial fans and terraces, and the slopes range from 0 to 12 percent.

Gestrin soils are associated on the landscape with Archabal, Blackwell, and Melton soils. Archabal soils are well drained. Blackwell and Melton soils are poorly drained and do not have a B2 horizon.

Typical pedon of Gestrin loam, 2 to 4 percent slopes, 20 feet east and 1,350 feet north of the SW corner of sec. 25, T. 15 N., R. 3 E.; about 6 miles north of Cascade, along highway 55:

A1p—0 to 8 inches; gray (10YR 5/1) loam, black (10YR 2/1) moist; moderate medium and coarse granular structure; slightly hard, friable, slightly sticky and slightly plastic; many medium and fine roots; strongly acid (pH 5.4); clear smooth boundary.

A12—8 to 18 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak medium and coarse subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; strongly acid (pH 5.5); clear smooth boundary.

A3—18 to 24 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; many fine pores; medium acid (pH 5.6); clear smooth boundary.

B2—24 to 32 inches; pale brown (10YR 6/3) coarse sandy loam, dark brown (10YR 4/3) moist; weak medium prismatic structure parting to weak medium and fine subangular blocky; hard, friable, slightly sticky and slightly plastic; common fine roots; many very fine pores; few thin patchy clay films on vertical faces of peds and lining pores; medium acid (pH 5.7); clear smooth boundary.

C1—32 to 41 inches; very pale brown (10YR 7/3) coarse sandy loam, yellowish brown (10YR 5/4) moist; massive; slightly hard, friable, slightly sticky; few fine roots; medium acid (pH 5.6); clear smooth boundary.

C2—41 to 46 inches; very pale brown (10YR 7/4) coarse sandy loam, dark brown (10YR 4/3) moist; few fine distinct olive gray (5Y 5/2) mottles, moist; massive; slightly hard, very friable, slightly sticky; few fine roots; medium acid (pH 5.6); clear smooth boundary.

C3—46 to 60 inches; very pale brown (10YR 7/3) loamy coarse sand, brown (10YR 5/3) moist; single grain; loose; medium acid (pH 5.9).

Pebbles, cobbles, or stones are at a depth of 30 to more than 60 inches. Mottles are common below a depth of 40 inches.

The A1 horizon is 15 to 20 inches thick. Its color has value of 4 or 5, dry, and 2 or 3, moist, and chroma of 1 or 2. Base saturation ranges from 30 to 45 percent.

The B2 horizon is loam or coarse sandy loam. Its color has hue of 10YR or 7.5YR.

The lower part of the pedon is stratified with dominantly sandy loam and loamy sand.

Jugson series

The Jugson series consists of sandy, mixed Typic Cryumbrepts. These soils are moderately deep and somewhat excessively drained. They formed in residuum of granite. Jugson soils are on mountains, and the slopes range from 5 to 60 percent.

Jugson soils are associated on the landscape with Bryan, Koppes, Pyle, Shellrock, and Toiyabe soils. Bryan soils do not have rock within a depth of 60 inches. Koppes and Pyle soils do not have A2 and Bir horizons. Shellrock soils do not have A2 and Bir horizons and have bedrock at a depth of more than 40 inches. Toiyabe soils have a paralithic contact at a depth between 10 and 20 inches.

Typical pedon of Jugson coarse sandy loam, 30 to 60 percent slopes, 1,000 feet north and 1,600 feet east of the SW corner of sec. 30, T. 17 N., R. 4 E.; about 3.5 miles northeast of Donnelly on Paddy Flat Road near Melton Reservoir:

O11—1.5 inches to 1 inch; undecomposed dry needles and leaves; medium acid (pH 5.9).

O12—1 inch to 0; slightly decomposed needles and leaves that have some fungus growth; medium acid (pH 5.6); fungus growth is very strongly acid (pH 4.9).

A2—0 to 0.5 inch; light brownish gray (10YR 6/2) coarse sandy loam, very dark grayish brown (10YR 3/2) moist; weak very fine granular structure; soft, very friable, slightly sticky; many fine roots; slightly acid (pH 6.2); clear wavy boundary.

B2ir—0.5 inch to 7 inches; grayish brown (10YR 5/2) coarse sandy loam, dark brown (10YR 3/3) moist; weak very fine granular structure; soft, very friable, slightly sticky; many fine and medium roots; slightly acid (pH 6.1); clear smooth boundary.

B3ir—7 to 20 inches; grayish brown (10YR 5/2) coarse sandy loam, dark brown (10YR 3/3) moist; faint splotches of gray; weak very fine granular structure; soft, very friable, slightly sticky; many fine and medium roots; medium acid (pH 5.7); gradual wavy boundary.

C1—20 to 35 inches; light brownish gray (10YR 6/2) loamy coarse sand, dark grayish brown (10YR 4/2) moist; weak very fine granular structure; soft, very friable, slightly sticky; common fine and medium roots; medium acid (pH 6.0); clear smooth boundary.

C2r—35 to 43 inches; disintegrating biotite granite or a slightly more basic rock.

R—43 inches; granitic bedrock.

A paralithic contact is at a depth between 20 and 40 inches. Hard bedrock is at a depth between 40 and 60 inches.

If the surface has been disturbed or burned, the O and A2 horizons are absent or indistinct.

The B2ir horizon has hue of 10YR or 7.5YR, value of 4 through 6, dry, and 2 or 3, moist, and chroma of 2 through 4. It is sandy loam or coarse sandy loam. The base saturation ranges from 35 to 45 percent, and the pH ranges from about 5.0 to 6.1.

The C horizon has hue of 10YR or 2.5Y, value of 6 through 8, dry, and 4 through 7, moist, and chroma of 2 through 4. The C1 or B3ir horizons commonly have splotches of stronger colors and can have one or more very thin, wavy, horizontal clayey bands (lamellae). A C2 horizon of gravelly loamy coarse sand and gravelly coarse sand is in some pedons. Base saturation of the C horizon is 60 to 80 percent.

Jurvannah series

The Jurvannah series consists of sandy-skeletal, mixed Typic Cryaquents. These soils are very deep and poorly drained. They formed in alluvium that derived from granitic rock. Jurvannah soils are on alluvial fans, low stream terraces, or flood plains, and the slopes are 0 to 2 percent.

Jurvannah soils are associated on the landscape with Blackwell, Gestrin, Kangas, Melton, and Roseberry soils. Blackwell soils have a mollic epipedon. Gestrin soils have a cambic horizon and are moderately well drained. Kangas soils are somewhat excessively drained. Melton soils are medium textured to a depth of about 20 inches. Roseberry soils are less than 35 percent coarse fragments in the control section.

Typical pedon of Jurvannah sandy loam, 100 feet east and 460 feet south of the NW corner of sec. 6, T. 12 N., R. 4 E.; about 7 miles south of Cascade:

A1—0 to 6 inches; grayish brown (10YR 5/2) sandy loam, very dark gray (10YR 3/1) moist; weak fine granular structure; loose; common very fine roots; many very fine interstitial pores; medium acid (pH 6.0); abrupt smooth boundary.

C1—6 to 10 inches; very pale brown (10YR 7/3) sand, brown (10YR 5/3) moist; common distinct medium and fine dark brown (7.5YR 4/4) and few faint fine light yellowish brown (10YR 6/4) mottles; weak granular structure; soft, very friable; few very fine roots; medium acid (pH 5.6); abrupt smooth boundary.

C2—10 to 22 inches; white (10YR 8/1) and brownish yellow (10YR 6/6) gravelly sand, brownish yellow (10YR 6/6) moist; single grain; loose; medium acid (pH 5.9); clear smooth boundary.

C3—22 to 38 inches; pink (7.5YR 7/4) and yellowish red (5YR 4/6) very gravelly sand, yellowish red (5YR 4/6) moist; single grain; loose; slightly acid (pH 6.2); abrupt smooth boundary.

C4—38 to 60 inches; very pale brown (10YR 7/3) and pale brown (10YR 6/3) very gravelly sand, pale brown (10YR 6/3), very pale brown (10YR 7/3), and dark yellowish brown (10YR 4/4) moist; single grain; loose; slightly acid (pH 6.2).

The A horizon has value of 5 or 6, dry, and 3 through 5, moist, and chroma of 1 through 3.

The C horizon is stratified sand, gravelly sand, or very gravelly sand that is 5 to 50 percent gravel. In places, it has thin strata of sandy loam. Between depths of 10 and 40 inches, the soil material, on a weighted average, is 35 to 45 percent fine gravel. Mottles are between depths of 9 and 20 inches. The water table fluctuates between depths of 18 and 36 inches for about 2 months in spring and early in summer.

Kangas series

The Kangas series consists of sandy, mixed Entic Cryumbrepts. These soils are very deep and somewhat excessively drained. They formed in glacial outwash. Kangas soils are on outwash plains and terraces, and the slopes are 0 to 3 percent.

Kangas soils are associated on the landscape with Roseberry and Melton soils. Roseberry and Melton soils are poorly drained.

Typical pedon of Kangas fine gravelly loamy coarse sand, 1,640 feet west and 1,420 feet south of the NE corner of sec. 5, T. 12 N., R. 4 E., about 7 miles south of Cascade:

A11—0 to 8 inches; grayish brown (10YR 5/2) fine gravelly loamy coarse sand, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable; many very fine and fine roots; slightly acid (pH 6.1); clear smooth boundary.

A12—8 to 16 inches; brown (10YR 5/2) fine gravelly loamy coarse sand, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, slightly sticky; many fine roots; slightly acid (pH 6.2); clear smooth boundary.

C1—16 to 35 inches; pale brown (10YR 6/3) fine gravelly loamy sand, brown (10YR 4/3) moist; massive; soft, very friable, slightly sticky; common very fine roots; common fine tubular pores; slightly acid (pH 6.2); abrupt smooth boundary.

C2—35 to 42 inches; very pale brown (10YR 7/3) fine gravelly loamy coarse sand, pale brown (10YR 6/3) moist; single grain; loose; few very fine roots; slightly acid (pH 6.2); abrupt smooth boundary.

C3—42 to 60 inches; very pale brown (10YR 7/3) fine gravelly coarse sand, light yellowish brown (10YR 6/4) moist; single grain; loose; slightly acid (pH 6.3).

Sand and gravel are at a depth of 20 to 45 inches. The control section, between depths of 10 and 40 inches, is 20 to 35 percent fine gravel.

The A1 horizon has value of 2 or 3, moist, and chroma of 2 or 3, dry, and 1 or 2, moist.

The C horizon has value of 4 through 7, dry, and 3 through 6, moist; it has chroma of 3 or 4, dry, and 2 through 4, moist. It ranges from fine gravelly loamy coarse sand to fine very gravelly coarse sand.

Koppes series

The Koppes series consists of sandy, mixed Typic Cryoborolls. These soils are very deep and well drained. They formed in colluvium and residuum that derived from granite. They are on mountain side slopes, and the slopes range from 20 to 60 percent.

Koppes soils are associated on the landscape with Bryan, Coski, Ligget, Pyle, Quartzburg, and Toiyabe soils. Bryan soils have chroma of 3 in an umbric epipedon and are moderately coarse textured to a depth between 11 and 21 inches. Coski and Ligget soils have moderately coarse or finer textures, on a weighted average, in the control section. Ligget and Pyle soils do not have a mollic epipedon. Quartzburg soils have consolidated bedrock within a depth of 40 inches. Toiyabe soils have a paralithic contact within a depth of 10 to 20 inches.

Typical pedon of Koppes coarse sandy loam in an area of Koppes-Toiyabe complex, 40 to 60 percent slopes, 1,080 feet north and 400 feet west of the SE corner of sec. 12, T. 13 N., R. 4 E.; near Corral Creek Reservoir:

A11—0 to 5 inches; grayish brown (10YR 5/2) coarse sandy loam, very dark brown (10YR 2/2) moist; weak fine subangular blocky structure; slightly hard, very friable; many very fine and fine and common medium roots; many very fine and common fine interstitial pores; slightly acid (pH 6.4); clear wavy boundary.

A12—5 to 13 inches; grayish brown (10YR 5/2) coarse sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, very friable; many fine roots; common medium interstitial pores; slightly acid (pH 6.1); gradual irregular boundary.

C1—13 to 21 inches; pale brown (10YR 6/3) gravelly loamy coarse sand, dark brown (10YR 4/3) moist; weak medium subangular blocky structure parting to weak fine granular; slightly hard, very friable; few fine and medium roots; few medium interstitial pores; slightly acid (pH 6.2); gradual irregular boundary.

C2—21 to 32 inches; pale brown (10YR 6/3) gravelly loamy coarse sand, dark brown (10YR 4/3) moist; weak medium granular structure; slightly hard, very friable; few medium roots; few coarse interstitial pores; slightly acid (pH 6.4); gradual irregular boundary.

C3—32 to 44 inches; pale brown (10YR 6/3) loamy coarse sand, dark brown (10YR 4/3) moist; weak fine granular structure; slightly hard, very friable; many fine interstitial pores; slightly acid (pH 6.4); gradual irregular boundary.

C4—44 to 53 inches; pale brown (10YR 6/3) gravelly loamy coarse sand, dark brown (10YR 4/3) moist; weak fine granular structure; soft, very friable; many fine interstitial pores; neutral (pH 6.8); gradual irregular boundary.

C5—53 to 60 inches; pale brown (10YR 6/3) gravelly sand, dark brown (10YR 4/3) moist; massive; slightly hard, very friable; many fine interstitial pores; neutral (pH 6.8).

Consolidated bedrock is at a depth of 60 to 70 inches. The control section is loamy sand or a coarser texture throughout and is less than 35 percent coarse fragments.

The A1 horizon has value of 4 or 5, dry, and 2 or 3, moist, and chroma of 1.5 or 2. It is gravelly loamy coarse sand to coarse sandy loam. It is slightly acid or neutral.

The C horizon has value of 6 through 8, dry, and 4 through 6, moist; and chroma of 2 or 3. It ranges from gravelly loamy coarse sand to loamy sand; in places, it is very gravelly in the lower part. The C horizon is slightly acid or medium acid; in places, it is neutral in the lower part.

Ligget series

The Ligget series consists of coarse-loamy, mixed Typic Cryochrepts. These soils are deep and well drained. They formed in residuum of quartz diorite on dissected island-like ridges, which may be remnants of a former continuous surface. The slopes range from 20 to 60 percent.

Ligget soils are associated on the landscape with Bryan and Pyle soils. Bryan soils have an umbric epipedon. Pyle soils have bedrock at a depth between 20 and 40 inches.

Typical pedon of Ligget sandy loam in an area of Bryan-Ligget complex, 20 to 40 percent slopes, 1,300 feet south and 450 feet west of the center of sec. 23, T. 12 N., R. 3 E., along the Payette River west of Round Valley:

O1—1 inch to 0; decomposing needles, twigs, leaves, and moss.

A11—0 to 2 inches; brown (10YR 5/2) sandy loam, dark brown (10YR 3/2) moist; very weak thin platy and very weak fine granular structure; soft, very friable; many very fine roots; many very fine interstitial and tubular pores; medium acid (pH 6.0); clear smooth boundary.

A12—2 to 8 inches; brown (10YR 5/2) sandy loam, dark brown (10YR 3/2) moist; weak medium subangular blocky structure parting to moderate fine granular; soft, very friable; many very fine, few fine, and few medium roots; many very fine interstitial and tubular pores; medium acid (pH 5.8); clear smooth boundary.

B21—8 to 16 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; slightly hard, very friable; common medium and few very fine and coarse roots; many very fine and few medium tubular pores; 1 percent gravel that is less than 5mm. in diameter; few thin clay films; medium acid (pH 6.0); gradual wavy boundary.

B22—16 to 24 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 4/3) moist; weak medium and coarse subangular blocky structure; hard, friable; few very fine, fine, and medium roots; many very fine and medium interstitial pores; 1 percent gravel; few thin clay films; spots about 5 inches in diameter have clay content similar to that of lamellae; medium acid (pH 6.0); gradual wavy boundary.

B23—24 to 40 inches; light brown (10YR 6/4) coarse sandy loam, brown (10YR 5/4) moist; weak coarse prismatic structure parting to weak coarse subangular blocky; hard, friable; few very fine roots; many very fine and few medium interstitial pores; 1 percent gravel; medium acid (pH 5.8); clear wavy boundary.

B3—40 to 48 inches; very pale brown (10YR 7/3) coarse sandy loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; slightly hard, friable; few very fine roots; many very fine and few medium interstitial pores; 1 percent gravel; medium acid (pH 5.8); clear wavy boundary.

Cr—48 to 60 inches; very pale brown (10YR 7/3) weathered quartz diorite, pale brown (10YR 6/3) moist; strong brown (7.5YR 5/6) stains, moist; rock structure; very hard; medium acid (pH 5.8).

Consolidated bedrock is at a depth of 40 to 60 inches. The soil material is 7 to 13 percent clay and less than 20 percent, on a weighted average by volume, coarse fragments. The soil is slightly acid or medium acid in the upper part and very strongly acid, strongly acid, or medium acid in the lower part.

The A1 horizon has value of 5 or 6, dry, and 3 or 4, moist, and chroma of 2 or 3. To a depth of 3 to 8 inches, it has chroma of 2.

The B2 horizon has value of 6 or 7, dry, and 4 or 5, moist, and chroma of 3 or 4. It has weak, fine to coarse, subangular blocky or prismatic structure and weak, very fine and fine granular structure. It is slightly hard or hard. Few to several, 2- to 5-mm. thick, wavy, horizontal lamellae are below a depth of about 20 inches; they have more clay than the adjacent soil material. Clay films in the B horizon, except in the lamellae, are mainly in pores or are bridges between mineral grains.

Some pedons have a C horizon.

McCall series

The McCall series consists of loamy-skeletal, mixed Typic Cryumbrepts. These soils are very deep and somewhat excessively drained. They formed in moderately coarse textured and coarse textured, cobbly and stony glacial till. McCall soils are on glacial moraines, and the slopes range from 5 to 50 percent.

McCall soils are associated on the landscape with Archabal, Gestrin, Melton, and Naz soils. Archabal soils are not skeletal. Gestrin soils are moderately well drained and are medium textured throughout the solum. Melton soils are poorly drained and are mottled. Naz soils are coarse-loamy and have a thick mollic epipedon.

Typical pedon of McCall very cobbly sandy loam, in an area of McCall complex, 5 to 50 percent slopes, 2,000 feet east and 800 feet south of the northwest corner of sec. 16, T. 18 N., R. 3 E., along highway 55 in the southern part of McCall:

O1—1.5 inches to 0; organic layer consisting of pine needles, twigs, leaves, and grass; material is undecomposed in the upper part and decomposed in the lower one-eighth inch; the decomposed material is slightly acid (pH 6.1).

A11—0 to 3 inches; dark grayish brown (10YR 4/2) very cobbly sandy loam, very dark brown (10YR 2/2) moist; weak very fine granular structure; soft, very friable; many very fine, fine, and medium roots; many very fine interstitial pores; medium acid (pH 6.0); clear smooth boundary.

A12—3 to 8 inches; brown (10YR 4/3) very cobbly sandy loam, dark brown (10YR 3/3) moist; weak fine and medium subangular blocky structure parting to weak fine granular; soft, very friable; common fine and very fine roots; slightly acid (pH 6.1); gradual smooth boundary.

B1—8 to 25 inches; brown (10YR 5/3) very cobbly sandy loam, dark brown (10YR 3/3) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky; many fine and medium roots; common very fine pores; slightly acid (pH 6.3); gradual smooth boundary.

B2—25 to 40 inches; pale brown (10YR 6/3) very cobbly sandy loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky; few fine and very fine roots; many very fine and fine pores; slightly acid (pH 6.3); clear smooth boundary.

B3—40 to 48 inches; pale brown (10YR 6/3) very cobbly coarse sandy loam, dark brown (10YR 4/3) moist; weak medium subangular blocky structure; slightly hard, very friable; few fine roots; slightly acid (pH 6.4); clear wavy boundary.

C—48 to 60 inches; light brownish gray (10YR 6/3) very cobbly coarse sand, grayish brown (10YR 5/2) moist; massive; soft, very friable; slightly acid (pH 6.4).

The pedon is 35 to 80 percent rock fragments that range in size from small angular or rounded pebbles to cobblestones and large stones. The soil material is slightly acid to medium acid.

The A horizon has value of 4 or 5, dry, and 2 or 3, moist; and chroma of 2 or 3.

The B2 horizon has value of 5 or 6, dry, and 3 or 4, moist; and chroma of 3 or 4. The clay content in the A horizon increases slightly with depth, but the increase is not enough to qualify the A horizon as an argillic horizon.

The C horizon is very cobbly sand or very cobbly coarse sand.

Melton series

The Melton series consists of fine-loamy over sandy or sandy-skeletal, mixed, acid Humic Cryaquepts. These soils are very deep and poorly drained. They formed in alluvium or glacial outwash that derived from mainly granitic rock sources. Melton soils are on stream bottoms, glacial till plains, low terraces, and alluvial fans, and the slopes are 0 to 3 percent.

Melton soils are associated on the landscape with Archabal, Blackwell Variant, Blackwell, Cabarton, Gestrin, and Roseberry soils. Archabal soils are well drained and have a fine-loamy control section. Blackwell Variant soils have a sandy control section. Blackwell soils are moderately fine textured to a depth of 20 inches or more. Cabarton soils have a fine control section and have montmorillonitic mineralogy. Gestrin soils are moderately well drained. Roseberry soils are poorly drained and have a coarse-loamy control section.

Typical pedon of Melton loam, 700 feet north and 40 feet west of the SE corner of sec. 29, T. 18 N., R. 3 E.; about 3 miles south of McCall:

A1—0 to 10 inches; dark grayish brown (10YR 4/2) loam, black (10YR 2/1) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine and very fine roots; strongly acid (pH 5.3); abrupt wavy boundary.

C1g—10 to 25 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; few to many coarse distinct grayish brown (2.5Y 5/2) mottles; weak medium subangular blocky structure parting to moderate fine granular; hard, friable, sticky and plastic; common fine and very fine roots; occasional thin clay films on faces of peds; very strongly acid (pH 5.0); clear smooth boundary.

C2g—25 to 30 inches; brown (10YR 5/3) gravelly sandy loam, dark grayish brown (10YR 4/2) moist; many fine distinct grayish brown (2.5Y 5/2) mottles; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky; very strongly acid (pH 5.0); clear smooth boundary.

C3—30 to 60 inches; cobbly outwash consisting of mixed acid and basic igneous cobblestones and light grayish brown (10YR 6/2) and grayish brown (10YR 6/3) loamy sand, dark grayish brown (10YR 4/2) and brown (10YR 4/3) moist; single grain between cobblestones.

Sand, gravel, or cobbles are at a depth of 30 to 35 inches.

The A1 or Ap horizon has value of 4 or 5, dry, and 2 or 3, moist; and chroma of 1 or 2. The base saturation ranges from 25 to 45 percent.

The C horizon has hue of 10YR or 2.5Y.

Naz series

The Naz series consists of coarse-loamy, mixed Pachic Cryoborolls. These soils are deep and well drained. They formed in colluvium and residuum that derived from granite, diorite, and porphyry. Naz soils are on side slopes, in swales, and in concave positions on mountains, and the slopes range from 10 to 60 percent.

Naz soils are associated on the landscape with Bryan, Coski, Jugson, Ligget, McCall, and Pyle soils. Bryan, Jugson, Ligget, McCall, and Pyle soils do not have a mollic epipedon. Coski soils do not have a mollic epipedon that is more than 16 inches thick.

Typical pedon of Naz sandy loam, in an area of McCall-Naz complex, 5 to 40 percent slopes, 1,800 feet north and 1,200 feet east of the SW corner of sec. 26, T. 20 N., R. 3 E.; along Fisher Creek 3.5 miles north of Payette Lake:

O1—1 inch to 0; moderately decomposed needles, leaves, and twigs.

A11—0 to 8 inches; very dark grayish brown (10YR 3/2) sandy loam, very dark brown (10YR 2/2) moist; moderate very fine, fine, and medium subangular blocky structure; soft, very friable, slightly sticky; many very fine, fine, and medium roots; many very fine vesicular pores; slightly acid (pH 6.4); clear wavy boundary.

A12—8 to 18 inches; dark brown (10YR 3/3) sandy loam, very dark brown (10YR 2/2) moist; moderate fine and medium subangular blocky structure parting to moderate fine granular; soft, very friable, slightly sticky; many very fine and fine and common medium roots; many very fine vesicular pores; slightly acid (pH 6.4); gradual wavy boundary.

A3—18 to 26 inches; dark grayish brown (10YR 4/3) gravelly sandy loam, very dark brown (10YR 2/2) moist; very dark grayish brown (10YR 3/2) coatings, moist; moderate fine granular structure; soft, very friable, slightly sticky; few very fine and common fine and medium roots; many very fine interstitial pores; slightly acid (pH 6.4); gradual wavy boundary.

C1—26 to 40 inches; pale brown (10YR 6/3) cobbly coarse sandy loam, dark brown (10YR 3/3) moist; single grain; loose; few very fine and fine roots; many very fine interstitial pores; medium acid (pH 6.0); diffuse wavy boundary.

C2—40 to 60 inches; pale brown (10YR 6/3) cobbly coarse sandy loam, dark brown (10YR 4/3) moist; single grain; loose; few very fine roots, many very fine interstitial pores; 25 percent (by weight) fine gravel; medium acid (pH 6.0).

Bedrock is at a depth of 40 to 70 inches.

The A1 horizon has hue of 10YR or 7.5YR; value of 3, 4, or 5, dry, and 2 or 3, moist; and chroma of 2 or 3. It is neutral or medium acid.

The C horizon has hue of 10YR or 7.5YR; value of 5 or 6, dry, and 3 through 5, moist; and chroma of 2 or 3. It is neutral to strongly acid.

Nisula series

The Nisula series consists of fine-loamy, mixed Mollic Cryoboralfs. These soils are very deep and well drained. They formed in mixed alluvial and colluvial material that derived from basaltic and granitic sources. They are on alluvial fans and colluvial foot slopes, and the slopes range from 2 to 60 percent.

Nisula soils are associated on the landscape with Donnel, Gestrin, Swede, and Shellrock soils. Gestrin soils are moderately well drained and have mottles below a depth of 36 inches. Shellrock and Donnel soils are coarse textured or moderately coarse textured. Swede soils have a base saturation of more than 50 percent in the A horizon.

Typical pedon of Nisula loam, 12 to 20 percent slopes, 1,080 feet south and 680 feet west of the NE corner of sec. 10, T. 13 N., R. 3 E.; about 3 miles southwest of Cascade along West Cascade Lake Road:

A1—0 to 3 inches; dark brown (10YR 4/3) loam, dark brown (7.5YR 3/2) moist; strong fine granular structure; soft, friable, slightly sticky and slightly plastic; many fine and very fine roots; medium acid (pH 5.6); clear smooth boundary.

AB—3 to 12 inches; brown (10YR 5/3) heavy loam, dark brown (10YR 3/3) moist; dark brown (7.5YR 3/2) coatings, moist; strong medium platy structure parting to moderate fine subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; many very fine vesicular and few very fine tubular pores; very few thin clay films on faces of peds; medium acid (pH 5.8); clear smooth boundary.

B1—12 to 25 inches; dark yellowish brown (10YR 4/4) heavy loam, dark brown (10YR 4/3) moist; dark brown (7.5YR 3/3) coatings, moist; strong medium and fine subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; common very fine and fine roots; many very fine vesicular and common very fine tubular pores; very few very thin clay films on faces of peds; medium acid (pH 5.8); gradual wavy boundary.

B21t—25 to 35 inches; yellowish brown (10YR 5/4) clay loam, dark yellowish brown (10YR 3/4) moist; dark yellowish brown (10YR 4/4) coatings, moist; strong medium and fine subangular blocky structure; hard, very firm, sticky and plastic; few fine roots; many very fine vesicular and common very fine tubular pores; many moderately thick clay films lining pores and on faces of peds; medium acid (pH 6.0); gradual wavy boundary.

B22t—35 to 51 inches; light yellowish brown (10YR 5/4) clay loam, dark yellowish brown (10YR 4/4) moist; dark brown (7.5YR 3/4) coatings, moist; strong medium and fine subangular blocky structure; hard, very firm, sticky and plastic; many very fine vesicular and common very fine tubular pores; many thick clay films lining pores and on faces of peds; medium acid (pH 5.8); diffuse wavy boundary.

B3t—51 to 60 inches; brown (7.5YR 5/4) sandy clay loam, dark yellowish brown (10YR 4/4) moist; dark yellowish brown (10YR 3/4) coatings, moist; moderate fine subangular blocky structure; hard, very firm, sticky and plastic; common very fine vesicular and few very fine tubular pores; many moderately thick clay films on faces of peds; medium acid (pH 5.8).

In some places, the soil material is about 5 percent stone fragments throughout the pedon.

The A horizon has hue of 10YR or 7.5YR; value of 4 or 5, dry, and 2 or 3, moist; and chroma of 2 or 3.

The B2t horizon has hue of 10YR or 7.5YR; value of 4 through 6, dry, and 3 through 5, moist; and chroma of 3 or 4. It is silty clay loam, sandy clay loam, or clay loam.

Pyle series

The Pyle series consists of mixed Alfic Cryopsamments. These soils are moderately deep and somewhat excessively drained. They formed in granodiorite residuum on foothills and mountains, and the slopes range from 20 to 60 percent.

Pyle soils are associated on the landscape with Bryan, Jugson, Koppes, and Toiyabe soils. Bryan and Koppes soils are more than 40 inches deep. Bryan and Jugson soils have an umbric epipedon. Koppes soils have a mollic epipedon. Toiyabe soils have a paralithic contact at a depth between 10 and 20 inches; if they do not have an O horizon, they have a mean soil temperature in summer of more than 59 degrees F at a depth of 20 inches.

Typical pedon of Pyle loamy coarse sand, in an area of Bryan-Pyle complex, 40 to 60 percent slopes, 1,600 feet east and 1,760 feet south of the NW corner of sec. 34, T. 12 N., R. 4 E., along the eastern edge of Round Valley:

O1—1 inch to 0; dark grayish brown, slightly decomposed needles, leaves, twigs, and cones; neutral (pH 6.8); abrupt wavy boundary.

A1—0 to 4 inches; grayish brown (10YR 5/2) loamy coarse sand, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable; many fine and very fine roots; many very fine and common fine interstitial pores; neutral (pH 6.8); clear smooth boundary.

C1—4 to 14 inches; pale brown (10YR 6/3) loamy coarse sand, dark grayish brown (10YR 4/2) moist; very weak coarse subangular blocky structure; soft, very friable; common very fine and few medium roots; common very fine and few medium interstitial pores; slightly acid (pH 6.2); clear wavy boundary.

C2—14 to 20 inches; pale brown (10YR 6/3) coarse sand, brown (10YR 5/3) moist; massive; soft, very friable; few medium roots; few medium interstitial pores; medium acid (pH 6.0); abrupt wavy boundary.

C3—20 to 33 inches; very pale brown (10YR 7/3) gravelly sand, light brownish gray (10YR 6/2) moist; massive or rock structure; slightly hard, very friable; few medium roots; few medium interstitial pores; three 4mm. clayey lamellae; slightly acid (pH 6.4); gradual wavy boundary.

C4r—33 inches; granodiorite or related rock.

A paralithic contact is at a depth of 20 to 40 inches.

The A1 horizon has value of 2 or 3, moist, and chroma of 2 or 3. This horizon is neutral to medium acid.

The C horizon has value of 6 or 7, dry, and 4, 5 or 6, moist, and chroma of 2 to 4. Chroma of 3 or 4 is common in the horizon immediately above bedrock. The C horizon is loamy sand, sand, loamy coarse sand, coarse sand, gravelly sand, or gravelly loamy coarse sand. The pebbles are angular and are mainly less than 5mm. in diameter. In the lower part of this horizon in some pedons, clay films bridge the sand particles. More clayey bands or lamellae less than 0.3 inch thick are below a depth of 20 inches. The clay films and lamellae are not sufficient to qualify the C horizon as an argillic horizon. The C horizon is mainly medium acid to slightly acid; in some pedons, it is strongly acid in the lower part.

Quartzburg series

The Quartzburg series consists of sandy-skeletal, mixed, frigid Typic Xerorthents. These soils are moderately deep and somewhat excessively drained. They formed in residuum of granite. Quartzburg soils are on foothills, spur ridges, and the upper part of side slopes on mountains, and the slopes range from 20 to 60 percent.

Quartzburg soils are associated on the landscape with Bryan, Coski, Koppes, Pyle, and Toiyabe soils. Bryan soils have an umbric epipedon. Bryan, Coski, and Koppes soils do not have a paralithic or lithic contact within a depth of 40 inches. Coski and Koppes soils have a mollic epipedon. Coski soils are dominantly moderately coarse textured in the control section. Pyle soils are less than 35 percent coarse fragments. Toiyabe soils have a paralithic contact between depths of 10 and 20 inches and are less than 35 percent coarse fragments in the control section.

Typical pedon of Quartzburg loamy coarse sand, in an area of Quartzburg-Bryan complex, 20 to 40 percent slopes, 1,100 feet north and 320 feet east of the center of sec. 16, T. 11 N., R. 4 E.; near the southeast corner of Round Valley:

O1—1 inch to 0; slightly decomposed and moderately decomposed needles, leaves, twigs, and cones, sparse in some areas; abrupt wavy boundary.
A1—0 to 5 inches; grayish brown (10YR 5/2) loamy coarse sand, very dark brown (10YR 2/2) moist; weak very fine and fine granular structure; slightly hard, very friable; common fine and very fine roots; many very fine interstitial pores; neutral (pH 6.6); clear wavy boundary.
C1—5 to 14 inches; pale brown (10YR 6/3) loamy coarse sand, dark brown (10YR 3/3) moist; weak very fine and fine granular structure; slightly hard, very friable; common fine and very fine roots; many very fine interstitial pores; neutral (pH 6.6); clear wavy boundary.
C2—14 to 22 inches; very pale brown (10YR 7/3) very gravelly loamy coarse sand, brown (10YR 5/3) moist; massive; hard, firm; few fine roots; many fine interstitial pores; 75 percent angular gravel; slightly acid (pH 6.2); gradual wavy boundary.
C3r—22 inches; white (10YR 8/2) slightly decomposed granite, brown (10YR 5/3) moist; some black (10YR 2/1) spots; rock structure; extremely hard; slightly acid (pH 6.2).

A paralithic contact with weathered granitic or related bedrock is between depths of 20 and 30 inches. The control section is 35 to 80 percent, on a weighted average by volume, coarse fragments.

The A1 horizon has value of 2 or 3, moist, and chroma of 2 or 3.

The C horizon has value of 5 to 8, dry, and 3 to 5, moist, and chroma of 2 or 3. The bedrock immediately below the paralithic contact is consolidated and is stained and weathered. It has the original rock structure and can be dug with a spade.

Quartzburg Variant

The Quartzburg Variant consists of sandy-skeletal, mixed Typic Cryumbrepts. These soils are moderately deep and well drained. They formed in residuum of granite. Quartzburg Variant soils are on foothills and mountains, and the slopes range from 30 to 60 percent.

Quartzburg Variant soils are associated on the landscape with Jugson, McCall, and Shellrock soils. McCall and Shellrock soils have a paralithic contact at a depth of more than 40 inches. Jugson and Shellrock soils are less than 35 percent coarse fragments in the control section. McCall soils are skeletal throughout the solum.

Typical pedon of Quartzburg Variant loam, 30 to 60 percent slopes, 300 feet north and 1,600 feet west of the SE corner of sec. 20, T. 19 N., R. 3 E.; about 5 miles northwest of McCall:

O2—1 inch to 0; decomposed litter material.
A1—0 to 9 inches; yellowish brown (10YR 5/4) loam, dark brown (10YR 3/3) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine, medium, and coarse roots; common fine and very fine tubular pores; slightly acid (pH 6.2); clear wavy boundary.
B21—9 to 13 inches; light yellowish brown (10YR 6/4) sandy loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; soft, very friable; common coarse roots; common fine and very fine tubular pores; medium acid (pH 5.6); abrupt smooth boundary.
B22—13 to 24 inches; light yellowish brown (10YR 6/4) very gravelly coarse sandy loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure; soft, very friable; few very fine and common medium and coarse roots; about 65 percent gravel; medium acid (pH 5.7); gradual smooth boundary.
C—24 to 30 inches; yellowish brown (10YR 5/4) loamy sand, dark brown (10YR 4/3) moist; single grain; loose; few very fine and fine roots; slightly acid (pH 6.2); abrupt smooth boundary.
R—30 inches; granite bedrock.

On the average, the control section is 40 to 70 percent gravel.

The A horizon has value of 5 or 6, dry.

The B2 horizon has value of 6 or 7, dry. In the upper part, it is sandy loam or coarse sandy loam, and in the lower part, it is very gravelly sandy loam or very gravelly coarse sandy loam.

The C horizon is loamy sand or sand.

Roseberry series

The Roseberry series consists of sandy, mixed Humic Cryaquepts. These soils are very deep and poorly drained. They formed in alluvium and glacial outwash that derived mainly from granitic sources. Roseberry soils are on alluvial plains and stream bottoms, and the slopes are 0 to 3 percent.

Roseberry soils are associated on the landscape with Archabal, Donnel, and Melton soils. Archabal and Donnel soils are well drained. Melton soils have contrasting textures in the control section.

Typical pedon of Roseberry coarse sandy loam, 700 feet west and 40 feet south of the NE corner of sec. 26, T. 17 N., R. 3 E., about 4 miles north of Donnelly along Farm to Market Road:

A11—0 to 7 inches; dark gray (10YR 4/1) coarse sandy loam, very dark gray (2.5Y 3/1) moist; few fine faint very dark brown (7.5YR 2/2) mottles, moist; moderate fine and very fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; medium acid (pH 5.7); gradual smooth boundary.

A12—7 to 13 inches; gray (10YR 5/1) coarse sandy loam, very dark gray (2.5Y 3/1) moist; few fine faint very dark brown (7.5YR 2/2) mottles, moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; common very fine pores; medium acid (pH 5.5); clear irregular boundary.

C1—13 to 20 inches; light brownish gray (10YR 6/2) loamy coarse sand, dark brown (10YR 3/3) and dark grayish brown (10YR 4/2) moist; common medium faint dark gray (10YR 5/1) and dark olive (5Y 3/3) mottles, moist; very weak medium subangular blocky structure parting to moderate fine granular; friable, slightly sticky and slightly plastic; common fine roots; many very fine pores; medium acid (pH 5.6); gradual wavy boundary.

C2—20 to 35 inches; pale brown (10YR 6/3) loamy coarse sand, brown (10YR 4/3) and grayish brown (2.5Y 5/2) moist; single grain; loose; few fine roots; many very fine pores; medium acid (pH 5.6); clear wavy boundary.

C3—35 to 55 inches; light brownish gray (10YR 6/2) coarse sand, brown (10YR 4/3) moist; single grain; loose; medium acid (pH 5.6); gradual wavy boundary.

IIC4—55 to 60 inches; light brownish gray (10YR 6/2) fine sandy loam, brown (7.5YR 4/3) and dark yellowish brown (10YR 4/4) moist; light olive gray (5Y 6/2) mottles, moist; massive; friable, slightly sticky and slightly plastic; medium acid (pH 5.9); abrupt wavy boundary.

Stratified medium and coarse textured material is at a depth of 40 to 60 inches.

The A1 or Ap horizon has value of 4 or 5, dry, and 2 or 3, moist, and chroma of 1 or 2. The A1 horizon is medium acid or strongly acid. The substratum is strongly acid or medium acid.

Shellrock series

The Shellrock series consists of mixed, frigid Typic Xeropsamments. These soils are deep and somewhat excessively drained. They formed in residuum of granite or of related acid igneous rock. Shellrock soils are on ridgetops and side slopes of mountains, and the slopes range from 12 to 60 percent.

Shellrock soils are associated on the landscape with Bryan, Coski, Koppes, and Ligget soils. Bryan soils have an umbric epipedon. Coski and Koppes soils have a mollic epipedon. Ligget soils have a cambic horizon.

Typical pedon of Shellrock loamy coarse sand, in an area of Shellrock-Rock outcrop complex, 35 to 60 percent slopes, 1,600 feet west and 2,000 feet south of the NE corner of sec. 32, T. 16 N., R. 4 E., about 3 miles southeast of Donnelly on Goldfork Creek:

A11—0 to 2 inches; dark grayish brown (10YR 4/2) loamy coarse sand, very dark grayish brown (10YR 3/2) moist; weak fine and very fine granular structure; soft, very friable; few coarse roots; many very fine and coarse interstitial pores; slightly acid (pH 6.4); abrupt smooth boundary.

A12—2 to 6 inches; dark grayish brown (10YR 4/2) loamy coarse sand, very dark grayish brown (10YR 3/2) moist; weak fine and medium granular structure; soft, very friable; few very fine and common fine roots; many very fine and coarse interstitial pores; neutral (pH 6.6); clear smooth boundary.

C1—6 to 40 inches; brown (10YR 5/3) loamy coarse sand, dark brown (10YR 4/3) moist; massive or weak medium subangular blocky structure; soft, very friable; few very fine and common fine roots; many very fine and coarse interstitial pores; slightly acid (pH 6.4); gradual smooth boundary.

C2—40 to 56 inches; white (10YR 8/2) and very pale brown (10YR 8/4) gravelly coarse sand; single grain; loose; slightly acid (pH 6.4); gradual smooth boundary.

C3r—56 inches; weathered granite bedrock.

A paralithic contact is at a depth between 40 and 60 inches.

The A horizon has value of 4 or 5, dry, and 2 or 3, moist, and chroma of 2 or 3.

The C horizon has value of 5 to 9, dry, and 4 to 7, moist, and chroma of 2 to 5.

Sudduth Variant

The Sudduth Variant consists of fine, montmorillonitic Argic Pachic Cryoborolls. These soils are very deep and moderately well drained. They formed in alluvium and colluvium that derived from basalt. Sudduth Variant soils are on alluvial fans, colluvial fans, and terraces, and the slopes range from 3 to 20 percent.

Sudduth Variant soils are associated on the landscape with Blackwell, Cabarton, Demast, Bluebell, and Tica soils. Blackwell and Cabarton soils are poorly drained. Blackwell soils do not have a B horizon and are underlain by stratified sand. Bluebell and Tica soils are more than 35 percent coarse fragments in their solum. Demast soils are well drained and are less than 35 percent clay in the control section.

Typical pedon of Sudduth Variant loam, 3 to 20 percent slopes, 1,500 feet east and 1,540 feet north of the SW corner of sec. 26, T. 18 N., R. 2 E.; about 5 miles southeast of McCall:

A11—0 to 11 inches; dark grayish brown (10YR 4/2) heavy loam, very dark brown (10YR 2/2) moist;

weak medium and fine subangular blocky structure parting to moderate medium and fine granular; slightly hard, friable, slightly sticky and slightly plastic; many fine and very fine roots; common very fine vesicular pores; many thin clay films bridging mineral grains; slightly acid (pH 6.2); gradual wavy boundary.

A12—11 to 16 inches; dark grayish brown (10YR 4/2) heavy loam, dark brown (7.5YR 3/3) moist; moderate medium subangular blocky structure parting to moderate fine and medium granular; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; common very fine vesicular and common very fine tubular pores; continuous thin clay films bridging mineral grains; neutral (pH 6.6); clear wavy boundary.

B1—16 to 22 inches; dark grayish brown (10YR 4/2) light clay loam, dark brown (7.5YR 3/3) moist; moderate medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and plastic; few very fine roots; common very fine and few fine vesicular and few fine tubular pores; continuous moderately thick clay films lining pores and bridging mineral grains; neutral (pH 6.6); clear smooth boundary.

B21t—22 to 36 inches; brown (10YR 5/3) silty clay loam, dark brown (7.5YR 3/3) moist; strong medium and coarse subangular blocky structure; hard, firm, sticky and plastic; many very fine vesicular and few fine tubular pores; continuous thick clay films lining pores and on faces of peds; neutral (pH 6.6); abrupt smooth boundary.

B22t—36 to 41 inches; brown (10YR 5/3) silty clay loam, dark brown (10YR 3/3) moist, common fine distinct brownish yellow (10YR 6/6) mottles, dark yellowish brown (10YR 3/5) moist; strong medium and coarse subangular blocky structure; hard, firm, sticky and plastic; many very fine vesicular and few fine tubular pores; continuous thick clay films lining pores and on faces of peds; slightly acid (pH 6.4); abrupt smooth boundary.

C1g—41 to 60 inches; very pale brown (10YR 7/3) clay loam, grayish brown (10YR 5/2) moist; many medium prominent brownish yellow (10YR 6/6) mottles, dark yellowish brown (10YR 4/6) moist; strong medium and coarse subangular blocky structure; hard, firm, sticky and plastic; common very fine vesicular and few fine tubular pores; slightly acid (pH 6.4).

Reaction is neutral or slightly acid. Content of coarse fragments is 0 to 5 percent.

The A horizon has value of 2 or 3, moist, and 3 or 4, dry, and chroma of 2 or 3.

The B2t horizon has hue of 10YR or 7.5YR; value of 3 to 5, moist, and 4 to 6, dry; and chroma of 2 to 4, moist, and 3 to 6, dry. It is clay loam, silty clay loam, or clay that is more than 35 percent clay.

Swede series

The Swede series consists of fine-loamy, mixed Argic Cryoborolls. These soils are very deep and well drained. They formed in mixed alluvium that derived from basaltic and granitic sources. Swede soils are on alluvial fans and on colluvial toe slopes and foot slopes. The slopes range from 2 to 20 percent.

Swede soils are associated on the landscape with Donnel, Gestrin, Nisula, and Shellrock soils. Donnel soils do not have a textural B horizon. Gestrin soils are moderately well drained and have mottles below a depth of 36 inches. Shellrock soils do not have a textural B horizon and have bedrock at a depth of 40 to 60 inches. Nisula soils have a base saturation of less than 50 percent.

Typical pedon of Swede silt loam, 4 to 12 percent slopes, 1,570 feet east and 50 feet north of the SW corner of the NW1/4 sec. 10, T. 12 N., R. 4 E., about 10 miles southwest of Cascade:

A11—0 to 2 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak fine and very fine granular structure; soft, friable, slightly sticky and slightly plastic; many very fine and fine roots; slightly acid (pH 6.1); abrupt smooth boundary.

A12—2 to 4 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine vesicular pores; slightly acid (pH 6.1); abrupt smooth boundary.

A3—4 to 9 inches; brown (10YR 4/3) silt loam, dark brown (7.5YR 3/2) moist; weak medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; common very fine tubular pores; slightly acid (pH 6.3); clear smooth boundary.

B1t—9 to 15 inches; brown (7.5YR 5/3) silty clay loam, dark brown (7.5YR 3/2) moist; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, friable, sticky and plastic; common very fine and fine roots; many very fine tubular pores; thin patchy clay films on vertical faces of peds and lining pores; slightly acid (pH 6.3); clear smooth boundary.

B21t—15 to 30 inches; pale brown (10YR 6/3) silty clay loam, brown (7.5YR 5/4) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, firm, sticky and plastic; few fine roots; common very fine tubular pores; medium nearly continuous pinkish gray (7.5YR 7/2) clay films, brown (7.5YR 4/4) moist, on faces of peds; slightly acid (pH 6.3); gradual smooth boundary.

B22t—30 to 52 inches; very pale brown (10YR 7/3) silty clay loam, brown (7.5YR 5/4) moist; moderate and strong medium and coarse prismatic structure parting to moderate medium subangular blocky; hard, firm, sticky and plastic; many fine tubular pores; medium continuous brown (7.5YR 4/4), moist, clay films on faces of peds; slightly acid (pH 6.3); gradual smooth boundary.

B3t—52 to 60 inches; very pale brown (l0YR 7/3) fine gravelly silty clay loam, brown (7.5YR 5/4) moist; weak medium subangular blocky structure; hard, firm, sticky and plastic; many very fine tubular pores; thin nearly continuous brown (7.5YR 4/4), moist, clay films on faces of peds; slightly acid (pH 6.3).

The solum is 36 to more than 60 inches thick. It generally is underlain by coarse granitic sand and fine angular gravel. The profile is 0 to 3 percent stone fragments in some places.

The A horizon has value of 4 or 5, dry.

The B2t horizon has value of 5 through 7, dry. It is silty clay loam or clay loam that is 27 to 32 percent clay.

Takeuchi series

The Takeuchi series consists of coarse-loamy, mixed, frigid Typic Haploxerolls. These soils are moderately deep and well drained. They formed in residuum of granite or of other intrusive, acid igneous rock. Takeuchi soils are on ridgetops or on south-facing slopes of foothills, and the slopes range from 3 to 35 percent.

Takeuchi soils are associated on the landscape with Jugson, Pyle, Quartzburg, Shellrock, and Toiyabe soils. Jugson soils have an O horizon at the surface and a B2ir horizon. Pyle and Quartzburg soils have an O horizon and do not have a horizon of clay accumulation. Shellrock soils are more than 40 inches deep. Toiyabe soils have bedrock at a depth of 10 to 20 inches.

Typical pedon of Takeuchi coarse sandy loam, 3 to 35 percent slopes, 3,200 feet west and 900 feet south of the NE corner of sec. 2, T. 15 N., R. 3 W., on foothills along the northeastern edge of Round Valley:

A1—0 to 7 inches; dark grayish brown (10YR 4/2) coarse sandy loam, very dark grayish brown (10YR 3/2) moist; moderate very fine granular structure; soft, friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine interstitial pores; few fine angular granitic gravel; slightly acid (pH 6.2); clear smooth boundary.

B2t—7 to 14 inches; brown (10YR 5/3) coarse sandy loam, dark brown (7.5YR 3/2) moist; moderate medium and coarse subangular blocky structure; hard, firm, sticky and plastic; many very fine and fine roots; many fine tubular pores; thin patchy clay films on vertical faces of peds; slightly acid (pH 6.3); clear smooth boundary.

C1—14 to 24 inches; very pale brown (10YR 7/3) sand, yellowish brown (10YR 5/4) moist; single grain; loose; few very fine and fine roots; many fine interstitial pores; slightly acid (pH 6.5); diffuse smooth boundary.

C2r—24 to 30 inches; light gray (10YR 7/2) partly decomposed granite, pale brown (10YR 6/3) moist; the granite is firm in places but can be broken easily with a hammer or an auger.

R—30 inches; granite bedrock.

Bedrock is at a depth of 20 to 40 inches. The solum is 16 to 30 inches thick. The soil material is neutral to medium acid. In some pedons there is no C horizon.

The A1 horizon has value of 3 through 5, dry, and 2 to 3, moist, and chroma of 2 or 3. It has platy or granular structure.

A very weak B2t horizon underlies the A horizon. Part or all of the B2t horizon commonly is a cambic horizon; part of it is too dark to be considered as a cambic horizon. The color of this horizon has value of 4 through 6, dry, and 3 or 4, moist, and chroma of 2 through 4. Between a depth of 10 inches and bedrock, the soil dominantly is coarse sandy loam. In places, it is loamy coarse sand or sandy loam, and, in places, it is 10 to 35 percent pebbles and cobbles.

Tica series

The Tica series consists of clayey-skeletal, montmorillonitic Argic Lithic Cryoborolls. These soils are shallow and well drained. They formed in residuum of basalt. Tica soils are on foothills and mountains, and the slopes range from 4 to 65 percent.

Tica soils are associated on the landscape with Demast, Bluebell, and Sudduth Variant soils. Demast soils are more than 40 inches deep to bedrock. Bluebell soils are 20 to 40 inches deep to bedrock. Sudduth Variant soils are moderately well drained and are more than 60 inches deep to bedrock.

Typical pedon of Tica very cobbly loam, 4 to 65 percent slopes, 1,000 feet west and 800 feet south of the NE corner of sec. 26, T. 18 N., R. 2 E., about 4 miles southwest of McCall:

A1—0 to 4 inches; brown (10YR 5/3) very cobbly loam, very dark brown (10YR 2/2) moist; moderate fine and very fine granular structure; slightly hard, friable, sticky and slightly plastic; many fine and very fine roots; many very fine interstitial pores; neutral (pH 6.6); clear wavy boundary.

AB—4 to 13 inches; brown (10YR 4/2) very cobbly clay loam, dark brown (7.5YR 3/3) moist; moderate medium and fine subangular blocky structure parting to strong medium and fine granular; slightly hard, friable, sticky and plastic; many fine and very fine roots; many very fine interstitial and tubular pores; neutral (pH 6.7); gradual wavy boundary.

B2t—13 to 17 inches; brown (10YR 4/3) very cobbly clay, dark brown (7.5YR 3/2) moist; dark brown (10YR 3/3), crushed, moist; strong medium angular blocky structure; very hard, firm, very sticky and very plastic; many very fine roots; common very fine tubular pores; continuous moderately thick, very dark grayish brown (10YR 3/2) clay films, moist; slightly acid (pH 6.5); gradual smooth boundary.

R—17 inches; fractured basalt bedrock; clay similar to that in the B2t horizon is in some cracks.

Bedrock is at a depth between 10 and 20 inches.

The A1 horizon has hue of 10YR and 7.5YR, value of 3 through 5, dry, and chroma of 2 or 3. It is 35 to 50 percent cobbles and 0 to 5 percent stones. It is neutral or slightly acid.

The B2t horizon has hue of 7.5YR and 5YR and chroma of 2 or 3. It is a clay that is 40 to 55 percent clay and 50 to 70 percent cobbles. Its structure ranges from moderate and strong angular blocky to moderate prismatic. The soil material is slightly acid or medium acid.

Toiyabe series

The Toiyabe series consists of mixed, frigid, shallow Typic Xeropsamments. These soils are shallow and excessively drained. They formed in residuum of granite and are on mountainsides. The slopes range from 40 to 60 percent.

Toiyabe soils are associated on the landscape with Koppes, Pyle, Jugson, and Quartzburg soils. Koppes soils are more than 60 inches deep and have a mollic epipedon. Pyle and Jugson soils have an O horizon and have bedrock at a depth of 20 to 40 inches. Quartzburg soils have bedrock at a depth of 20 to 40 inches.

Typical pedon of Toiyabe loamy coarse sand, in an area of Koppes-Toiyabe complex, 40 to 60 percent slopes, 1,900 feet north and 1,100 feet west of the SE corner of sec. 24, T. 13 N., R. 4 E., about 7 miles southeast of Cascade along Clear Creek:

A1—0 to 5 inches; grayish brown (10YR 5/2) loamy coarse sand, very dark grayish brown (10YR 3/2) moist; weak medium granular structure; soft, very friable; many fine and very fine roots; many very fine pores; medium acid (pH 5.8); clear smooth boundary.

C1—5 to 11 inches; light brownish gray (10YR 6/2) gravelly loamy coarse sand, dark grayish brown (10YR 4/2) moist; weak medium granular structure; soft, very friable; common fine roots; common fine pores; medium acid (pH 6.0); abrupt smooth boundary.

C2r—11 inches; decomposing yellowish brown (10YR 5/4) and very pale brown (10YR 7/3) granite; rock structure.

Bedrock is at a depth between 10 and 20 inches. The weathered part of the bedrock is 6 to more than 30 inches thick.

In open areas or burned areas, there is no O1 horizon.

The A1 horizon has value of 4 or 5, dry, and 2 or 3, moist, and chroma of 1 to 2. The colors of higher value and chroma are mainly in the pedons on south-facing slopes.

The C horizon has hue of 10YR and, in a few places, of 7.5YR; value of 6 or 7, dry, and 3 through 5, moist; and chroma of 2 or 3. The control section typically is gravelly loamy coarse sand and loamy coarse sand; in some pedons, it is sand, coarse sand, or very coarse sand. These textures are modified by gravel, cobblestones, or stones. The content of coarse fragments is less than 35 percent, by volume. In the C horizon, strong brown or yellowish brown stains are on some individual sand grains or coarse fragments.

Formation of the soils

Soil is a natural body on the surface of the earth in which plants grow. It is a variable mixture of rocks and minerals, organic matter, water, and air. The rocks and minerals are fragmented and are in varying stages of weathering. Soils have more or less distinct layers, or horizons, that are produced by environmental forces acting on the material deposited or accumulated through geological processes.

The five soil-forming factors that determine the properties of the soils are (1) the physical and mineral composition of the parent material, (2) the climate under which the soil material has existed since accumulation, (3) the topography, or relief, (4) plants and animals, and (5) the length of time the forces of soil formation have acted on the parent material (*3*).

Soils differ according to the degree to which they were influenced by each of the soil-forming factors. In soil formation, one factor can dominate and influence the properties of the soil more than the other four; however, the interaction of all five factors generally determines the kind of soil that is formed.

Parent material

The parent materials in which the soils in the Valley Area formed are residuum, alluvium, and glacial material.

The largest geologic unit in the area is the Idaho Batholith, which consists of metamorphosed rocks including granite gneiss, mica schist, and porphyritic biotite-granite. These rocks are highly fractured and weathered, and the soils that developed from these rocks have a high content of rock fragments. Bryan, Coski, Jugson, Koppes, Naz, Pyle, Quartzburg, Shellrock, Takeuchi, and Toiyabe soils formed in this parent material.

In a few places, mainly along the mountain range west of McCall, Columbia River basalt intrudes into the Valley Area. The soils in the basalt areas range from shallow to deep and from very cobbly to nearly free of cobbles in the upper part of the soil. Bluebell, Demast, and Tica soils formed in residuum of basalt.

There is much evidence of glacial action in the survey area. Glacial Payette Lake and the resulting moraines are in the northern part of the area. The movement of the glacial ice grooved and polished large areas of granite bedrock. The McCall soils are an example of soils that formed in glacial till.

Large areas on the valley floors are till plains of glacial outwash material. Archabal, Donnel, Duston, and Gestrin soils formed in this material.

Alluvium is the parent material of the soils on flood plains along streams. Blackwell, Jurvannah, Kangas, Roseberry, and Melton soils formed in alluvium.

Climate

Temperature and precipitation determine the rate of weathering of rock and the decomposition of minerals and organic matter. They also influence leaching, eluviation, and illuviation. The climate in the Valley Area generally is subhumid and is characterized by warm, dry summers and cold, wet winters that have an abundance of snow. Mountain areas have cooler summers and colder winters than valley areas. Differences in annual precipitation and temperature are associated with changes in elevation. The greatest amount of precipitation is on mountains surrounding the valleys. The coldest temperatures are on the highest mountains.

The abundance of moisture in the survey area produces a large amount of vegetation. Many soils have a duff or organic layer at the surface. Bryan, Demast, Duston, Jugson, Ligget, McCall, Naz, Pyle, and Quartzburg soils have an organic surface layer.

The decomposition of organic matter into humus results in soils that have a thick, dark surface layer. Archabal, Blackwell, Bluebell, Coski, Gestrin, Koppes, Naz, and Roseberry soils are examples.

Because of the high amount of precipitation in the survey area, some soils have been leached and have a low base saturation. Archabal, Bryan, Donnel, Gestrin, Jugson, Kangas, McCall, and Nisula soils have a base saturation of less than 50 percent.

Topography

Topography, or relief, in the Valley Area influences soil formation through its effect on climate and erosion. Areas that have the same amount of precipitation can differ in their microclimate. Steep, north-facing slopes are cooler and lose less water through evaporation than nearby south-facing slopes. The direction of slopes also results in differences in soil depth and vegetation. For example, the deep Bryan soils on north-facing slopes have a dense canopy of Douglas-fir and grand fir, and the shallow Toiyabe soils on south-facing slopes have scattered stands of ponderosa pine.

The mountainous areas are deeply dissected by drainageways, resulting in relatively steep side slopes. Because the slopes are steep and very steep, the soils mainly are well drained to somewhat excessively drained. Geologic erosion is active and is accelerated following logging, fire, or other disturbance. As a result, many soils are only moderately deep. Examples of moderately deep, steep or very steep soils are Bluebell, Jugson, Pyle, Quartzburg, and Takeuchi soils.

The flood plains of rivers and streams are nearly level, and the soils have slopes of less than 2 percent. In these areas, drainage is poor, and in places, drainage outlets are not available. As a result, the water table is high or fluctuating. Blackwell, Jurvannah, and Melton soils formed in areas where the water table is high. Because these soils have poor drainage, they have mottles caused by the reduction of iron.

The soils on terraces above the flood plains have better drainage, but even here the topography results in soil drainage catenas. The well drained Archabal soils are near the edge of the terrace, and the moderately well drained Gestrin soils are in a slightly lower position on the terrace.

Plants and animals

Plants and animals are important in soil formation. The kind and amount of vegetation on a soil influence the amount of organic matter that is added to the soil. Dense forest vegetation adds a large amount of pine needles to the soil, producing a duff layer. If trees are removed through fire or logging, the vegetation changes to brush, which has leaves that decompose faster than pine needles. If the duff covering is removed, the surface soil can be lost through erosion.

In the Valley Area, large areas on the valley floors have been cleared of brush and trees and are used for farming. The introduction of grasses for hay and pasture and the use of water for irrigation have changed the soils. The Archabal soils in these areas now have a dark color and platy and granular structure in the surface layer, which are characteristics of a grassland soil. Irrigation has changed the drainage of Gestrin and Roseberry soils.

Time

The length of time required for soils to form depends mainly on the other factors of soil formation. In areas where granite bedrock was deposited by glaciers, soil formation is now starting. Aerial photographs taken in 1955 show the area east of Little Payette Lake as bare granite bedrock. In 1974, aerial photographs show vegetation and young trees growing in that area. Thus, once enough soil material had accumulated for vegetation to grow, the change in this area was rapid. The high rainfall in the Valley Area has reduced the length of time needed for soils to form from granite.

The length of time that the parent material remains in place is reflected in the formation of soils. Swede and Nisula soils formed in an old parent material that has remained in place for a long time. The older age of these soils is reflected in the development of a subsoil of silty clay loam and clay loam.

Soils that formed on steep slopes have little profile development. Erosion has kept pace with soil formation, and thus, these soils are relatively young. Pyle and Quartzburg soils are examples.

In general, the soils that formed in recent alluvium on flood plains and low terraces are young. Such soils as Donnel, Kangas, and Roseberry soils have a dark surface layer, and some of the bases have been leached out. Horizon development in these soils requires more time than in other soils.

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Glossary

Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher), or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim. 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 mapping 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—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	More than 9

Base saturation. The degree to which material having base exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the 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 frequent flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Calcareous soil. A soil containing enough calcium carbonate (commonly with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid. A soil having measurable amounts of calcium carbonate or magnesium carbonate.

Catena. A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

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 coat, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Climax vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse fragments. Mineral or rock particles up to 3 inches (2 millimeters to 7.5 centimeters) in diameter.

Coarse textured (light 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 bases of steep slopes.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures is difficult.

Complex, soil. A mapping unit of two or more kinds of soil occurring in such an intricate pattern that they cannot be shown separately on a soil map at the selected scale of mapping and publication.

Compressible. Excessive decrease in volume of soft soil under load.

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.

Contour stripcropping (or contour farming). Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is 40 or 80 inches (1 or 2 meters).

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cutbanks cave. Unstable walls of cuts made by earthmoving equipment. The soil sloughs easily.

Depth to rock. Bedrock at a depth that adversely affects the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

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

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils 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, as for example in "hillpeats" and "climatic moors."

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Erosion. The wearing away of the land surface by running 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 a bare surface.

Excess fines. Excess silt and clay. The soil does not provide a source of gravel or sand for construction purposes.

Favorable. Favorable soil features for the specified use.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fine textured (heavy textured) soil. Sandy clay, silty clay, and clay.

Flooding. The temporary covering of soil with water from overflowing streams, runoff from adjacent slopes, and tides. Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather 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. Water standing for short periods after rainfall or commonly covering swamps and marshes is not considered flooding.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forage. Plant material used as feed by domestic animals. Forage can be grazed or cut for hay.

Forb. Any herbaceous plant not a grass or a sedge.

Frost action. Freezing and thawing of soil moisture. Frost action can damage structures and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by melt water as it flows from glacial ice.

Glacial till (geology). Unassorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Gleyed soil. A soil having one or more neutral gray horizons as a result of waterlogging and lack of oxygen. The term "gleyed" also designates gray horizons and horizons having yellow and gray mottles as a result of intermittent waterlogging.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material from 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

Green manure (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table, which is the upper limit of saturation.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Habitat. The natural abode of a plant or animal; refers to the kind of environment in which a plant or animal normally lives, as opposed to the range or geographical distribution.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. The major horizons of mineral soil are as follows:

O horizon.—An organic layer, fresh and decaying plant residue, at the surface of a mineral soil.

A horizon.—The mineral horizon, formed or forming 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.

A2 horizon.—A mineral horizon, mainly a residual concentration of sand and silt high in content of resistant minerals as a result of the loss of silicate clay, iron, aluminum, or a combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or a combination of these; (2) by prismatic or blocky structure; (3) by redder or browner colors than those in the A horizon; or (4) by a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil lacks 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 from which the solum is presumed to have 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.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered, but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, invader plants are those that follow disturbance of the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Large stones. Rock fragments 10 inches (25 centimeters) or more across. Large stones adversely affect the specified use.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. Inadequate strength for supporting loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is greater than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous areas. Areas that have little or no natural soil, are too nearly inaccessible for orderly examination, or cannot otherwise be feasibly classified.

Moderately coarse textured (moderately light textured) soil. Sandy loam and fine sandy loam.

Moderately fine textured (moderately heavy textured) soil. Clay loam, sandy clay loam, and silty clay loam.

Moraine (geology). An accumulation of earth, stones, and other debris deposited by a glacier. Types are terminal, lateral, medial, and ground.

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).

Muck. Dark colored, finely divided, well decomposed organic soil material mixed with mineral soil material. The content of organic matter is more than 20 percent.

Munsell notation. A designation of color by degrees of the three single 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.

Neutral soil. A soil having a pH value between 6.6 and 7.3.

Nutrient, plant. Any element taken in by a plant, essential to its growth, and used by it in the production of food and tissue. Plant nutrients are nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, zinc, and perhaps other elements obtained from the soil; and carbon, hydrogen, and oxygen obtained largely from the air and water.

Outwash, glacial. Stratified sand and gravel produced by glaciers and carried, sorted, and deposited by water that originated mainly from the melting of glacial ice. Glacial outwash is commonly in valleys on landforms known as valley trains, outwash terraces, eskers, kame terraces, kames, outwash fans, or deltas.

Outwash plain. A land form of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it is generally low in relief.

Pan. A compact, dense layer in a soil. A pan impedes the movement of water and the growth of roots. The word "pan" is commonly combined with other words that more explicitly indicate the nature of the layer; for example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material. The great variety of unconsolidated organic and mineral material in which soil forms. Consolidated bedrock is not yet parent material by this concept.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture.

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.

Percolation. The downward movement of water through the soil.

Percs slowly. The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality that enables the soil to transmit water or air, measured as the number of inches per hour that water moves through the soil. 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 to 2.0 inches), *moderately rapid* (2.0 to 6.0 inches), *rapid* (6.0 to 20 inches), and *very rapid* (more than 20 inches).

Phase, soil. A subdivision of a soil series or other unit in the soil classification system based on differences in the soil that affect its management. A soil series, for example, may be divided into phases on the basis of differences in slope, stoniness, thickness, or some other characteristic that affects management. These differences are too small to justify separate series.

pH value. (See Reaction, soil). A numerical designation of acidity and alkalinity in soil.

Piping. Moving water of subsurface tunnels or pipelike cavities in the 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 a semisolid to a plastic state.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Poorly graded. Refers to soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor outlets. Surface or subsurface drainage outlets difficult or expensive to install.

Productivity (soil). The capability of a soil for producing a specified plant or sequence of plants under a specified system of management. Productivity is measured in terms of output, or harvest, in relation to input.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Range (or rangeland). Land that, for the most part, produces native plants suitable for grazing by livestock; includes land supporting some forest trees.

Range condition. The health or productivity of forage plants on a given range, in terms of the potential productivity under normal climate and the best practical management. Condition classes generally recognized are—*excellent, good, fair,* and *poor*. The classification is based on the percentage of original, or assumed climax vegetation on a site, as compared to what has been observed to grow on it when well managed.

Range site. An area of range where climate, soil, and relief are sufficiently uniform to produce a distinct kind and amount of native vegetation.

Reaction, soil. The degree 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

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulates over disintegrating rock.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth. Shallow root zone. The soil is shallow over a layer that greatly restricts roots. See Root zone.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged in stream channels from a drainage area. The water that flows off the land surface without sinking in is called surface runoff; that which enters the ground before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Seepage. The rapid movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils, formed from a particular type of parent material, having horizons that, except for the texture of the A or surface horizon, are similar in all profile characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineralogical and chemical composition.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

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.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

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.

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 intake. The slow movement of water into the soil.

Slow refill. The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones. Rock fragments 3 to 10 inches (7.5 to 25 centimeters) in diameter. Small stones adversely affect the specified use.

Soil. A natural, three-dimensional body at the earth's surface that 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 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows: *very coarse sand* (2.0 millimeters to 1.0 millimeter); *coarse sand* (1.0 to 0.5 millimeter); *medium sand* (0.5 to 0.25 millimeter); *fine sand* (0.25 to 0.10 millimeter); *very fine sand* (0.10 to 0.05 millimeter); *silt* (0.05 to 0.002 millimeter); and *clay* (less than 0.002 millimeter).

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in mature 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 other plant and animal life characteristics of the soil are largely confined to the solum.

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.

Stratified. Arranged in strata, or layers. The term refers to geologic material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates that are separated from adjoining 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 soil. 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."

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that it can soak into the soil or flow slowly to a prepared outlet without harm. A terrace in a field is generally built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea. A stream terrace is frequently called a second bottom, in contrast with a flood plain, and is seldom subject to overflow. A marine terrace, generally wide, was deposited by the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt, silt loam, 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. Otherwise suitable soil material too thin for the specified use.

Till plain. An extensive flat to undulating area underlain by glacial till.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil (engineering). Presumably a fertile soil or soil material, or one that responds to fertilization, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Trace elements. The chemical elements in soils, in only extremely small amounts, essential to plant growth. Examples are zinc, cobalt, manganese, copper, and iron.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but the limited geographic soil area does not justify creation of a new series.

Water table. The upper limit of the soil or underlying rock material that is wholly saturated with water.

Water table, apparent. A thick zone of free water in the soil. An apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Water table, artesian. A water table under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole.

Water table, perched. A water table standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to a soil or soil material consisting of particles well distributed over a wide range in size or diameter. Such a soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

TABLES

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Recorded in the period 1951-73 at Cascade, Idaho]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days[1]	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January-----	30.1	13.2	21.7	46	-25	8	3.18	1.60	4.47	8	30.2
February----	35.5	14.7	25.1	50	-19	11	1.87	.88	2.67	6	15.0
March-------	41.0	18.0	29.5	58	-11	12	1.84	1.14	2.47	6	15.1
April-------	50.9	27.0	39.0	71	11	57	1.49	.71	2.12	5	4.2
May---------	62.8	34.4	48.6	83	21	278	1.62	.83	2.27	5	.7
June--------	70.7	40.8	55.8	89	27	474	1.95	.87	2.82	5	.0
July--------	82.6	45.1	63.9	95	32	741	.28	.04	.46	1	.0
August------	81.0	43.2	62.1	94	30	685	.64	.07	1.06	2	.0
September---	70.7	35.7	53.2	88	22	405	1.03	.32	1.59	3	.0
October-----	57.5	29.3	43.4	78	14	146	1.80	.55	2.78	4	1.3
November----	40.8	23.1	32.0	57	1	19	2.64	1.22	3.79	7	11.4
December----	31.4	21.7	23.6	46	-17	0	3.21	1.53	4.57	9	25.3
Year------	54.6	28.4	41.5	97	-26	2,836	21.55	18.81	24.19	61	103.2

[1]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).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Recorded in the period 1951-73 at Cascade, 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 21	June 17	June 29
2 years in 10 later than--	May 15	June 10	June 23
5 years in 10 later than--	May 5	May 27	June 11
First freezing temperature in fall:			
1 year in 10 earlier than--	September 10	August 17	July 15
2 years in 10 earlier than--	September 17	August 26	July 28
5 years in 10 earlier than--	October 1	September 12	August 22

TABLE 3.--GROWING SEASON

[Recorded in the period 1951-73 at Cascade, Idaho]

Probability	Daily minimum temperature during growing season		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	120	70	24
8 years in 10	129	83	40
5 years in 10	148	108	71
2 years in 10	166	133	102
1 year in 10	176	146	118

TABLE 4.--POTENTIALS AND LIMITATIONS OF MAP UNITS ON THE GENERAL SOIL MAP FOR SPECIFIED USES

Map unit	Extent of land area	Farming	Woodland	Grazing land	Urban uses	Intensive recreation areas	Extensive recreation areas
	Pct						
1. Melton-Jurvannah-Roseberry	5	Poor: flooding, wetness.	Poor: flooding, wetness.	Fair: palatability.	Poor: flooding, wetness.	Poor: flooding, wetness.	Good.
2. Roseberry-Donnel	11	Fair to poor: wetness.	Fair: wetness.	Good.	Poor: wetness.	Poor: wetness.	Good.
3. Archabal-Gestrin	17	Good.	Fair: cleared for cultivation	Good.	Fair: permeability, shrink-swell, seasonal wetness.	Good.	Good.
4. Swede-Donnel-Nisula	6	Fair: slope, permeability, shrink-swell.	Good.	Good to fair: variable canopy.	Fair: slope, permeability, shrink-swell.	Fair: slope, permeability, shrink-swell.	Good.
5. McCall	4	Poor: slopes, stones.	Good.	Fair: dense canopy.	Poor: slope, stones.	Poor: slope, stones.	Good.
6. McCall-Rock Outcrop	6	Poor: slope, stones, poor accessibility.	Fair: slope, stones, poor accessibility.	Fair: slope, stones, poor accessibility.	Poor: slope, stones.	Poor: slope, stones.	Poor: poor accessibility.
7. Demast-Tica-Bluebell	4	Poor: soil depth, stones, slope.	Good to poor: variable soil depth.	Good to fair: variable canopy.	Poor: soil depth, stones, slope.	Poor: soil depth, stones, slope.	Good.
8. Shellrock-Jugson	15	Poor: slope.	Good.	Good to fair: variable canopy, sparse vegetation.	Poor: slope.	Poor: slope.	Good.
9. Bryan-Pyle-Quartzburg	19	Poor: slope, soil depth.	Good.	Fair: dense canopy, slope.	Poor: slope, soil depth.	Poor: slope, soil depth.	Good.
10. Koppes-Pyle	4	Poor: slope, soil depth.	Good.	Good to fair: variable canopy.	Poor: slope, soil depth.	Poor: slope, soil depth.	Good.
11. Jugson-Pyle	7	Poor: slope, soil depth.	Good.	Fair: dense canopy, slope.	Poor: slope, soil depth.	Poor: slope, soil depth.	Good.

TABLE 5.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Valley County	Adams County	Total--	
				Area	Extent
		Acres	Acres	Acres	Pct
1	Archabal loam, 0 to 2 percent slopes	902	0	902	0.3
2	Archabal loam, 2 to 4 percent slopes	22,356	0	22,356	7.4
3	Archabal loam, 4 to 12 percent slopes	13,835	0	13,835	4.6
4	Archabal loam, 12 to 20 percent slopes	2,035	0	2,035	0.7
5	Blackwell clay loam	7,815	0	7,815	2.6
6	Blackwell mucky silt loam	1,507	0	1,507	0.5
7	Blackwell Variant silt loam	1,044	0	1,044	0.3
8	Bluebell cobbly loam, 5 to 35 percent slopes	2,332	0	2,332	0.8
9	Bryan-Ligget complex, 20 to 40 percent slopes	2,195	0	2,195	0.7
10	Bryan-Ligget complex, 40 to 60 percent slopes	1,786	0	1,786	0.6
11	Bryan-Pyle complex, 40 to 60 percent slopes	26,373	0	26,373	8.8
12	Cabarton silty clay loam	2,603	0	2,603	0.9
13	Coski sandy loam, 20 to 40 percent slopes	646	0	646	0.2
14	Demast loam, 15 to 30 percent slopes	1,723	0	1,723	0.6
15	Demast loam, 30 to 60 percent slopes	2,319	0	2,319	0.8
16	Donnel sandy loam, 0 to 2 percent slopes	10,009	0	10,009	3.3
17	Donnel sandy loam, 2 to 4 percent slopes	5,326	0	5,326	1.8
18	Donnel sandy loam, 4 to 12 percent slopes	1,799	0	1,799	0.6
19	Dumps, mine	256	0	256	0.1
20	Duston sandy loam, 0 to 2 percent slopes	966	0	966	0.3
21	Duston sandy loam, 2 to 4 percent slopes	1,208	0	1,208	0.4
22	Gestrin loam, 0 to 2 percent slopes	1,844	0	1,844	0.6
23	Gestrin loam, 2 to 4 percent slopes	6,489	0	6,489	2.2
24	Gestrin loam, 4 to 12 percent slopes	1,901	0	1,901	0.6
25	Jugson coarse sandy loam, 5 to 30 percent slopes	3,711	0	3,711	1.2
26	Jugson coarse sandy loam, 30 to 60 percent slopes	18,139	0	18,139	6.0
27	Jurvannah sandy loam	1,860	0	1,860	0.6
28	Kangas coarse sandy loam	3,532	0	3,532	1.2
29	Kangas fine gravelly loamy coarse sand	3,227	0	3,227	1.1
30	Koppes-Toiyabe complex, 40 to 60 percent slopes	4,066	0	4,066	1.4
31	McCall complex, 5 to 50 percent slopes	9,823	0	9,823	3.3
32	McCall-Naz complex, 5 to 40 percent slopes	3,165	0	3,165	1.1
33	McCall-Rock outcrop complex, 40 to 60 percent slopes	3,463	0	3,463	1.2
34	Melton loam	6,109	0	6,109	2.0
35	Naz sandy loam, 40 to 60 percent slopes	636	0	636	0.2
36	Nisula loam, 2 to 4 percent slopes	238	0	238	0.1
37	Nisula loam, 4 to 12 percent slopes	2,436	0	2,436	0.8
38	Nisula loam, 12 to 20 percent slopes	1,726	0	1,726	0.6
39	Nisula loam, 30 to 60 percent slopes	417	0	417	0.1
40	Pits, gravel	201	0	201	0.1
41	Pyle-Koppes complex, 20 to 40 percent slopes	1,893	0	1,893	0.6
42	Pyle-Koppes complex, 40 to 60 percent slopes	21,863	0	21,863	7.3
43	Quartzburg-Bryan complex, 20 to 40 percent slopes	16,243	0	16,243	5.4
44	Quartzburg-Coski complex, 40 to 60 percent slopes	666	0	666	0.2
45	Quartzburg Variant loam, 30 to 60 percent slopes	1,808	0	1,808	0.6
46	Rock outcrop	5,321	0	5,321	1.8
47	Roseberry coarse sandy loam	15,668	0	15,668	5.2
48	Roseberry-Melton complex	5,377	0	5,377	1.8
49	Shellrock loamy coarse sand, 12 to 35 percent slopes	4,610	0	4,610	1.5
50	Shellrock loamy coarse sand, 35 to 60 percent slopes	7,568	0	7,568	2.5
51	Shellrock-Rock outcrop complex, 12 to 35 percent slopes	4,051	0	4,051	1.3
52	Shellrock-Rock outcrop complex, 35 to 60 percent slopes	18,478	0	18,478	6.2
53	Sudduth Variant loam, 3 to 20 percent slopes	1,148	0	1,148	0.4
54	Swede silt loam, 2 to 4 percent slopes	817	0	817	0.3
55	Swede silt loam, 4 to 12 percent slopes	4,481	0	4,481	1.5
56	Swede silt loam, 12 to 20 percent slopes	2,475	0	2,475	0.8
57	Takeuchi coarse sandy loam, 3 to 35 percent slopes	2,552	0	2,552	0.8
58	Tica very cobbly loam, 4 to 65 percent slopes	2,489	160	2,649	0.8
	Water	964	0	964	0.3
	Total	300,490	160	300,650	100.0

TABLE 6.--YIELDS PER ACRE OF CROPS AND PASTURE

[Yields in the N columns are for nonirrigated soils; those in the I columns are for irrigated soils. Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil. Only those soils suitable for crops and pasture are listed]

Soil name and map symbol	Oats		Grass hay		Irish potatoes		Pasture	
	N	I	N	I	N	I	N	I
	Bu	Bu	Ton	Ton	Cwt	Cwt	AUM*	AUM*
1 Archabal	40	80	2.5	3.0	---	100	6.0	8.0
2 Archabal	40	70	2.5	3.0	---	100	6.0	8.0
3 Archabal	35	70	2.0	2.5	---	90	5.0	6.0
4 Archabal	---	---	2.0	2.0	---	---	5.0	5.0
16 Donnel	---	60	2.0	3.0	---	90	6.0	9.0
17 Donnel	---	55	1.0	2.0	---	90	5.0	7.0
18 Donnel	---	50	1.0	2.0	---	---	5.0	7.0
20 Duston	---	55	---	---	---	---	5.0	8.0
21 Duston	---	50	---	---	---	---	4.0	6.0
22 Gestrin	40	80	2.5	3.0	---	---	6.0	8.0
23 Gestrin	40	70	2.5	3.0	---	---	6.0	8.0
24 Gestrin	35	70	2.0	2.5	---	---	5.0	6.0
28, 29 Kangas	---	---	---	---	---	---	1.0	3.0
31 McCall	---	---	---	---	---	---	1.3	---
47 Roseberry	---	---	1.0	1.5	---	---	3.0	4.5
53 Sudduth Variant	---	---	2.5	3.0	---	---	---	---
54 Swede	40	70	2.5	3.0	---	---	6.0	8.0
55 Swede	35	70	2.0	2.5	---	---	5.0	6.0
56 Swede	---	---	2.0	2.0	---	---	5.0	5.0

* 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 30 days.

TABLE 7.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES

[Only the soils that support rangeland vegetation are listed]

Soil name and map symbol	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
5 Blackwell	Wet Meadow	Favorable	4,000	Nebraska sedge	20
		Normal	3,000	Willow	10
		Unfavorable	2,500	Ovalhead sedge	10
				Redtop	5
				Mountain brome	5
				Slender wheatgrass	5
				Baltic rush	5
				Herbaceous cinquefoil	5
				Tufted hairgrass	5
6 Blackwell	Wet Meadow	Favorable	4,000	Nebraska sedge	20
		Normal	3,000	Willow	10
		Unfavorable	2,500	Ovalhead sedge	10
				Redtop	5
				Mountain brome	5
				Slender wheatgrass	5
				Baltic rush	5
				Herbaceous cinquefoil	5
				Tufted hairgrass	5
7 Blackwell Variant	Wet Meadow	Favorable	4,000	Nebraska sedge	20
		Normal	3,000	Willow	10
		Unfavorable	2,500	Ovalhead sedge	10
				Redtop	5
				Mountain brome	5
				Slender wheatgrass	5
				Baltic rush	5
				Herbaceous cinquefoil	5
				Tufted hairgrass	5
8 Bluebell	Stony Loam, 22"+ Precipitation Zone	Favorable	1,400	Idaho fescue	30
		Normal	1,000	Bluebunch wheatgrass	25
		Unfavorable	600	Elk sedge	5
				Arrowleaf balsamroot	5
				Mountain big sagebrush	5
				Common snowberry	5
12 Cabarton	Wet Meadow	Favorable	4,000	Nebraska sedge	15
		Normal	3,500	Sedge	10
		Unfavorable	3,000	Rush	10
				Tufted hairgrass	10
				Redtop	5
				Kentucky bluegrass	5
				Cinquefoil	5
				Common camas	5
				Valerian	5
				Shrubby cinquefoil	5
				Willow	5
27 Jurvannah	Wet Meadow	Favorable	4,000	Nebraska sedge	15
		Normal	3,500	Sedge	15
		Unfavorable	3,000	Tufted hairgrass	15
				Rush	10
				Redtop	10
				Kentucky bluegrass	5
				Common camas	5
				Valerian	5
				Shrubby cinquefoil	5
				Willow	5

TABLE 7.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
34 Melton	Wet Meadow	Favorable	4,500	Nebraska sedge	15
		Normal	4,000	Sedge	15
		Unfavorable	3,000	Rush	10
				Tufted hairgrass	10
				Redtop	5
				Kentucky bluegrass	5
				Cinquefoil	5
				Common camas	5
				Valerian	5
				Scouler willow	5
48*:					
Roseberry.					
Melton	Wet Meadow	Favorable	4,500	Nebraska sedge	15
		Normal	4,000	Sedge	15
		Unfavorable	3,000	Rush	10
				Tufted hairgrass	10
				Redtop	5
				Kentucky bluegrass	5
				Cinquefoil	5
				Common camas	5
				Valerian	5
				Scouler willow	5
Jurvannah	Wet Meadow	Favorable	4,000	Nebraska sedge	15
		Normal	3,500	Sedge	15
		Unfavorable	3,000	Tufted hairgrass	15
				Rush	10
				Redtop	10
				Kentucky bluegrass	5
				Common camas	5
				Valerian	5
				Shrubby cinquefoil	5
				Willow	5
53 Sudduth Variant	Loamy, 22"+ Precipitation Zone	Favorable	3,200	Slender wheatgrass	20
		Normal	2,300	Bluebunch wheatgrass	10
		Unfavorable	1,700	Idaho fescue	10
				Beardless wheatgrass	5
				Big bluegrass	5
				Basin wildrye	5
				Tapertip hawksbeard	5
				Lupine	5
				Strawberry	5
57 Takeuchi	Granitic, 22"+ Precipitation Zone	Favorable	1,900	Bluebunch wheatgrass	30
		Normal	1,300	Idaho fescue	20
		Unfavorable	800	Dwarf green rabbitbrush	5
				Needlegrass	5
				Nevada bluegrass	5
				Basin wildrye	5
				Arrowleaf balsamroot	5
				Western yarrow	5
				Lupine	5
				Biscuitroot	5
				Big sagebrush	5
				Antelope bitterbrush	5
58 Tica	Shallow Stony, 22"+ Precipitation Zone	Favorable	700	Idaho fescue	30
		Normal	500	Bluebunch wheatgrass	10
		Unfavorable	300	Mountain big sagebrush	10
				Common snowberry	10
				Elk sedge	5
				Arrowleaf balsamroot	5

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--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: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Trees to plant
8 Bluebell	4x	Moderate	Moderate	Severe	Moderate	Moderate	Ponderosa pine	80	Ponderosa pine.
9*:									
Bryan	3s	Moderate	Moderate	Moderate	Slight	Moderate	Douglas-fir	100	Douglas-fir,
							Grand fir	51	ponderosa pine,
							Ponderosa pine	---	grand fir.
Ligget	3r	Moderate	Moderate	Slight	Slight	Moderate	Douglas-fir	80	Douglas-fir,
							Grand fir	53	ponderosa pine,
							Ponderosa pine	90	grand fir.
10*:									
Bryan	3s	Severe	Severe	Moderate	Slight	Moderate	Douglas-fir	100	Douglas-fir,
							Grand fir	51	ponderosa pine,
							Ponderosa pine	---	grand fir.
Ligget	3r	Severe	Severe	Slight	Slight	Moderate	Douglas-fir	80	Douglas-fir,
							Grand fir	53	ponderosa pine,
							Ponderosa pine	90	grand fir.
11*:									
Bryan	3s	Severe	Severe	Moderate	Slight	Moderate	Douglas-fir	100	Douglas-fir,
							Grand fir	51	ponderosa pine,
							Ponderosa pine	---	grand fir.
Pyle	4s	Severe	Severe	Moderate	Moderate	Moderate	Douglas-fir	81	Douglas-fir,
							Ponderosa pine	82	ponderosa pine.
13 Coski	3s	Moderate	Moderate	Moderate	Slight	Slight	Douglas-fir	90	Douglas-fir,
							Ponderosa pine	95	ponderosa pine.
14 Demast	2r	Moderate	Moderate	Slight	Slight	Severe	Grand fir	58	Grand fir,
							Douglas-fir	90	Douglas-fir,
							Western larch	---	ponderosa pine.
							Ponderosa pine	100	
15 Demast	2r	Severe	Severe	Slight	Slight	Severe	Grand fir	58	Grand fir,
							Douglas-fir	90	Douglas-fir,
							Western larch	---	ponderosa pine.
							Ponderosa pine	100	
16, 17, 18 Donnel	2o	Slight	Slight	Slight	Moderate	Moderate	Lodgepole pine	80	Ponderosa pine, Douglas-fir.

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns					Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	
20, 21------------- Duston	4s	Slight	Slight	Moderate	Moderate	Severe	Ponderosa pine------	82	Ponderosa pine.
							Lodgepole pine------	65	
25----------------- Jugson	2o	Slight	Slight	Slight	Slight	Moderate	Grand fir-----------	65	Ponderosa pine,
							Douglas-fir---------	100	Douglas-fir,
							Lodgepole pine------	85	western white pine,
							Western white pine--	45	grand fir.
26----------------- Jugson	2r	Severe	Severe	Slight	Slight	Moderate	Grand fir-----------	65	Ponderosa pine,
							Douglas-fir---------	100	Douglas-fir,
							Lodgepole pine------	85	western white pine,
							Western white pine--	45	grand fir.
30*: Koppes------------	3s	Severe	Severe	Moderate	Slight	Slight	Douglas-fir---------	90	Douglas-fir,
							Ponderosa pine------	92	ponderosa pine.
							Lodgepole pine------	---	
Toiyabe-----------	4x	Severe	Severe	Moderate	Moderate	Moderate	Ponderosa pine------	83	Ponderosa pine,
31* McCall, south slope------	4s	Moderate	Moderate	Moderate	Slight	Moderate	Douglas-fir---------	84	Douglas-fir,
							Ponderosa pine------	80	ponderosa pine.
							Lodgepole pine------	84	
McCall, north slope------	2r	Moderate	Moderate	Slight	Slight	Moderate	Grand fir-----------	60	Grand fir,
							Douglas-fir---------	84	Douglas-fir,
							Ponderosa pine------	80	ponderosa pine.
32*: McCall------------	2r	Moderate	Moderate	Slight	Slight	Moderate	Grand fir-----------	60	Grand fir,
							Douglas-fir---------	84	Douglas-fir,
							Ponderosa pine------	80	ponderosa pine.
Naz---------------	2r	Moderate	Moderate	Slight	Slight	Moderate	Douglas-fir---------	80	Douglas-fir,
							Ponderosa pine------	100	ponderosa pine.
							Grand fir-----------	53	
33*: McCall------------	2r	Severe	Severe	Slight	Slight	Moderate	Grand fir-----------	60	Grand fir,
							Douglas-fir---------	84	Douglas-fir,
							Ponderosa pine------	80	ponderosa pine.
Rock outcrop.									
35----------------- Naz	2r	Severe	Severe	Slight	Slight	Moderate	Douglas-fir---------	80	Douglas-fir,
							Ponderosa pine------	100	ponderosa pine.
							Grand fir-----------	53	
36, 37, 38, 39----- Nisula	2o	Slight	Slight	Slight	Slight	Moderate	Douglas-fir---------	---	Grand fir,
							Grand fir-----------	60	Douglas-fir.

See footnote at end of table.

41*:									
Pyle------------------	4s	Moderate	Moderate	Moderate	Slight	Moderate	Douglas-fir--------- Ponderosa pine------	81 82	Douglas-fir, ponderosa pine.
Koppes----------------	3s	Moderate	Moderate	Moderate	Slight	Slight	Douglas-fir--------- Ponderosa pine------ Lodgepole pine------	90 92 ---	Douglas-fir, ponderosa pine.
42*:									
Pyle------------------	4s	Severe	Severe	Moderate	Moderate	Moderate	Douglas-fir--------- Ponderosa pine------	81 82	Douglas-fir, ponderosa pine.
Koppes----------------	3s	Severe	Severe	Moderate	Slight	Slight	Douglas-fir--------- Ponderosa pine------ Lodgepole pine------	90 92 ---	Douglas-fir, ponderosa pine.
43*:									
Quartzburg------------	4s	Severe	Severe	Moderate	Moderate	Moderate	Ponderosa pine------ Douglas-fir---------	75 70	Douglas-fir, ponderosa pine.
Bryan-----------------	3s	Moderate	Moderate	Moderate	Slight	Moderate	Douglas-fir--------- Grand fir----------- Ponderosa pine------	100 51 ---	Douglas-fir, ponderosa pine, grand fir.
44*:									
Quartzburg------------	4s	Severe	Severe	Moderate	Moderate	Moderate	Douglas-fir--------- Ponderosa pine------	70 75	Douglas-fir, ponderosa pine.
Coski-----------------	3s	Severe	Severe	Moderate	Slight	Slight	Douglas-fir--------- Ponderosa pine------	90 95	Douglas-fir, ponderosa pine.
45-------------------- Quartzburg Variant	4s	Severe	Severe	Moderate	Moderate	Moderate	Douglas-fir--------- Ponderosa pine------	70 80	Douglas-fir, ponderosa pine.
49-------------------- Shellrock	3r	Moderate	Moderate	Moderate	Slight	Moderate	Ponderosa pine------ Douglas-fir---------	84 80	Ponderosa pine, Douglas-fir.
50-------------------- Shellrock	4s	Severe	Severe	Moderate	Slight	Moderate	Ponderosa pine------ Douglas-fir---------	84 80	Ponderosa pine, Douglas-fir.
51*:									
Shellrock-------------	3r	Moderate	Moderate	Moderate	Slight	Moderate	Ponderosa pine------ Douglas-fir---------	84 80	Ponderosa pine, Douglas-fir.
Rock outcrop.									
52*:									
Shellrock-------------	4s	Severe	Severe	Moderate	Slight	Moderate	Ponderosa pine------ Douglas-fir---------	84 80	Ponderosa pine, Douglas-fir.
Rock outcrop.									
54, 55, 56------------ Swede	3o	Slight	Slight	Slight	Slight	Slight	Ponderosa pine------ Douglas-fir--------- Lodgepole pine------	87 --- 77	Ponderosa pine, Douglas-fir.
58-------------------- Tica	5x	Moderate	Moderate	Severe	Moderate	Moderate	Ponderosa pine------	60	Ponderosa pine.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--WOODLAND UNDERSTORY VEGETATION

[Only the soils suitable for production of commercial trees are listed]

Soil name and map symbol	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
		Lb/acre		Pct
8 Bluebell	Favorable	1,400	Idaho fescue	30
	Normal	1,000	Bluebunch wheatgrass	25
	Unfavorable	600	Elk sedge	5
			Arrowleaf balsamroot	5
			Mountain big sagebrush	5
			Common snowberry	5
9*, 10*:				
Bryan	Favorable	300	Common beargrass	15
	Normal	200	Pachystima	10
	Unfavorable	100	Goldthread	10
			Hook violet	10
			Northern twinflower	5
			Idaho trillium	5
			Starry false-solomons-seal	5
			Common ladyfern	5
			American trailplant	5
Ligget	Favorable	250	Mallow ninebark	30
	Normal	150	Elk sedge	10
	Unfavorable	75	Snowbrush ceanothus	10
			Common snowberry	10
			Pine reedgrass	5
			Willow	5
			Cinquefoil	5
11*:				
Bryan	Favorable	300	Common beargrass	15
	Normal	200	Pachystima	10
	Unfavorable	100	Goldthread	10
			Hook violet	10
			Northern twinflower	5
			Idaho trillium	5
			Starry false-solomons-seal	5
			Common ladyfern	5
			American trailplant	5
Pyle	Favorable	1,000	Pine reedgrass	10
	Normal	600	Elk sedge	10
	Unfavorable	500	Mallow ninebark	10
			Fendler meadowrue	5
			Alumroot	5
			Lupine	5
			Geranium	5
			Longtube twinflower	5
			Willow	5
			Snowbrush ceanothus	5
			Saskatoon serviceberry	5
			Western thimbleberry	5
13 Coski	Favorable	1,000	Mallow ninebark	35
	Normal	800	Redstem ceanothus	10
	Unfavorable	400	Pine reedgrass	5
			Rocky mountain maple	5
			Saskatoon serviceberry	5
			Willow	5
14, 15 Demast	Favorable	200	Heartleaf arnica	10
	Normal	125	Pine reedgrass	5
	Unfavorable	50	Elk sedge	5
			Rattlesnake plantin	5
			Little princess pine	5
			Common snowberry	5
			Western thimbleberry	5

See footnote at end of table.

TABLE 9.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		Lb/acre		Pct
16, 17, 18 Donnel	Favorable	1,000	Idaho fescue	15
	Normal	800	Bluebunch wheatgrass	15
	Unfavorable	500	Elk sedge	10
			Prairie junegrass	5
			California danthonia	5
			Pine reedgrass	5
			Wooly hawkweed	5
			Tapertip hawksbeard	5
20, 21 Duston	Favorable	1,200	Pine reedgrass	25
	Normal	900	Common snowberry	15
	Unfavorable	700	Elk sedge	10
			Heartleaf arnica	5
25, 26 Jugson	Favorable	200	Common beargrass	15
	Normal	150	Pachystima	10
	Unfavorable	50	Goldthread	10
			Hook violet	7
			Northern twinflower	6
			Starry false-solomons-seal	5
			Common ladyfern	5
			American trailplant	5
30*:				
Koppes	Favorable	1,000	Mallow ninebark	35
	Normal	700	Common snowberry	15
	Unfavorable	550	Pine reedgrass	5
			Elk sedge	5
			Antelope bitterbrush	5
			Willow	5
Toiyabe	Favorable	700	Idaho fescue	30
	Normal	500	Bluebunch wheatgrass	10
	Unfavorable	300	Common snowberry	10
			Elk sedge	5
			Arrowleaf balsamroot	5
31*				
McCall, south slope	Favorable	250	Mallow ninebark	25
	Normal	150	Pine reedgrass	15
	Unfavorable	75	Common snowberry	15
			Elk sedge	10
			Spirea	5
			Heartleaf arnica	5
			Willow	5
McCall, north slope	Favorable	250	Mallow ninebark	25
	Normal	150	Pine reedgrass	15
	Unfavorable	75	Common snowberry	15
			Elk sedge	10
			Spirea	5
			Heartleaf arnica	5
			Willow	5
32*:				
McCall	Favorable	250	Mallow ninebark	25
	Normal	150	Pine reedgrass	15
	Unfavorable	75	Common snowberry	15
			Elk sedge	10
			Spirea	5
			Heartleaf arnica	5
			Willow	5

See footnote at end of table.

TABLE 9.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
		Lb/acre		Pct
32*:				
Naz	Favorable	300	Pine reedgrass	11
	Normal	200	California brome	10
	Unfavorable	75	Ninebark	10
			Douglas-fir	10
			Snowberry	5
			Lupine	5
			Common chokecherry	5
			Ponderosa pine	5
			Grand fir	5
33*:				
McCall	Favorable	250	Mallow ninebark	25
	Normal	150	Pine reedgrass	15
	Unfavorable	75	Common snowberry	15
			Elk sedge	10
			Spirea	5
			Heartleaf arnica	5
			Willow	5
Rock outcrop.				
35 Naz	Favorable	300	Pine reedgrass	11
	Normal	200	California brome	10
	Unfavorable	75	Ninebark	10
			Douglas-fir	10
			Snowberry	5
			Lupine	5
			Common chokecherry	5
			Ponderosa pine	5
			Grand fir	5
36, 37, 38, 39 Nisula	Favorable	250	Heartleaf arnica	10
	Normal	175	Common snowberry	10
	Unfavorable	100	Pine reedgrass	5
			Elk sedge	5
			Willow	5
			Snowbrush ceanothus	5
41*, 42*:				
Pyle	Favorable	1,000	Pine reedgrass	10
	Normal	600	Elk sedge	10
	Unfavorable	500	Mallow ninebark	10
			Fendler meadowrue	5
			Alumroot	5
			Lupine	5
			Geranium	5
			Longtube twinflower	5
			Willow	5
			Snowbrush ceanothus	5
			Saskatoon serviceberry	5
			Western thimbleberry	5
Koppes	Favorable	1,000	Mallow ninebark	35
	Normal	700	Common snowberry	15
	Unfavorable	550	Pine reedgrass	5
			Elk sedge	5
			Antelope bitterbrush	5
			Willow	5
			Redstem ceanothus	5

See footnote at end of table.

TABLE 9.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
		Lb/acre		Pct
43*:				
Quartzburg	Favorable	600	Mallow ninebark	25
	Normal	400	Pine reedgrass	10
	Unfavorable	300	Elk sedge	10
			Common snowberry	10
			Alumroot	5
			Lupine	5
			Geranium	5
			Snowbrush ceanothus	5
			Western thimbleberry	5
			Willow	5
Bryan	Favorable	300	Common beargrass	15
	Normal	200	Pachystima	10
	Unfavorable	100	Goldthread	10
			Hook violet	10
			Northern twinflower	5
			Idaho trillium	5
			Starry false-solomons-seal	5
			Common ladyfern	5
			American trailplant	5
44*:				
Quartzburg	Favorable	600	Mallow ninebark	25
	Normal	400	Pine reedgrass	10
	Unfavorable	300	Elk sedge	10
			Common snowberry	10
			Alumroot	5
			Lupine	5
			Geranium	5
			Snowbrush ceanothus	5
			Western thimbleberry	5
			Willow	5
Coski	Favorable	1,000	Mallow ninebark	35
	Normal	800	Redstem ceanothus	10
	Unfavorable	400	Pine reedgrass	5
			Rocky mountain maple	5
			Saskatoon serviceberry	5
			Willow	5
45 Quartzburg Variant	Favorable	1,000	Snowbrush ceanothus	25
	Normal	700	Low Oregon-grape	10
	Unfavorable	550	Pine reedgrass	10
			Elk sedge	5
			Arrowleaf balsamroot	5
			Common snowberry	5
			Antelope bitterbrush	5
			Mallow ninebark	5
49, 50 Shellrock	Favorable	800	Pine reedgrass	20
	Normal	600	Bluebunch wheatgrass	15
	Unfavorable	400	Snowberry	10
			Idaho fescue	10
			Snowbrush ceanothus	10
			Antelope bitterbrush	5
51*, 52*:				
Shellrock	Favorable	800	Pine reedgrass	20
	Normal	600	Bluebunch wheatgrass	15
	Unfavorable	400	Snowberry	10
			Idaho fescue	10
			Snowbrush ceanothus	10
			Antelope bitterbrush	5
Rock outcrop.				

See footnote at end of table.

TABLE 9.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
		Lb/acre		Pct
54, 55, 56: Swede	Favorable	1,400	Pine reedgrass	25
	Normal	1,000	Elk sedge	20
	Unfavorable	600	Common snowberry	10
			Woods rose	5
			Saskatoon serviceberry	5
			Mountain big sagebrush	5
58: Tica	Favorable	700	Idaho fescue	30
	Normal	500	Bluebunch wheatgrass	10
	Unfavorable	300	Mountain big sagebrush	10
			Common snowberry	10
			Elk sedge	5
			Arrowleaf balsamroot	5

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS

[Absence of an entry indicates that trees generally do not grow to the given height on that soil. Only those soils suitable for windbreaks and environmental plantings are listed]

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--		
	8-15	16-25	26-35
1, 2, 3, 4 Archabal	Siberian peashrub, lilac, golden willow, Rocky Mt. juniper.	Ponderosa pine, blue spruce.	---
16, 17, 18 Donnel	Siberian peashrub, lilac, golden willow, Rocky Mt. juniper.	Blue spruce, ponderosa pine.	---
22, 23, 24 Gestrin	Siberian peashrub, lilac, golden willow, blue spruce, Rocky Mt. juniper.	Ponderosa pine	Idahybrid poplar.
28, 29 Kangas	Siberian peashrub, lilac, golden willow, Rocky Mt. juniper.	Ponderosa pine.	---
31*: McCall	Lilac, golden willow	Blue spruce, Rocky Mt. juniper.	Ponderosa pine, Douglas-fir.
32*: McCall	Lilac, golden willow	Blue spruce, Rocky Mt. juniper.	Ponderosa pine, Douglas-fir.
33*: McCall	Lilac, golden willow	Blue spruce, Rocky Mt. juniper.	Ponderosa pine, Douglas-fir.
47 Roseberry	Siberian peashrub, lilac, golden willow.	Ponderosa pine, blue spruce, Rocky Mt. juniper.	---
48*: Roseberry	Siberian peashrub, lilac, golden willow.	Ponderosa pine, blue spruce, Rocky Mt. juniper.	---
54, 55, 56 Swede	Siberian peashrub, lilac, golden willow, blue spruce, Rocky Mt. juniper.	Ponderosa pine, Douglas-fir.	---
57 Takeuchi	Siberian peashrub, lilac, golden willow, ponderosa pine, Rocky Mt. juniper.	---	---

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--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, 2 Archabal	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: frost action, low strength, shrink-swell.
3 Archabal	Severe: cutbanks cave.	Moderate: slope, shrink-swell.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: frost action, low strength, slope.
4 Archabal	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
5, 6 Blackwell	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods, frost action.
7 Blackwell Variant	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.
8 Bluebell	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.
9*, 10*:					
Bryan	Severe: slope, cutbanks cave, small stones.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Ligget	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
11*:					
Bryan	Severe: slope, cutbanks cave, small stones.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Pyle	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
12 Cabarton	Severe: wetness, floods, too clayey.	Severe: wetness, shrink-swell, floods.	Severe: wetness, shrink-swell, floods.	Severe: wetness, shrink-swell, floods.	Severe: wetness, low strength, floods.
13 Coski	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
14, 15 Demast	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
16, 17 Donnel	Severe: cutbanks cave.	Slight	Slight	Slight	Slight.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
18----------------- Donnel	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
19. Dumps					
20, 21------------- Duston	Severe: cutbanks cave.	Slight------------	Slight------------	Slight------------	Slight.
22, 23------------- Gestrin	Severe: cutbanks cave.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods, frost action.
24----------------- Gestrin	Severe: cutbanks cave.	Severe: floods.	Severe: floods.	Severe: floods, slope.	Moderate: slope, floods, frost action.
25, 26------------- Jugson	Severe: slope, cutbanks cave, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.
27----------------- Jurvannah	Severe: wetness, cutbanks cave.	Severe: floods.	Severe: floods, wetness.	Severe: floods.	Severe: floods.
28, 29------------- Kangas	Severe: cutbanks cave, small stones.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods.
30*: Koppes------------	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Toiyabe-----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
31*: McCall------------	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.
McCall------------	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.
32*: McCall------------	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.
Naz---------------	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
33*: McCall------------	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.
Rock outcrop.					
34----------------- Melton	Severe: floods, wetness, cutbanks cave.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness, frost action.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
35----------------- Naz	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
36----------------- Nisula	Moderate: too clayey.	Moderate: low strength.	Moderate: shrink-swell, low strength.	Moderate: low strength.	Moderate: low strength, frost action.
37----------------- Nisula	Moderate: too clayey, slope.	Moderate: low strength, slope.	Moderate: shrink-swell, low strength, slope.	Severe: slope.	Moderate: low strength, slope, frost action.
38, 39------------- Nisula	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
40. Pits					
41*, 42*:					
Pyle---------------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Koppes------------	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
43*:					
Quartzburg--------	Severe: cutbanks cave, slope. depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Bryan-------------	Severe: slope, cutbanks cave, small stones.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
44*:					
Quartzburg--------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Coski-------------	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
45----------------- Quartzburg Variant	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
46. Rock outcrop					
47----------------- Roseberry	Severe: floods, wetness, cutbanks cave.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: frost action, floods, wetness.
48*:					
Roseberry---------	Severe: floods, wetness, cutbanks cave.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: frost action, floods, wetness.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
48*:					
Melton	Severe: floods, wetness, cutbanks cave.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness, frost action.
Jurvannah	Severe: floods, wetness, cutbanks cave.	Severe: floods.	Severe: floods, wetness.	Severe: floods.	Severe: floods.
49, 50 Shellrock	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
51*, 52*:					
Shellrock	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.					
53 Sudduth Variant	Moderate: wetness, too clayey, slope.	Severe: shrink-swell, low strength.	Severe: shrink-swell.	Severe: shrink-swell, slope, low strength.	Severe: shrink-swell, low strength.
54 Swede	Moderate: too clayey.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: low strength.
55 Swede	Moderate: slope, too clayey.	Moderate: slope, shrink-swell, low strength.	Moderate: slope, shrink-swell, low strength.	Severe: slope.	Severe: low strength.
56 Swede	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.
57 Takeuchi	Severe: depth to rock, slope, cutbanks cave.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.
58 Tica	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, slope, low strength.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--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, 2----------------- Archabal	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
3------------------- Archabal	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: slope.
4------------------- Archabal	Severe: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage, slope.	Poor: slope.
5, 6----------------- Blackwell	Severe: wetness, floods, percs slowly.	Severe: wetness, floods,	Severe: wetness, floods, too sandy.	Severe: wetness, floods.	Poor: wetness.
7------------------- Blackwell Variant	Severe: wetness, floods.	Severe: wetness, floods, seepage.	Severe: wetness, floods, seepage.	Severe: wetness, floods, seepage.	Poor: wetness, too sandy.
8------------------- Bluebell	Severe: depth to rock, percs slowly, slope.	Severe: slope.	Severe: depth to rock.	Severe: slope.	Poor: thin layer, area reclaim, slope.
9*, 10*:					
Bryan---------------	Severe: slope, depth to rock.	Severe: seepage, slope.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope.	Poor: small stones, slope.
Ligget--------------	Severe: slope, depth to rock.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: slope.
11*:					
Bryan---------------	Severe: slope, depth to rock.	Severe: seepage, slope.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope.	Poor: small stones, slope.
Pyle----------------	Severe: depth to rock, slope.	Severe: seepage, slope.	Severe: depth to rock, slope, seepage.	Severe: seepage, slope.	Poor: slope, area reclaim.
12------------------ Cabarton	Severe: wetness, floods, percs slowly.	Severe: wetness, floods.	Severe: wetness, floods, too clayey.	Severe: wetness, floods.	Poor: wetness, too clayey.
13------------------ Coski	Severe: slope.	Severe: slope, seepage.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
14------------------ Demast	Severe: slope, percs slowly.	Severe: slope.	Severe: depth to rock.	Severe: slope.	Poor: slope.
15------------------ Demast	Severe: slope, percs slowly.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope, large stones.

See footnote at end of table.

TABLE 12.--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
16, 17: Donnel	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
18: Donnel	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: slope.
19. Dumps					
20, 21: Duston	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: seepage, too sandy.
22, 23: Gestrin	Severe: wetness.	Severe: seepage, floods.	Severe: seepage, wetness.	Severe: seepage, wetness.	Good.
24: Gestrin	Severe: wetness.	Severe: seepage, floods, slope.	Severe: seepage, wetness.	Severe: seepage, wetness.	Fair: slope.
25: Jugson	Severe: slope, depth to rock.	Severe: slope, seepage, depth to rock.	Severe: seepage, depth to rock.	Severe: seepage, slope.	Poor: slope, area reclaim.
26: Jugson	Severe: slope, depth to rock.	Severe: slope, seepage, depth to rock.	Severe: seepage, depth to rock, slope.	Severe: seepage, slope.	Poor: slope, area reclaim.
27: Jurvannah	Severe: floods, wetness.	Severe: floods, wetness, seepage.	Severe: floods, seepage, wetness.	Severe: floods, seepage, wetness.	Poor: too sandy, seepage, small stones.
28, 29: Kangas	Moderate: floods.	Severe: seepage, floods.	Severe: seepage.	Severe: seepage.	Fair: too sandy, small stones.
30*:					
Koppes	Severe: slope.	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope, too sandy.
Toiyabe	Severe: slope, depth to rock.	Severe: slope, seepage, depth to rock.	Severe: slope, depth to rock.	Severe: slope, seepage.	Poor: slope, thin layer, area reclaim.
31*:					
McCall	Severe: large stones, slope.	Severe: seepage, slope, large stones.	Severe: seepage, slope, large stones.	Severe: seepage, slope.	Poor: large stones, slope.
McCall	Severe: large stones, slope.	Severe: seepage, slope, large stones.	Severe: seepage, slope, large stones.	Severe: seepage, slope.	Poor: large stones, slope.
32*:					
McCall	Severe: large stones, slope.	Severe: seepage, slope, large stones.	Severe: seepage, slope, large stones.	Severe: seepage, slope.	Poor: large stones, slope.

See footnote at end of table.

TABLE 12.--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
32*:					
Naz	Severe: slope, depth to rock.	Severe: slope, seepage.	Severe: slope, seepage, depth to rock.	Severe: slope, seepage.	Poor: slope.
33*:					
McCall	Severe: large stones, slope.	Severe: seepage, slope, large stones.	Severe: seepage, slope, large stones.	Severe: seepage, slope.	Poor: large stones, slope.
Rock outcrop.					
34 Melton	Severe: floods, wetness.	Severe: floods, wetness, seepage.	Severe: floods, wetness, seepage.	Severe: floods, wetness, seepage.	Poor: wetness.
35 Naz	Severe: slope, depth to rock.	Severe: slope, seepage.	Severe: slope, seepage, depth to rock.	Severe: slope, seepage.	Poor: slope.
36 Nisula	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
37 Nisula	Severe: percs slowly.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: too clayey, slope.
38, 39 Nisula	Severe: percs slowly, slope.	Severe: slope.	Moderate: too clayey, slope.	Severe: slope.	Poor: slope.
40. Pits					
41*, 42*:					
Pyle	Severe: depth to rock, slope.	Severe: seepage, slope.	Severe: depth to rock, slope, seepage.	Severe: seepage, slope.	Poor: slope, area reclaim.
Koppes	Severe: slope.	Severe: slope, seepage.	Severe: slope, seepage.	Severe: seepage, slope.	Poor: slope.
43*:					
Quartzburg	Severe: depth to rock, slope.	Severe: seepage, slope.	Severe: seepage, depth to rock, slope.	Severe: seepage, slope.	Poor: area reclaim, slope, small stones.
Bryan	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope.	Poor: small stones, slope.
44*:					
Quartzburg	Severe: depth to rock, slope.	Severe: seepage, slope.	Severe: seepage, depth to rock, slope.	Severe: seepage, slope.	Poor: area reclaim, slope, small stones.
Coski	Severe: slope.	Severe: slope, seepage.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.

See footnote at end of table.

TABLE 12.--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
45------------------ Quartzburg Variant	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: seepage, slope.	Poor: slope, small stones.
46. Rock outcrop					
47------------------ Roseberry	Severe: floods, wetness.	Severe: floods, wetness, seepage.	Severe: floods, wetness, seepage.	Severe: floods, seepage, wetness.	Poor: wetness.
48*:					
Roseberry-----------	Severe: floods, wetness.	Severe: floods, wetness, seepage.	Severe: floods, wetness, seepage.	Severe: floods, seepage, wetness.	Poor: wetness.
Melton--------------	Severe: floods, wetness.	Severe: floods, wetness, seepage.	Severe: floods, wetness, seepage.	Severe: floods, wetness, seepage.	Poor: wetness.
Jurvannah-----------	Severe: floods, wetness.	Severe: floods, wetness, seepage.	Severe: floods, seepage, wetness.	Severe: floods, seepage, wetness.	Poor: too sandy, seepage.
49------------------ Shellrock	Severe: slope, depth to rock.	Severe: seepage, slope.	Severe: seepage, depth to rock, slope.	Severe: seepage, slope.	Poor: slope.
50------------------ Shellrock	Severe: slope, depth to rock.	Severe: seepage, slope.	Severe: seepage, depth to rock, slope.	Severe: seepage, slope.	Poor: slope.
51*:					
Shellrock-----------	Severe: slope, depth to rock.	Severe: seepage, slope.	Severe: seepage, depth to rock, slope,	Severe: seepage, slope.	Poor: slope.
Rock outcrop.					
52*:					
Shellrock-----------	Severe: slope, depth to rock.	Severe: seepage, slope.	Severe: seepage, depth to rock, slope.	Severe: seepage, slope.	Poor: slope.
Rock outcrop.					
53------------------ Sudduth Variant	Severe: percs slowly, wetness.	Severe: slope, wetness.	Severe: wetness, too clayey.	Severe: wetness.	Fair: too clayey, slope.
54------------------ Swede	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight------------	Fair: too clayey.
55------------------ Swede	Severe: percs slowly.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: too clayey, slope.
56------------------ Swede	Severe: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Severe: slope.	Poor: slope.

See footnote at end of table.

TABLE 12.--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
57----------------- Takeuchi	Severe: depth to rock, slope.	Severe: seepage, slope, depth to rock.	Severe: seepage, depth to rock.	Severe: seepage, slope.	Poor: area reclaim, slope, small stones.
58----------------- Tica	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope, thin layer, area reclaim.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--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--- Archabal	Fair: frost action, low strength.	Fair: excess fines.	Unsuited---	Good.
3--- Archabal	Fair: frost action, low strength.	Fair: excess fines.	Unsuited---	Fair: slope.
4--- Archabal	Fair: frost action, low strength, slope.	Fair: excess fines.	Unsuited---	Poor: slope.
5, 6--- Blackwell	Poor: wetness, frost action.	Unsuited---	Unsuited---	Poor: wetness.
7--- Blackwell Variant	Fair: wetness, frost action.	Fair: excess fines.	Unsuited---	Poor: wetness.
8--- Bluebell	Poor: thin layer, area reclaim.	Unsuited: excess fines.	Unsuited: thin layer.	Poor: large stones, slope.
9*, 10*:				
Bryan---	Poor: slope.	Poor: excess fines.	Unsuited---	Poor: slope, small stones.
Ligget---	Poor: slope.	Poor: excess fines.	Unsuited---	Poor: slope.
11*:				
Bryan---	Poor: slope.	Poor: excess fines.	Unsuited---	Poor: slope, small stones.
Pyle---	Poor: thin layer, slope, area reclaim.	Unsuited: thin layer.	Unsuited---	Poor: slope.
12--- Cabarton	Poor: wetness, frost action, low strength.	Unsuited---	Unsuited---	Poor: wetness, too clayey.
13--- Coski	Poor: slope.	Poor: excess fines.	Unsuited---	Poor: slope, small stones.
14--- Demast	Fair: slope, shrink-swell, low strength.	Unsuited---	Unsuited---	Poor: slope.
15--- Demast	Poor: slope.	Unsuited---	Unsuited---	Poor: slope.
16, 17--- Donnel	Fair: low strength.	Good---	Unsuited---	Fair: small stones.
18--- Donnel	Fair: low strength.	Good---	Unsuited---	Fair: slope, small stones.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
19. Dumps				
20, 21 Duston	Good	Poor: excess fines.	Unsuited	Fair: too sandy, small stones.
22, 23 Gestrin	Fair: frost action, low strength.	Poor: excess fines.	Unsuited	Good.
24 Gestrin	Fair: frost action, low strength.	Poor: excess fines.	Unsuited	Fair: slope.
25 Jugson	Poor: thin layer.	Unsuited: thin layer.	Unsuited	Poor: slope.
26 Jugson	Poor: thin layer, slope.	Unsuited: thin layer.	Unsuited	Poor: slope.
27 Jurvannah	Fair: frost action, wetness.	Fair: excess fines.	Unsuited	Poor: small stones, too sandy.
28 Kangas	Good	Poor: excess fines.	Unsuited	Fair: small stones.
29 Kangas	Good	Poor: excess fines.	Unsuited	Poor: small stones.
30*:				
Koppes	Poor: slope.	Fair: excess fines.	Unsuited	Poor: small stones, slope, area reclaim.
Toiyabe	Poor: slope, thin layer, area reclaim.	Unsuited	Unsuited	Poor: slope, too sandy, area reclaim.
31*:				
McCall	Poor: large stones.	Poor: excess fines, large stones.	Unsuited	Poor: large stones, slope.
McCall	Poor: slope, large stones.	Poor: excess fines, large stones.	Unsuited	Poor: large stones, slope.
32*:				
McCall	Poor: large stones.	Poor: excess fines, large stones.	Unsuited	Poor: large stones, slope.
Naz	Poor: slope.	Poor: excess fines.	Unsuited	Poor: slope.
33*:				
McCall	Poor: slope, large stones.	Poor: excess fines, large stones.	Unsuited	Poor: large stones, slope.
Rock outcrop.				
34 Melton	Poor: frost action.	Fair: excess fines,	Poor: excess fines.	Good.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
35. Naz	Poor: slope.	Poor: excess fines.	Unsuited.	Poor: slope.
36. Nisula	Poor: low strength.	Unsuited.	Unsuited.	Good.
37. Nisula	Poor: low strength.	Unsuited.	Unsuited.	Fair: slope.
38, 39. Nisula	Poor: low strength.	Unsuited.	Unsuited.	Poor: slope.
40. Pits				
41*, 42*:				
Pyle	Poor: thin layer, slope, area reclaim.	Unsuited: thin layer.	Unsuited.	Poor: slope.
Koppes	Poor: slope.	Poor: excess fines.	Unsuited.	Poor: small stones, slope.
43*:				
Quartzburg	Poor: thin layer, slope, area reclaim.	Unsuited: thin layer.	Unsuited: thin layer.	Poor: slope, small stones, area reclaim.
Bryan	Poor: slope.	Poor: excess fines.	Unsuited.	Poor: slope, small stones.
44*:				
Quartzburg	Poor: thin layer, slope, area reclaim.	Unsuited: thin layer.	Unsuited: thin layer.	Poor: slope, small stones, area reclaim.
Coski	Poor: slope.	Poor: excess fines.	Unsuited.	Poor: slope, small stones.
45. Quartzburg Variant	Poor: thin layer, area reclaim, slope.	Unsuited: thin layer.	Unsuited: thin layer.	Poor: slope.
46. Rock outcrop				
47. Roseberry	Poor: frost action.	Poor: excess fines.	Unsuited.	Fair: thin layer.
48*:				
Roseberry	Poor: frost action.	Poor: excess fines.	Unsuited.	Fair: thin layer.
Melton	Poor: wetness, frost action.	Fair: excess fines, small stones.	Poor: excess fines.	Poor: wetness.
Jurvannah	Fair: frost action, wetness.	Fair: excess fines.	Unsuited.	Poor: small stones, too sandy.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
49: Shellrock	Fair: slope, area reclaim, thin layer.	Poor: excess fines.	Unsuited	Poor: slope.
50: Shellrock	Poor: slope.	Poor: excess fines.	Unsuited	Poor: slope.
51*:				
Shellrock	Fair: slope, area reclaim, thin layer.	Poor: excess fines.	Unsuited	Poor: slope.
Rock outcrop.				
52*:				
Shellrock	Poor: slope.	Poor: excess fines.	Unsuited	Poor: slope.
Rock outcrop.				
53: Sudduth Variant	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Fair: too clayey, slope.
54: Swede	Poor: low strength.	Unsuited	Unsuited	Good.
55: Swede	Poor: low strength.	Unsuited	Unsuited	Fair: slope.
56: Swede	Poor: low strength.	Unsuited	Unsuited	Poor: slope.
57: Takeuchi	Poor: thin layer, area reclaim.	Unsuited: thin layer.	Unsuited: thin layer.	Poor: slope.
58: Tica	Poor: low strength, thin layer, slope.	Unsuited	Unsuited	Poor: too clayey, large stones, slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. Absence of an entry indicates the soil was not evaluated]

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
1 Archabal	Seepage	Piping	No water	Favorable	Favorable	Favorable	Favorable.
2, 3, 4 Archabal	Seepage, slope.	Piping	No water	Slope	Slope	Slope	Slope.
5, 6 Blackwell	Seepage	Wetness	Slow refill	---	---	---	---
7 Blackwell Variant	Seepage	Wetness, seepage.	Favorable	---	---	---	---
8 Bluebell	Depth to rock, slope.	Thin layer, large stones.	No water	---	---	Large stones, slope.	Depth to rock, large stones, slope.
9*, 10*:							
Bryan	Slope, seepage.	Seepage	No water	---	---	Slope, too sandy.	Droughty, slope.
Ligget	Seepage, slope, depth to rock.	Seepage	No water	---	---	Slope	Slope.
11*:							
Bryan	Slope, seepage.	Seepage	No water	---	---	Slope, too sandy.	Droughty, slope.
Pyle	Depth to rock, seepage, slope.	Seepage, thin layer.	No water	---	---	Slope, too sandy, depth to rock.	Slope, droughty, depth to rock.
12 Cabarton	Favorable	Hard to pack, wetness.	Slow refill	---	---	Percs slowly, wetness.	Percs slowly, wetness.
13 Coski	Seepage, slope.	Seepage, large stones.	No water	---	---	Slope	Droughty, slope.
14, 15 Demast	Slope	Thin layer	No water	---	---	Slope	Slope.
16 Donnel	Seepage	Seepage	No water	Favorable	Droughty	Favorable	Droughty.
17, 18 Donnel	Seepage, slope.	Seepage	No water	Slope	Droughty, slope.	Slope	Droughty, slope.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
19. Dumps							
20----------------- Duston	Seepage---------	Seepage---------	No water--------	Favorable-------	Droughty--------	Too sandy-------	Droughty.
21----------------- Duston	Seepage, slope.	Seepage---------	No water--------	Slope-----------	Slope, droughty.	Slope, too sandy.	Droughty, slope.
22----------------- Gestrin	Seepage---------	Seepage---------	Deep to water	Favorable-------	Favorable-------	Favorable-------	Favorable.
23, 24------------- Gestrin	Seepage, slope.	Seepage---------	Deep to water	Slope-----------	Slope-----------	Slope-----------	Slope.
25, 26------------- Jugson	Depth to rock, seepage, slope.	Seepage, thin layer.	No water--------	---	---	Slope, depth to rock.	Droughty, slope, depth to rock.
27----------------- Jurvannah	Seepage---------	Seepage---------	Deep to water	Floods----------	Droughty, wetness, floods.	---	---
28, 29------------- Kangas	Seepage---------	Seepage---------	No water--------	Favorable-------	Droughty, fast intake.	Too sandy-------	Droughty.
30*:							
Koppes-------------	Seepage, slope.	Seepage---------	No water--------	---	---	Slope, too sandy.	Droughty, slope.
Toiyabe------------	Slope, seepage, depth to rock.	Hard to pack, seepage, thin layer.	No water--------	---	---	Depth to rock, erodes easily, slope.	
31*:							
McCall-------------	Seepage, slope.	Seepage, large stones.	No water--------	Slope-----------	Large stones, slope, droughty.	Slope, large stones.	Slope, large stones, droughty.
McCall-------------	Seepage, slope.	Seepage, large stones.	No water--------	Slope-----------	Large stones, slope, droughty.	Slope, large stones.	Slope, large stones, droughty.
32*:							
McCall-------------	Seepage, slope.	Seepage, large stones.	No water--------	Slope-----------	Large stones, slope, droughty.	Slope, large stones.	Slope, large stones, droughty.
Naz----------------	Seepage, slope, depth to rock.	Seepage---------	No water--------	---	---	Slope, too sandy.	Droughty, slope.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
33*:							
McCall	Seepage, slope.	Seepage, large stones.	No water	Slope	Large stones, slope, droughty.	Slope, large stones.	Slope, large stones, droughty.
Rock outcrop.							
34 Melton	Seepage	Seepage, wetness.	Favorable	Floods, frost action.	Floods, wetness.	Wetness, too sandy.	Wetness.
35 Naz	Seepage, slope, depth to rock.	Seepage	No water	---	---	Slope, too sandy.	Droughty, slope.
36, 37, 38, 39 Nisula	Slope	Shrink-swell	No water	---	---	Slope	Slope.
40. Pits							
41*, 42*:							
Pyle	Depth to rock, seepage, slope.	Seepage, thin layer.	No water	---	---	Slope, too sandy, depth to rock.	Slope, droughty, depth to rock.
Koppes	Seepage, slope.	Seepage	No water	---	---	Slope, too sandy.	Droughty, slope.
43*:							
Quartzburg	Depth to rock, seepage, slope.	Seepage, thin layer.	No water	---	---	Depth to rock,	Slope, droughty, depth to rock.
Bryan	Slope, seepage.	Seepage	No water	---	---	Slope, too sandy.	Droughty, slope.
44*:							
Quartzburg	Depth to rock, seepage, slope.	Seepage, thin layer.	No water	---	---	Depth to rock, slope.	Slope, droughty, depth to rock.
Coski	Seepage, slope.	Seepage, large stones.	No water	---	---	Slope	Droughty, slope.
45 Quartzburg Variant	Slope, seepage.	Seepage, thin layer.	No water	---	---	Depth to rock, slope.	Slope, droughty.
46. Rock outcrop							

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
47------------------ Roseberry	Seepage--------	Seepage, wetness.	Favorable------	Floods, frost action.	Wetness, floods, droughty.	Wetness, too sandy.	Wetness, droughty.
48*:							
Roseberry---------	Seepage--------	Seepage, wetness.	Favorable------	Floods, frost action.	Wetness, floods, droughty.	Wetness, too sandy.	Wetness, droughty.
Melton------------	Seepage--------	Seepage, wetness.	Favorable------	Floods, frost action.	Floods, wetness.	Wetness, too sandy.	Wetness.
Jurvannah---------	Seepage--------	Seepage--------	Deep to water	Floods, wetness,	Droughty, wetness, cutbanks cave.	Too sandy, wetness. floods.	Droughty.
49, 50------------- Shellrock	Depth to rock, slope, seepage.	Seepage--------	No water-------	---	---	Slope, too sandy.	Droughty, slope.
51*, 52*:							
Shellrock---------	Depth to rock, slope, seepage.	Seepage--------	No water-------	---	---	Slope, too sandy.	Droughty, slope.
Rock outcrop.							
53----------------- Sudduth Variant	Slope----------	Hard to pack---	Slow refill----	Percs slowly, slope.	Percs slowly, slope.	Percs slowly, slope, piping.	Percs slowly, slope, piping.
54, 55, 56--------- Swede	Slope----------	Shrink-swell---	No water-------	Slope----------	Erodes easily, slope.	Erodes easily, slope.	Erodes easily, slope.
57----------------- Takeuchi	Depth to rock, seepage, slope.	Thin layer, seepage.	No water-------	---	---	Depth to rock, slope, small stones.	Depth to rock, slope, droughty.
58----------------- Tica	Depth to rock, slope.	Thin layer, large stones.	No water-------	---	---	Large stones, slope, depth to rock.	Large stones, rooting depth, slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--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 Archabal	Slight	Slight	Slight	Slight.
2 Archabal	Slight	Slight	Moderate: slope.	Slight.
3 Archabal	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
4 Archabal	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
5, 6 Blackwell	Severe: wetness, floods.	Severe: wetness.	Severe: wetness.	Severe: wetness.
7 Blackwell Variant	Severe: wetness, floods.	Moderate: wetness, floods.	Severe: wetness, floods.	Moderate: floods.
8 Bluebell	Severe: slope.	Severe: slope.	Severe: slope, large stones.	Moderate: large stones.
9*, 10*:				
Bryan	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Ligget	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
11*:				
Bryan	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Pyle	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
12 Cabarton	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Moderate: wetness, floods, too clayey.
13 Coski	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
14 Demast	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
15 Demast	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
16 Donnel	Slight	Slight	Moderate: small stones.	Slight.
17 Donnel	Slight	Slight	Moderate: slope, small stones.	Slight.
18 Donnel	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
19. Dumps				

See footnote at end of table.

TABLE 15.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
20 Duston	Slight	Slight	Slight	Slight.
21 Duston	Slight	Slight	Moderate: slope.	Slight.
22 Gestrin	Severe: floods.	Slight	Moderate: small stones.	Slight.
23 Gestrin	Severe: floods.	Slight	Moderate: slope, small stones.	Slight.
24 Gestrin	Severe: floods.	Moderate: slope.	Severe: slope.	Slight.
25 Jugson	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
26 Jugson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
27 Jurvannah	Severe: floods.	Moderate: floods, wetness.	Severe: floods.	Moderate: floods.
28 Kangas	Severe: floods.	Slight	Moderate: small stones.	Slight.
29 Kangas	Severe: floods.	Moderate: too sandy, small stones.	Severe: small stones.	Moderate: too sandy.
30*:				
Koppes	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Toiyabe	Severe: slope, dusty.	Severe: slope, dusty.	Severe: slope, too sandy.	Severe: slope.
31*:				
McCall	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones.
McCall	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.
32*:				
McCall	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones.
Naz	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
33*:				
McCall	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.
Rock outcrop.				
34 Melton	Severe: floods, wetness.	Moderate: wetness, floods.	Severe: floods, wetness.	Moderate: wetness, floods.

See footnote at end of table.

TABLE 15.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
35: Naz	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
36: Nisula	Moderate: percs slowly, dusty.	Moderate: dusty.	Moderate: percs slowly, slope, dusty.	Moderate: dusty.
37: Nisula	Moderate: percs slowly, slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Moderate: dusty.
38, 39: Nisula	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, dusty.
40. Pits				
41*, 42*:				
Pyle	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Koppes	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
43*:				
Quartzburg	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Bryan	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
44*:				
Quartzburg	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Coski	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
45: Quartzburg Variant	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
46. Rock outcrop				
47: Roseberry	Severe: wetness, floods.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
48*:				
Roseberry	Severe: wetness, floods.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
Melton	Severe: floods, wetness.	Severe: wetness.	Severe: floods, wetness.	Moderate: wetness, floods.
Jurvannah	Severe: floods.	Moderate: floods, wetness.	Severe: floods.	Moderate: floods.
49: Shellrock	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, too sandy.

See footnote at end of table.

TABLE 15.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
50: Shellrock	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
51*:				
Shellrock	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, too sandy.
Rock outcrop.				
52*:				
Shellrock	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.				
53: Sudduth Variant	Moderate: percs slowly, slope.	Moderate: slope.	Severe: slope.	Slight.
54: Swede	Moderate: percs slowly.	Slight	Moderate: slope, percs slowly.	Slight.
55: Swede	Moderate: slope, percs slowly.	Moderate: slope.	Severe: slope.	Slight.
56: Swede	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
57: Takeuchi	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
58: Tica	Severe: slope, percs slowly.	Severe: slope.	Severe: large stones, slope, depth to rock.	Severe: large stones, slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--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 herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow-water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
1, 2, 3 Archabal	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	---	Very poor.	Good.
4 Archabal	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	---	Very poor.	Good.
5, 6 Blackwell	Very poor.	Poor	Good	Poor	Fair	Good	Good	Poor	---	Good	Fair.
7 Blackwell Variant	Very poor.	Poor	Fair	Poor	Fair	Good	Good	Poor	---	Good	Fair.
8 Bluebell	Poor	Poor	Good	Fair	Good	Very poor.	Very poor.	Fair	---	Very poor.	Good.
9*:											
Bryan	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	---
Ligget	Poor	Poor	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
10*:											
Bryan	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	Very poor.	Fair	Very poor.	---
Ligget	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
11*:											
Bryan	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	Very poor.	Fair	Very poor.	---
Pyle	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	---
12 Cabarton	Poor	Fair	Fair	Poor	Fair	Good	Good	Fair	---	Good	Fair.
13 Coski	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
14 Demast	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
15 Demast	Poor	Poor	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
16, 17, 18 Donnel	Fair	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	Good.
19. Dumps											
20, 21 Duston	Poor	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.	---
22 Gestrin	Poor	Fair	Good	Good	Good	Poor	Poor	Fair	---	Poor	Fair.
23 Gestrin	Poor	Fair	Good	Good	Good	Poor	Very poor.	Fair	---	Very poor.	Fair.
24 Gestrin	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	---	Very poor.	Fair.

See footnote at end of table.

TABLE 16.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements-- Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow-water areas	Potential as habitat for-- Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
25 Jugson	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
26 Jugson	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Very poor.	Good	Very poor.	---
27 Jurvannah	Poor	Fair	Fair	Poor	Fair	Good	Good	Fair	---	Good	Fair.
28, 29 Kangas	Poor	Poor	Fair	Poor	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
30*:											
Koppes	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Very poor.	Good	Very poor.	---
Toiyabe	Very poor.	Poor	Fair	Poor	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.	---
31*:											
McCall	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
McCall	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
32*:											
McCall	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
Naz	Poor	Poor	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
33*:											
McCall	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Very poor.	Good	Very poor.	---
Rock outcrop.											
34 Melton	Poor	Fair	Fair	Fair	Fair	Fair	Good	Fair	---	Fair	Fair.
35 Naz	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
36 Nisula	Poor	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.	---
37, 38, 39 Nisula	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	---
40. Pits											
41*:											
Pyle	Poor	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	---
Koppes	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
42*:											
Pyle	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	---
Koppes	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Very poor.	Good	Very poor.	---

See footnote at end of table.

TABLE 16.--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 herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow-water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
43*:											
Quartzburg	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	---
Bryan	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	---
44*:											
Quartzburg	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	Very poor.	Fair	Very poor.	---
Coski	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Very poor.	Good	Very poor.	---
45 Quartzburg Variant	Poor	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	---
46. Rock outcrop											
47 Roseberry	Poor	Fair	Good	Good	Good	Good	Good	Fair	---	Good	Good.
48*:											
Roseberry	Poor	Fair	Good	Good	Good	Good	Good	Fair	---	Good	Good.
Melton	Poor	Fair	Fair	Fair	Fair	Fair	Good	Fair	---	Fair	Fair.
Jurvannah	Poor	Fair	Fair	Poor	Fair	Good	Good	Fair	---	Good	Fair.
49, 50 Shellrock	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
51*, 52*:											
Shellrock	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	---
Rock outcrop.											
53 Sudduth Variant	Poor	Fair	Good	Good	Good	Poor	Very poor.	Fair	---	Very poor.	Good.
54, 55, 56. Swede											
57 Takeuchi	Poor	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
58 Tica	Very poor.	Very poor.	Fair	Poor	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--ENGINEERING PROPERTIES AND CLASSIFICATIONS

[The symbol > means more than. Absence of an entry indicates that data were not estimated]

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	
1, 2, 3, 4--------- Archabal	0-14	Loam------------	CL, CL-ML	A-4, A-6	0	95-100	90-100	65-85	50-70	25-35	5-15
	14-31	Loam------------	CL, CL-ML	A-6, A-4	0	95-100	90-100	65-85	50-70	25-35	5-15
	31-52	Coarse sandy loam.	SM	A-2, A-1	0	95-100	90-100	45-65	20-35	---	NP
	52-60	Coarse sand, loamy coarse sand.	SM, SP-SM	A-1, A-2, A-3	0	95-100	90-100	35-55	5-25	---	NP
5----------------- Blackwell	0-11	Clay loam-------	CL-ML, CL	A-4, A-6	0	90-100	80-100	70-90	50-70	25-40	5-15
	11-60	Stratified clay loam to gravelly coarse sand.	CL-ML, CL, SC, SM-SC	A-4, A-6	0	80-100	75-100	55-80	45-65	25-35	5-15
6----------------- Blackwell	0-19	Mucky silt loam	OL, OH	A-5	0	100	95-100	90-100	75-95	40-55	NP-10
	19-60	Stratified clay loam to gravelly coarse sand.	CL-ML, CL, SC, SM-SC	A-4, A-6	0	80-100	75-100	55-80	45-65	25-35	5-15
7----------------- Blackwell Variant	0-14	Silt loam-------	CL-ML	A-4	0	95-100	95-100	90-100	70-90	20-25	5-10
	14-60	Coarse sand-----	SM, SW-SM, SP-SM	A-1, A-2, A-3	0	90-95	80-90	40-65	5-15	---	NP
8----------------- Bluebell	0-18	Cobbly loam-----	SC	A-6	20-25	85-95	50-70	45-70	35-50	30-40	10-15
	18-25	Very gravelly clay loam, very gravelly silty clay loam.	GC	A-2	20-25	30-40	20-30	15-30	15-25	35-45	15-20
	25	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
9*, 10*: Bryan-------------	0-10	Coarse sandy loam.	SM	A-2, A-4	0	95-100	95-100	60-70	30-40	---	NP
	10-34	Gravelly loamy coarse sand, loamy coarse sand.	SM	A-1	0	70-85	55-80	35-50	10-25	---	NP
	34-60	Very gravelly loamy coarse sand, very gravelly coarse sand.	SP, SP-SM	A-1	0	60-70	35-50	10-20	0-10	---	NP
Ligget------------	0-24	Sandy loam------	SM	A-2	0	90-100	75-95	45-65	25-35	---	NP
	24-48	Coarse sandy loam, sandy loam.	SM	A-2	0	90-100	75-95	45-65	25-35	---	NP
	48	Weathered bedrock.	---	---	---	---	---	---	---	---	---
11*: Bryan-------------	0-10	Coarse sandy loam.	SM	A-2, A-4	0	95-100	95-100	60-70	30-40	---	NP
	10-34	Gravelly loamy coarse sand, loamy coarse sand.	SM	A-1	0	70-85	55-80	35-50	10-25	---	NP
	34-60	Very gravelly loamy coarse sand, very gravelly coarse sand.	SP, SP-SM	A-1	0	60-70	35-50	10-20	0-10	---	NP

See footnote at end of table.

TABLE 17.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
11*:											
Pyle	0-14	Loamy coarse sand.	SM	A-2	0	90-100	85-100	50-75	25-35	---	NP
	14-33	Sand, gravelly sand, coarse sand.	SW, SW-SM, SP, SP-SM	A-1	0	90-100	50-80	30-50	0-10	---	NP
	33	Weathered bedrock.	---	---	---	---	---	---	---	---	---
12 Cabarton	0-10	Silty clay loam	CL	A-6	0	100	100	95-100	85-95	30-40	15-20
	10-49	Clay	CL, CH	A-7	0	100	100	90-100	75-95	45-60	20-35
	49-60	Clay loam	CL	A-6	0	100	100	90-100	70-80	30-40	15-25
13 Coski	0-28	Sandy loam	SM	A-2, A-4	0-5	90-100	85-100	65-75	30-40	20-30	NP-5
	28-38	Gravelly coarse sandy loam.	SM	A-1, A-2	0-10	75-90	60-85	35-40	20-30	---	NP
	38-60	Gravelly loamy coarse sand, gravelly coarse sand.	SM, SP-SM	A-1	0-15	75-80	50-75	20-40	5-20	---	NP
14, 15 Demast	0-33	Loam	CL-ML	A-4	0-15	85-95	75-90	65-85	50-70	25-30	5-10
	33-60	Gravelly clay loam, gravelly loam, cobbly loam.	CL	A-6	15-35	75-85	70-80	65-80	50-60	30-35	10-15
	60	Weathered bedrock.	---	---	---	---	---	---	---	---	---
16, 17, 18 Donnel	0-15	Sandy loam	SM	A-2, A-4	0	95-100	80-90	55-65	30-40	---	NP
	15-35	Sandy loam, coarse sandy loam, loamy sand.	SM	A-2	0	95-100	85-95	55-65	20-35	---	NP
	35-60	Loamy coarse sand, loamy sand.	SM	A-1	0	95-100	85-95	25-35	15-25	---	NP
19. Dumps											
20, 21 Duston	0-9	Sandy loam	SM	A-2	0	100	90-100	55-75	25-35	20-25	NP-5
	9-43	Loamy sand, loamy coarse sand.	SM	A-1, A-2	0-5	95-100	80-95	45-65	15-25	---	NP
	43-60	Coarse sand, sand.	SM, SW-SM, SP-SM	A-1	0-5	90-100	80-90	40-50	5-15	---	NP
22, 23, 24 Gestrin	0-24	Loam	CL-ML, SM-SC	A-4	0	100	80-90	60-70	45-60	25-30	5-10
	24-46	Coarse sandy loam.	SM	A-4	0	100	80-90	55-65	35-45	20-25	NP-5
	46-60	Loamy coarse sand.	SM	A-1	5-10	85-100	80-100	30-40	15-25	---	NP
25, 26 Jugson	0-20	Coarse sandy loam.	SM	A-4	0	90-100	85-95	55-70	35-50	25-35	NP-5
	20-35	Gravelly loamy coarse sand, loamy coarse sand, sand.	SM, SP-SM	A-1	0	65-85	60-80	35-50	5-20	---	NP
	35	Weathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 17.--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	
27----------------- Jurvannah	0-6	Sandy loam------	SM	A-4	0	100	100	60-80	35-50	20-30	NP-5
	6-22	Sand, gravelly sand.	SP, SP-SM	A-1, A-3	0	80-95	55-95	30-55	0-10	---	NP
	22-60	Very gravelly sand.	SP	A-1	0	75-85	35-50	20-30	0-5	---	NP
28----------------- Kangas	0-16	Coarse sandy loam.	SM	A-2, A-1	0	95-100	80-90	40-50	20-35	20-25	NP-5
	16-42	Fine gravelly loamy coarse sand, fine gravelly loamy sand.	SM	A-1	0	70-85	60-75	20-50	15-25	---	NP
	42-60	Fine gravelly coarse sand, very gravelly coarse sand.	SP	A-1	0	60-80	35-60	20-40	0-5	---	NP
29----------------- Kangas	0-16	Fine gravelly loamy coarse sand.	SM	A-1	0	70-85	50-70	25-50	10-25	---	NP
	16-42	Fine gravelly loamy coarse sand, fine gravelly loamy sand.	SM	A-1	0	70-85	50-70	20-50	15-25	---	NP
	42-60	Fine gravelly coarse sand, very gravelly coarse sand.	SP	A-1	0	60-80	35-60	20-40	0-5	---	NP
30*: Koppes------------	0-13	Coarse sandy loam.	SM	A-1, A-2	0	90-100	75-85	40-50	20-35	---	NP
	13-53	Gravelly loamy coarse sand, loamy sand, loamy coarse sand.	SM	A-1	0-10	75-100	65-85	25-50	15-20	---	NP
	53-60	Very gravelly coarse sand, gravelly sand.	SP,SP-SM, GP,GP-GM	A-1	0-10	50-80	35-75	5-10	0-10	---	NP
Toiyabe-----------	0-5	Loamy coarse sand.	SP-SM, SM	A-1	0-10	75-100	75-90	30-50	5-20	---	NP
	5-11	Loamy coarse sand, gravelly loamy coarse sand, sand.	SP-SM, SM	A-1	0-15	70-100	60-85	20-50	5-20	---	NP
	11	Weathered bedrock.	---	---	---	---	---	---	---	---	---
31*: McCall------------	0-8	Very cobbly sandy loam.	SM	A-1, A-2	25-70	50-80	45-75	40-50	20-35	---	NP
	8-48	Very cobbly sandy loam, very cobbly coarse sandy loam.	SM	A-1, A-2	25-70	50-80	45-75	40-50	20-35	20-30	NP-5
	48-60	Very cobbly coarse sand.	SP	A-1	25-70	50-80	45-75	30-40	0-5	---	NP

See footnote at end of table.

TABLE 17.--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	
31*:											
McCall------------	0-8	Very cobbly sandy loam.	SM	A-1, A-2	25-70	50-80	45-75	40-50	20-35	---	NP
	8-48	Very cobbly sandy loam, very cobbly coarse sandy loam.	SM	A-1, A-2	25-70	50-80	45-75	40-50	20-35	20-30	NP-5
	48-60	Very cobbly coarse sand.	SP	A-1	25-70	50-80	45-75	30-40	0-5	---	NP
32*:											
McCall------------	0-8	Very cobbly sandy loam.	SM	A-1, A-2	25-70	50-80	45-75	40-50	20-35	---	NP
	8-48	Very cobbly sandy loam, very cobbly coarse sandy loam.	SM	A-1, A-2	25-70	50-80	45-75	40-50	20-35	20-30	NP-5
	48-60	Very cobbly coarse sand.	SP	A-1	25-70	50-80	45-75	30-40	0-5	---	NP
Naz---------------	0-18	Sandy loam------	SM	A-2, A-4	0-5	90-100	85-95	65-75	30-40	---	NP
	18-26	Coarse sandy loam, loamy sand, gravelly sandy loam.	SM	A-2, A-1	0-10	75-100	70-90	45-65	15-35	---	NP
	26-60	Cobbly coarse sandy loam.	SM	A-2, A-4	10-25	80-100	75-90	45-65	25-40	---	NP
33*:											
McCall------------	0-8	Very cobbly sandy loam.	SM	A-1, A-2	25-70	50-80	45-75	40-50	20-35	---	NP
	8-48	Very cobbly sandy loam, very cobbly coarse sandy loam.	SM	A-1, A-2	25-70	50-80	45-75	40-50	20-35	20-30	NP-5
	48-60	Very cobbly coarse sand.	SP	A-1	25-70	50-80	45-75	30-40	0-5	---	NP
Rock outcrop.											
34----------------- Melton	0-25	Loam------------	CL-ML, CL	A-4, A-6	0	100	100	85-95	60-75	25-35	5-15
	25-30	Gravelly sandy loam.	SM, GM	A-1	0-5	55-85	50-70	35-40	15-25	20-30	NP-5
	30-60	Cobbly sand, cobbly loamy sand.	SM, SP-SM	A-1	10-25	80-90	70-80	35-50	5-25	---	NP
35----------------- Naz	0-18	Sandy loam------	SM	A-2, A-4	0-5	90-100	85-95	65-75	30-40	---	NP
	18-26	Coarse sandy loam, loamy sand, gravelly sandy loam.	SM	A-2, A-1	0-10	75-100	70-90	45-65	15-35	---	NP
	26-60	Cobbly coarse sandy loam.	SM	A-2, A-4	10-25	80-100	75-90	45-65	25-40	---	NP
36, 37, 38, 39----- Nisula	0-25	Loam------------	ML	A-4	0-5	95-100	95-100	85-100	60-80	30-35	5-10
	25-51	Clay loam, silty clay loam.	CL	A-6	0-5	95-100	95-100	90-100	70-85	30-40	10-20
	51-60	Sandy clay loam	SC, CL	A-6	0-5	90-100	90-100	80-90	35-55	25-40	10-15
40. Pits											

See footnote at end of table.

TABLE 17.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Fragments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
41*, 42*:											
Pyle	0-14	Loamy coarse sand.	SM	A-2	0	90-100	85-100	50-75	25-35	---	NP
	14-33	Sand, gravelly sand, coarse sand.	SW, SW-SM, SP, SP-SM	A-1	0	90-100	50-80	30-50	0-10	---	NP
	33	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Koppes	0-13	Coarse sandy loam.	SM	A-1, A-2	0	90-100	75-85	40-50	20-35	---	NP
	13-53	Gravelly loamy coarse sand, loamy sand, loamy coarse sand.	SM	A-1	0-10	75-100	65-85	25-50	15-20	---	NP
	53-60	Very gravelly coarse sand, gravelly sand.	SP,SP-SM, GP,GP-GM	A-1	0-10	50-80	35-75	5-10	0-10	---	NP
43*:											
Quartzburg	0-14	Loamy coarse sand.	SM	A-1	0	80-90	75-80	20-50	10-20	---	NP
	14-22	Very gravelly loamy coarse sand.	GP, GP-GM, GM, SM	A-1	0	35-60	15-50	5-25	0-15	---	NP
	22	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Bryan	0-10	Coarse sandy loam.	SM	A-2, A-4	0	95-100	95-100	60-70	30-40	---	NP
	10-34	Gravelly loamy coarse sand, loamy coarse sand.	SM	A-1	0	70-85	55-80	35-50	10-25	---	NP
	34-60	Very gravelly loamy coarse sand, very gravelly coarse sand.	SP, SP-SM	A-1	0	60-70	35-50	10-20	0-10	---	NP
44*:											
Quartzburg	0-14	Loamy coarse sand.	SM	A-1	0	80-90	75-80	20-50	10-20	---	NP
	14-22	Very gravelly loamy coarse sand.	GP, GP-GM, GM, SM	A-1	0	35-60	15-50	5-25	0-15	---	NP
	22	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Coski	0-28	Sandy loam	SM	A-2, A-4	0-5	90-100	85-100	65-75	30-40	20-30	NP-5
	28-38	Gravelly coarse sandy loam.	SM	A-1, A-2	0-10	75-90	60-85	35-40	20-30	---	NP
	38-60	Gravelly loamy coarse sand, gravelly coarse sand.	SM, SP-SM	A-1	0-15	75-80	50-75	20-40	5-20	---	NP
45 Quartzburg Variant	0-13	Loam	CL-ML	A-4	0	95-100	95-100	70-90	50-65	20-25	5-10
	13-24	Very gravelly coarse sandy loam.	GP-GM, GM	A-1	0	30-50	20-45	10-25	5-15	20-25	NP-5
	24-30	Loamy sand	SM, SP-SM	A-2, A-3	0	95-100	90-100	50-70	5-15	---	NP
	30	Weathered bedrock.	---	---	---	---	---	---	---	---	---
46. Rock outcrop											

See footnote at end of table.

TABLE 17.--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	
47----------------- Roseberry	0-13	Coarse sandy loam.	SM	A-4	0	90-100	85-95	60-70	35-45	---	NP
	13-35	Loamy coarse sand, loamy sand.	SM	A-2	0	90-100	90-100	50-65	20-30	---	NP
	35-55	Coarse sand-----	SP-SM	A-1	0	90-100	80-90	20-30	5-10	---	NP
	55-60	Very fine sandy loam, fine sandy loam.	ML	A-4	0	100	90-100	75-85	50-60	---	NP
48*: Roseberry---------	0-13	Coarse sandy loam.	SM	A-4	0	90-100	85-95	60-70	35-45	---	NP
	13-35	Loamy coarse sand, loamy sand.	SM	A-2	0	90-100	90-100	50-65	20-30	---	NP
	35-55	Coarse sand-----	SP-SM	A-1	0	90-100	80-90	20-30	5-10	---	NP
	55-60	Very fine sandy loam, fine sandy loam.	ML	A-4	0	100	90-100	75-85	50-60	---	NP
Melton------------	0-25	Loam------------	CL-ML, CL	A-4, A-6	0	100	100	85-95	60-75	25-35	5-15
	25-30	Gravelly sandy loam.	SM, GM	A-1	0-5	55-85	50-70	35-40	15-25	20-30	NP-5
	30-60	Cobbly sand, cobbly loamy sand.	SM, SP-SM	A-1	10-25	80-90	70-80	35-50	5-25	---	NP
Jurvannah---------	0-6	Sandy loam------	SM	A-4	0	100	100	60-80	35-50	20-30	NP-5
	6-22	Sand, gravelly sand.	SP, SP-SM	A-1, A-3	0	80-95	55-80	30-55	0-10	---	NP
	22-60	Very gravelly sand.	SP	A-1	0	75-85	35-50	20-30	0-5	---	NP
49, 50------------- Shellrock	0-40	Loamy coarse sand.	SM	A-1	0	90-100	85-95	30-50	15-25	---	NP
	40-56	Gravelly coarse sand.	SP-SM	A-1	5-10	90-100	70-85	15-30	5-10	---	NP
	56	Weathered bedrock.	---	---	---	---	---	---	---	---	---
51*, 52*: Shellrock---------	0-40	Loamy coarse sand.	SM	A-1	0	90-100	85-95	30-50	15-25	---	NP
	40-56	Gravelly coarse sand.	SP-SM	A-1	5-10	90-100	70-85	15-30	5-10	---	NP
	56	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
53----------------- Sudduth Variant	0-16	Loam------------	ML	A-4	0	100	95-100	75-85	55-70	30-40	5-10
	16-22	Clay loam-------	CL	A-7	0	100	95-100	85-95	65-75	40-50	20-30
	22-41	Silty clay loam, clay.	CL, CH	A-7	0	100	95-100	85-95	70-90	40-65	20-40
	41-60	Clay loam-------	CL	A-6	0	100	95-100	85-95	65-75	30-40	15-25
54, 55, 56--------- Swede	0-9	Silt loam-------	ML	A-4	0-5	100	100	85-100	60-90	30-35	5-10
	9-52	Silty clay loam, clay loam.	CL	A-6	0-5	100	100	95-100	85-95	30-40	10-20
	52-60	Fine gravelly silty clay loam.	CL	A-6	0-5	65-80	60-75	55-75	50-65	30-40	10-20

See footnote at end of table.

TABLE 17.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
57----------------- Takeuchi	0-14	Coarse sandy loam.	SM	A-2, A-4	0	95-100	90-95	60-70	30-40	---	NP
	14-24	Sand, gravelly sand.	SM, SP-SM	A-1	0	60-95	50-90	25-35	5-15	---	NP
	24	Weathered bedrock.	---	---	---	---	---	---	---	---	---
58----------------- Tica	0-4	Very cobbly loam	GM-GC, GC	A-4, A-6	50-70	65-75	55-70	50-65	35-50	25-35	5-15
	4-17	Stony clay, stony clay loam, very cobbly clay.	CL, CH	A-7	70-85	75-85	70-80	65-75	50-70	45-55	25-35
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 18.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Absence of an entry indicates that data were not available or were not estimated]

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T
	In	In/hr	In/in	pH	Mmhos/cm			
1, 2, 3, 4--------	0-14	0.6-2.0	0.20-0.22	5.1-5.5	<2	Moderate	0.24	4
Archabal	14-31	0.6-2.0	0.17-0.19	5.1-5.5	<2	Moderate	0.32	
	31-52	2.0-6.0	0.10-0.12	5.1-5.5	<2	Low--------	0.28	
	52-60	6.0-20	0.04-0.05	5.1-5.5	<2	Low--------	0.17	
5-----------------	0-11	0.2-0.6	0.19-0.21	5.6-6.0	<2	Low--------	0.28	5
Blackwell	11-60	0.2-0.6	0.12-0.14	6.1-6.5	<2	Moderate	0.28	
6-----------------	0-19	0.6-2.0	0.21-0.24	5.6-6.0	<2	Low--------	0.43	5
Blackwell	19-60	0.2-0.6	0.12-0.14	6.1-6.5	<2	Moderate	0.28	
7-----------------	0-14	0.6-2.0	0.15-0.17	5.1-6.5	<2	Low--------	0.37	5
Blackwell Variant	14-60	>20.0	0.04-0.06	6.1-6.5	<2	Low--------	0.10	
8-----------------	0-18	0.2-2.0	0.08-0.13	6.1-7.3	<2	Low--------	0.20	2
Bluebell	18-25	0.2-0.6	0.09-0.11	6.1-6.5	<2	Low--------	0.17	
	25	---	---	---	---	-----------	---	
9*, 10*:								
Bryan------------	0-10	6.0-20	0.10-0.13	5.6-6.5	<2	Low--------	0.10	3
	10-34	>20	0.04-0.08	5.6-6.5	<2	Low--------	0.10	
	34-60	>20	0.02-0.03	5.6-6.5	<2	Low--------	0.10	
Ligget-----------	0-24	2.0-6.0	0.11-0.13	5.6-6.5	<2	Low--------	0.24	4
	24-48	2.0-6.0	0.09-0.11	4.5-6.0	<2	Low--------	0.28	
	48	---	---	---	---	-----------	---	
11*:								
Bryan------------	0-10	6.0-20	0.10-0.13	5.6-6.5	<2	Low--------	0.10	3
	10-34	>20	0.04-0.08	5.6-6.5	<2	Low--------	0.10	
	34-60	>20	0.02-0.03	5.6-6.5	<2	Low--------	0.10	
Pyle-------------	0-14	6.0-20	0.08-0.11	5.1-7.3	<2	Low--------	0.10	2
	14-33	>20	0.03-0.05	5.1-6.0	<2	Low--------	0.10	
	33	---	---	---	---	-----------	---	
12----------------	0-10	0.2-0.6	0.19-0-21	5.6-6.5	<2	Moderate	0.37	5
Cabarton	10-49	0.06-0.2	0.14-0.16	6.1-6.5	<2	High-------	0.43	
	49-60	0.2-0.6	0.16-0.18	6.1-6.5	<2	Moderate	0.43	
13----------------	0-28	2.0-6.0	0.06-0.08	5.6-6.5	<2	Low--------	0.24	5
Coski	28-38	2.0-6.0	0.06-0.08	5.6-6.5	<2	Low--------	0.17	
	38-60	>20	0.05-0.06	5.1-6.0	<2	Low--------	0.10	
14, 15------------	0-33	0.6-2.0	0.11-0.18	5.6-7.3	<2	Low--------	0.28	3
Demast	33-60	0.2-0.6	0.13-0.15	5.6-7.3	<2	Moderate--	0.24	
	60	---	---	---	---	-----------	---	
16, 17, 18--------	0-15	2.0-6.0	0.13-0.15	5.6-6.0	<2	Low--------	0.28	3
Donnel	15-35	2.0-6.0	0.10-0.12	5.6-6.5	<2	Low--------	0.24	
	35-60	6.0-20	0.07-0.09	5.6-6.5	<2	Low--------	0.17	
19. Dumps								
20, 21------------	0-9	6.0-20	0.12-0.15	6.1-6.5	<2	Low--------	0.10	4
Duston	9-43	>20	0.07-0.10	6.1-6.5	<2	Low--------	0.10	
	43-60	>20	0.04-0.06	6.1-6.5	<2	Low--------	0.10	

See footnote at end of table.

TABLE 18.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T
	In	In/hr	In/in	pH	Mmhos/cm			
22, 23, 24-------- Gestrin	0-24	0.6-2.0	0.18-0.24	5.1-6.0	<2	Low--------	0.32	4
	24-46	2.0-6.0	0.14-0.17	5.6-6.0	<2	Low--------	0.24	
	46-60	6.0-20	0.08-0.10	5.6-6.0	<2	Low--------	0.17	
25, 26------------ Jugson	0-20	2.0-6.0	0.10-0.12	5.6-6.5	<2	Low--------	0.15	3
	20-35	6.0-20	0.04-0.06	5.6-6.0	<2	Low--------	0.17	
	35	---	---	---	---	-----------	---	
27---------------- Jurvannah	0-6	2.0-6.0	0.11-0.15	5.6-6.0	<2	Low--------	0.10	1
	6-22	>20	0.03-0.06	5.6-6.0	<2	Low--------	0.10	
	22-60	>20	0.02-0.03	6.1-6.5	<2	Low--------	0.10	
28---------------- Kangas	0-16	2.0-6.0	0.11-0.13	6.1-6.5	<2	Low--------	0.24	5
	16-42	6.0-20	0.07-0.09	6.1-6.5	<2	Low--------	0.17	
	42-60	6.0-20	0.02-0.04	6.1-6.5	<2	Low--------	0.10	
29---------------- Kangas	0-16	6.0-20	0.08-0.10	6.1-6.5	<2	Low--------	0.17	5
	16-42	6.0-20	0.07-0.09	6.1-6.5	<2	Low--------	0.17	
	42-60	6.0-20	0.02-0.04	6.1-6.5	<2	Low--------	0.10	
30*:								
Koppes-----------	0-13	6.0-20	0.10-0.12	6.1-7.3	<2	Low--------	0.24	5
	13-53	6.0-20	0.06-0.08	5.6-6.5	<2	Low--------	0.17	
	53-60	>20	0.02-0.05	5.6-7.3	<2	Low--------	0.10	
Toiyabe----------	0-5	6.0-20	0.06-0.08	5.6-6.0	<2	Low--------	0.10	1
	5-11	6.0-20	0.06-0.08	5.6-6.0	<2	Low--------	0.10	
	11	---	---	---	---	-----------	---	
31*:								
McCall-----------	0-8	2.0-6.0	0.06-0.08	5.6-6.5	<2	Low--------	0.17	2
	8-48	2.0-6.0	0.05-0.07	5.6-6.5	<2	Low--------	0.17	
	48-60	6.0-20	0.02-0.03	5.6-6.5	<2	Low--------	0.10	
32*:								
McCall-----------	0-8	2.0-6.0	0.06-0.08	5.6-6.5	<2	Low--------	0.17	2
	8-48	2.0-6.0	0.05-0.07	5.6-6.5	<2	Low--------	0.17	
	48-60	6.0-20	0.02-0.03	5.6-6.5	<2	Low--------	0.10	
Naz--------------	0-18	2.0-6.0	0.10-0.12	5.6-7.3	<2	Low--------	0.24	3
	18-26	6.0-20	0.06-0.08	5.6-7.3	<2	Low--------	0.24	
	26-60	6.0-20	0.05-0.07	5.1-7.3	<2	Low--------	0.20	
33*:								
McCall-----------	0-8	2.0-6.0	0.06-0.08	5.6-6.5	<2	Low--------	0.17	2
	8-48	2.0-6.0	0.05-0.07	5.6-6.5	<2	Low--------	0.17	
	48-60	6.0-20	0.02-0.03	5.6-6.5	<2	Low--------	0.10	
Rock outcrop.								
34---------------- Melton	0-23	0.6-2.0	0.16-0.18	4.5-5.5	<2	Moderate	0.37	5
	25-30	02.0-6.0	0.06-0.09	4.5-5.0	<2	Low--------	0.37	
	30-60	6.0-20	0.04-0.06	4.5-5.5	<2	Low--------	0.10	
35---------------- Naz	0-18	2.0-6.0	0.10-0.12	5.6-7.3	<2	Low--------	0.24	3
	18-26	6.0-20	0.06-0.08	5.6-7.3	<2	Low--------	0.24	
	26-60	6.0-20	0.05-0.07	5.1-7.3	<2	Low--------	0.30	
36, 37, 38, 39---- Nisula	0-25	0.6-2.0	0.13-0.21	5.6-6.0	<2	Low--------	0.43	5
	25-51	0.2-0.6	0.14-0.21	5.6-6.0	<2	Moderate	0.37	
	51-60	0.6-2.0	0.13-0.19	5.6-6.0	<2	Moderate	0.32	

See footnote at end of table.

TABLE 18.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T
	In	In/hr	In/in	pH	Mmhos/cm			
40. Pits								
41*, 42*:								
Pyle	0-14	6.0-20	0.08-0.11	5.6-7.3	<2	Low	0.10	2
	14-33	>20	0.03-0.05	5.1-6.5	<2	Low	0.10	
	33	---	---	---	---	---	---	
Koppes	0-13	6.0-20	0.10-0.12	5.6-6.5	<2	Low	0.24	5
	13-53	6.0-20	0.06-0.08	5.6-6.5	<2	Low	0.17	
	53-60	>20	0.02-0.05	5.6-6.0	<2	Low	0.10	
43*:								
Quartzburg	0-14	6.0-20	0.05-0.07	6.6-7.3	<2	Low	0.20	2
	14-22	6.0-20	0.02-0.04	6.1-6.5	<2	Low	0.10	
	22	---	---	---	---	---	---	
Bryan	0-10	6.0-20	0.10-0.13	5.6-6.5	<2	Low	0.10	3
	10-34	>20	0.04-0.08	5.6-6.5	<2	Low	0.10	
	34-60	>20	0.02-0.03	5.6-6.5	<2	Low	0.10	
44*:								
Quartzburg	0-14	6.0-20	0.05-0.07	6.6-7.3	<2	Low	0.20	2
	14-22	6.0-20	0.02-0.04	6.1-6.5	<2	Low	0.10	
	22	---	---	---	---	---	---	
Coski	0-28	2.0-6.0	0.10-0.12	5.6-6.5	<2	Low	0.24	5
	28-38	2.0-6.0	0.06-0.08	5.6-6.5	<2	Low	0.17	
	38-60	>20	0.05-0.06	5.1-6.0	<2	Low	0.10	
45 Quartzburg Variant	0-13	2.0-6.0	0.10-0.19	5.6-6.5	<2	Low	0.17	2
	13-24	2.0-6.0	0.06-0.09	5.6-6.0	<2	Low	0.10	
	24-30	6.0-20	0.04-0.09	6.1-6.5	<2	Low	0.10	
	30	---	---	---	---	---	---	
46. Rock outcrop								
47 Roseberry	0-13	2.0-6.0	0.12-0.14	5.1-6.0	<2	Low	---	---
	13-35	2.0-6.0	0.08-0.11	5.1-6.0	<2	Low	---	
	35-55	6.0-20	0.03-0.06	5.1-6.0	<2	Low	---	
	55-60	0.6-2.0	0.12-0.14	5.1-6.0	<2	Low	---	
48*:								
Roseberry	0-13	2.0-6.0	0.12-0.14	5.1-6.0	<2	Low	---	
	13-35	2.0-6.0	0.08-0.11	5.1-6.0	<2	Low	---	
	35-55	6.0-20	0.03-0.06	5.1-6.0	<2	Low	---	
	55-60	0.6-2.0	0.12-0.14	5.1-6.0	<2	Low	---	
Melton	0-25	0.6-2.0	0.16-0.18	4.5-5.5	<2	Moderate	0.37	5
	25-30	2.0-6.0	0.06-0.09	4.5-5.5	<2	Low	0.20	
	30-60	6.0-20	0.04-0.06	4.5-5.5	<2	Low	0.10	
Jurvannah	0-6	2.0-6.0	0.11-0.15	5.1-6.0	<2	Low	0.10	1
	6-22	>20	0.03-0.06	5.6-6.5	<2	Low	0.10	
	22-60	>20	0.02-0.03	5.6-6.5	<2	Low	0.10	
49, 50 Shellrock	0-40	6.0-20	0.06-0.10	6.1-7.3	<2	Low	0.17	3
	40-56	>20	0.02-0.04	6.1-7.3	<2	Low	0.10	
	56	---	---	---	---	---	---	
51*, 52*:								
Shellrock	0-40	6.0-20	0.06-0.10	6.1-7.3	<2	Low	0.17	3
	40-56	>20	0.02-0.04	6.1-7.3	<2	Low	0.10	
	56	---	---	---	---	Low	---	
Rock outcrop.								

See footnote at end of table.

TABLE 18.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T
	In	In/hr	In/in	pH	Mmhos/cm			
53----------------- Sudduth Variant	0-16	0.6-2.0	0.18-0.20	6.1-7.3	<2	Low--------	0.28	5
	16-22	0.2-0.6	0.19-0.21	6.1-7.3	<2	Moderate	0.37	
	22-41	0.06-0.2	0.14-0.17	6.1-7.3	<2	High------	0.43	
	41-60	0.2-0.6	0.19-0.21	6.1-7.3	<2	Moderate	0.43	
54, 55, 56-------- Swede	0-9	0.6-2.0	0.16-0.21	6.1-6.5	<2	Low--------	0.43	4
	9-52	0.2-0.6	0.19-0.21	6.1-6.5	<2	Moderate	0.37	
	52-60	0.2-0.6	0.16-0.21	6.1-6.5	<2	Moderate	0.32	
57----------------- Takeuchi	0-14	2.0-6.0	0.10-0.12	5.6-7.3	<2	Low--------	0.17	2
	14-24	6.0-20	0.04-0.06	5.6-7.3	<2	Low--------	0.17	
	24	---	---	---	---	-----------	---	
58----------------- Tica	0-4	0.6-2.0	0.14-0.16	6.1-7.3	<2	Low--------	0.24	1
	4-17	0.06-0.2	0.11-0.13	5.6-6.5	<2	High------	0.20	
	17	---	---	---	---	-----------	---	

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 19.--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 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
					Ft			In				
1, 2, 3, 4--------- Archabal	B	None----------	---	---	>6.0	---	---	>60	---	Moderate	High------	High.
5, 6--------------- Blackwell	D	Common-------	Very brief to brief.	Apr-Jun	0.2-2.5	Apparent	Mar-Jul	>60	---	High------	Moderate	Moderate.
7------------------ Blackwell Variant	D	Common-------	Brief------	Apr-Jun	1.0-2.0	Apparent	Apr-Jul	>60	---	Moderate	Moderate	Moderate.
8------------------ Bluebell	B	None----------	---	---	>6.0	---	---	20-40	Rippable	Moderate	High------	Low.
9*, 10*:												
Bryan--------------	A	None----------	---	---	>6.0	---	---	60-80	Rippable	Low-------	Moderate	Moderate.
Ligget-------------	B	None----------	---	---	>6.0	---	---	40-60	Rippable	Moderate	High------	High.
11*:												
Bryan--------------	A	None----------	---	---	>6.0	---	---	60-80	Rippable	Low-------	Moderate	Moderate.
Pyle---------------	A	None----------	---	---	>6.0	---	---	20-40	Rippable	Low-------	Moderate	Moderate.
12----------------- Cabarton	D	Common-------	Brief------	May-Jun	0.5-1.5	Apparent	Mar-Jul	>60	---	High------	High------	Moderate.
13----------------- Coski	B	None----------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
14, 15------------- Demast	B	None----------	---	---	>6.0	---	---	40-60	Rippable	Moderate	Moderate	Moderate.
16, 17, 18--------- Donnel	B	None----------	---	---	>6.0	---	---	>60	---	Low-------	High------	Moderate.
19. Dumps												
20, 21------------- Duston	A	None----------	---	---	>6.0	---	---	>60	---	Low-------	Moderate	Moderate.
22, 23, 24--------- Gestrin	B	Rare----------	---	---	3.0-4.0	Apparent	Apr-Jul	>60	---	Moderate	Moderate	Moderate.
25, 26------------- Jugson	B	None----------	---	---	>6.0	---	---	20-40	Hard	Moderate	Moderate	High.
27----------------- Jurvannah	C	Frequent-----	Long-------	May-Jun	1.5-3.0	Apparent	Apr-Jul	>60	---	Moderate	High------	Moderate.

See footnote at end of table.

TABLE 19.--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
					Ft			In				
28, 29------------- Kangas	A	Rare---------	---	---	>6.0	---	---	>60	---	Low-------	Moderate	Moderate.
30*:												
Koppes------------	B	None---------	---	---	>6.0	---	---	>60	---	Low-------	Moderate	Moderate.
Toiyabe-----------	C	None---------	---	---	>6.0	---	---	10-20	Rippable	Low-------	Moderate	High.
31*:												
McCall------------	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	High------	High.
McCall------------	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	High------	High.
32*:												
McCall------------	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	High------	High.
Naz---------------	A	None---------	---	---	>6.0	---	---	40-70	Rippable	Moderate	Moderate	Moderate.
33*:												
McCall------------	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	High------	High.
Rock outcrop.												
34---------------- Melton	B/D	Common-------	Brief------	May-Jul	1.0-2.0	Apparent	Apr-Jul	>60	---	High------	High------	High.
35---------------- Naz	A	None---------	---	---	>6.0	---	---	40-70	Rippable	Moderate	Moderate	Moderate.
36, 37, 38, 39---- Nisula	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
40. Pits												
41*, 42*:												
Pyle--------------	A	None---------	---	---	>6.0	---	---	20-40	Rippable	Low-------	Moderate	Moderate.
Koppes------------	B	None---------	---	---	>6.0	---	---	>60	---	Low-------	Moderate	Moderate.
43*:												
Quartzburg--------	C	None---------	---	---	>6.0	---	---	20-30	Rippable	Low-------	Moderate	Moderate.
Bryan-------------	A	None---------	---	---	>6.0	---	---	60-80	Rippable	Low-------	Moderate	Moderate.
44*:												
Quartzburg--------	C	None---------	---	---	>6.0	---	---	20-30	Rippable	Low-------	Moderate	Moderate.
Coski-------------	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
45---------------- Quartzburg Variant	C	None---------	---	---	>6.0	---	---	20-40	Rippable	Low-------	Moderate	Moderate.

See footnote at end of table.

TABLE 19.--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
					Ft			In				
46. Rock outcrop												
47 Roseberry	B/D	Occasional	Very brief	May-Jun	1.0-2.0	Apparent	Apr-Jul	>60	---	High	High	High.
48*:												
Roseberry	B/D	Occasional	Very brief	May-Jun	1.0-2.0	Apparent	Apr-Jul	>60	---	High	High	High.
Melton	B/D	Common	Brief	May-Jul	1.0-2.0	Apparent	Apr-Jul	>60	---	High	High	High.
Jurvannah	C	Frequent	Long	May-Jun	1.5-3.0	Apparent	Apr-Jul	>60	---	Moderate	High	Moderate.
49, 50 Shellrock	A	None	---	---	>6.0	---	---	40-60	Rippable	Low	Moderate	Moderate.
51*, 52*:												
Shellrock	A	None	---	---	>6.0	---	---	40-60	Rippable	Low	Moderate	Moderate.
Rock outcrop.												
53 Sudduth Variant	C	None	---	---	3.0-6.0	Perched	May-Jul	>60	---	Moderate	Moderate	Low.
54, 55, 56 Swede	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
57 Takeuchi	C	None	---	---	>6.0	---	---	20-40	Hard	Moderate	High	Moderate.
58 Tica	D	None	---	---	>6.0	---	---	10-20	Hard	Moderate	High	Low.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 20.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Archabal	Fine-loamy, mixed Typic Cryumbrepts
Blackwell	Fine-loamy, mixed Typic Cryaquolls
Blackwell Variant	Sandy, mixed Typic Cryaquolls
Bluebell	Loamy-skeletal, mixed Argic Pachic Cryoborolls
Bryan	Sandy, mixed Entic Cryumbrepts
Cabarton	Fine, montmorillonitic Typic Cryaquolls
Coski	Coarse-loamy, mixed Typic Cryoborolls
Demast	Fine-loamy, mixed Argic Pachic Cryoborolls
Donnel	Coarse-loamy, mixed Typic Cryumbrepts
Duston	Sandy, mixed Dystric Cryochrepts
Gestrin	Coarse-loamy, mixed Typic Cryumbrepts
Jugson	Sandy, mixed Typic Cryumbrepts
Jurvannah	Sandy-skeletal, mixed Typic Cryaquents
Kangas	Sandy, mixed Entic Cryumbrepts
Koppes	Sandy, mixed Typic Cryoborolls
Ligget	Coarse-loamy, mixed Typic Cryochrepts
McCall	Loamy-skeletal, mixed Typic Cryumbrepts
Melton	Fine-loamy over sandy or sandy-skeletal, mixed, acid Humic Cryaquepts
Naz	Coarse-loamy, mixed Pachic Cryoborolls
Nisula	Fine-loamy, mixed Mollic Cryoboralfs
Pyle	Mixed Alfic Cryopsamments
Quartzburg	Sandy-skeletal, mixed, frigid Typic Xerorthents
Quartzburg Variant	Coarse-loamy over sandy or sandy-skeletal, mixed Typic Cryumbrepts
Roseberry	Sandy, mixed Humic Cryaquepts
Shellrock	Mixed, frigid Typic Xeropsamments
Sudduth Variant	Fine, montmorillonitic Argic Pachic Cryoborolls
Swede	Fine-loamy, mixed Argic Cryoborolls
Takeuchi	Coarse-loamy, mixed, frigid Typic Haploxerolls
Tica	Clayey-skeletal, montmorillonitic Argic Lithic Cryoborolls
Toiyabe	Mixed, frigid, shallow Typic Xeropsamments

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