SOIL SURVEY OF

Payette County, Idaho

United States Department of Agriculture
Soil Conservation Service
in cooperation with
University of Idaho College of Agriculture
Idaho Agricultural Experiment Station
United States Department of the Interior
Bureau of Land Management

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.

Major fieldwork for this soil survey was completed in the period 1959–70. Soil names and descriptions were approved in 1971. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1971. This survey was made cooperatively by the Soil Conservation Service, the University of Idaho College of Agriculture, the Idaho Agricultural Experiment Station, and the United States Department of the Interior, Bureau of Land Management. It is part of the technical assistance furnished to the Payette Soil and Water 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.

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY contains information that can be applied in managing farms, ranches, and windbreaks; in selecting sites for roads, ponds, buildings, and other structures; and in judging the suitability of tracts of land for farming, industry, and recreation.

Locating Soils

All the soils of Payette County are shown on the detailed map at the back of this publication. This map consists of many sheets made from aerial photographs. Each sheet is numbered to correspond with a number on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by symbols. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside and a pointer shows where the symbol belongs.

Finding and Using Information

The "Guide to Mapping Units" can be used to find information. This guide lists all the soils of the county in alphabetic order by map symbol and shows the capability classification of each. It also shows the page where each soil is described and the page for the capability unit and range site to which the soil has been assigned.

Individual colored maps that show the relative suitability or degree of limitation of soils for many specific purposes can be developed by using the soil map and the information in the text. Translucent material can be used as an overlay over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those that have a moderate limitation can be colored yellow, and those that have a severe limitation can be colored red.

Farmers and those who work with farmers can learn about use and management of the soils from the soil descriptions and from the descriptions of the capability units, the range sites, and the windbreak suitability groups.

Foresters and others can refer to the section "Windbreaks," where the soils of the county are grouped according to their suitability for trees.

Game managers, sportsmen, and others can find information about soils and wildlife in the section "Wildlife."

Ranchers and others can find, under "Management of the soils for Range," groupings of the soils according to their suitability for range, and also the names of many of the plants that grow on each range site.

Community planners and others can read about soil properties that affect the choice of sites for dwellings, industrial buildings, and recreational facilities in the sections "Engineering Uses of the Soils" and "Use of the Soils for Recreational Development."

Engineers and builders can find, under "Engineering Uses of the Soils," tables that contain estimates of soil properties and information about soil features that affect engineering practices.

Scientists and others can read about how the soils formed and how they are classified in the section "Formation and Classification of the Soils."

Newcomers in Payette County may be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the information about the county given at the beginning of the publication and in the section "General Nature of the County."

Contents

Cover: Alfalfa hay on Lolalita sandy loam, 3 to 7 percent slopes. Lolalita complex, very steep, is on the terrace escarpment.

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SOIL SURVEY OF PAYETTE COUNTY, IDAHO

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UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, IN COOPERATION WITH THE UNIVERSITY OF IDAHO COLLEGE OF AGRICULTURE AND THE IDAHO AGRICULTURAL EXPERIMENT STATION; UNITED STATES DEPARTMENT OF THE INTERIOR, BUREAU OF LAND MANAGEMENT

PAYETTE COUNTY is in southwestern Idaho (fig. 1). The Snake River is the western and the Oregon-Idaho boundary. The Payette River flows northwesterly across the center of the county to the Snake River.

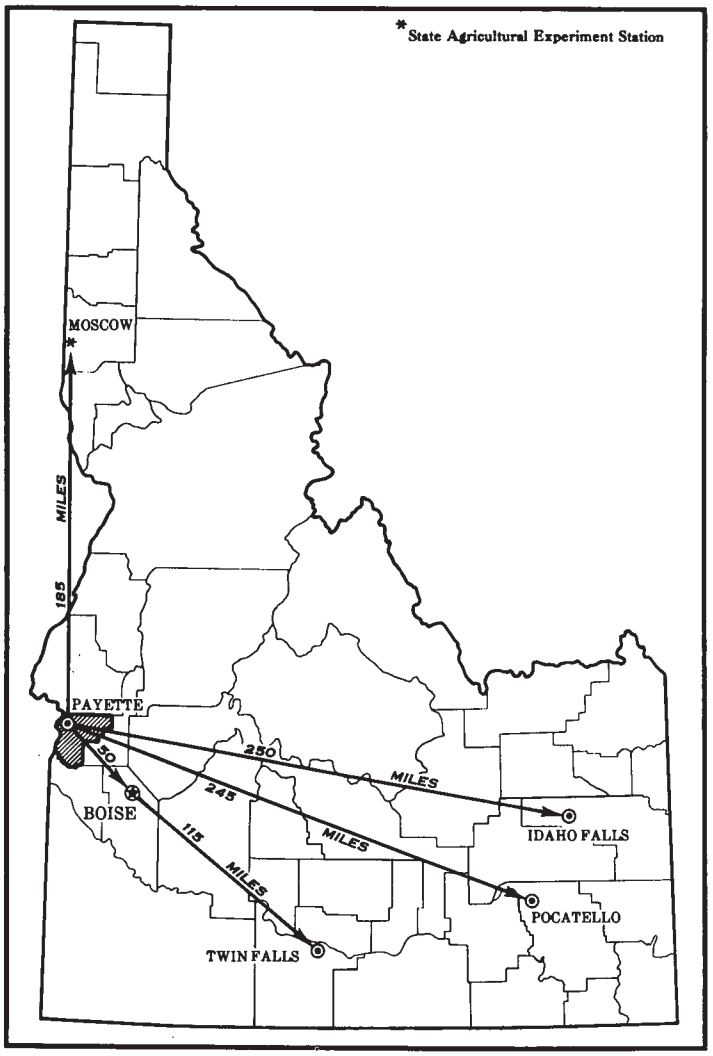

Figure 1.—**Location of Payette County in Idaho.**

The county has a land area of 257,920 acres, or 403 square miles. It is in the Payette section of the Columbia plateau physiographic province (*4*).[1] The flood plains of the Snake and Payette Rivers range to as much as 2 miles in width and are bordered by terraces at various elevations above the rivers. Most of the low and medium terraces are smooth to undulating and have little or no dissection. The uplands south and north of the Payette River are remnants of a high upland plain or terrace of old unconsolidated lacustrine and fluviatile material dissected by local streams. The northeast corner of the county has basalt flows. Elevations range from about 2,100 feet along the Snake River in the northwest corner to about 4,650 feet in the northeast corner.

Payette County has a semiarid continental climate. Summers are dry and warm. The average annual precipitation ranges from about 8 inches in the south to about 16 inches in the northeast.

Land use is diversified. About 30 percent of the county is irrigated. A small acreage is dryfarmed, and the rest is used for range. The principal crops are alfalfa seed and hay, seeded pasture, winter and spring wheat, field corn, sweet corn, sugar beets, potatoes, onions, and barley. Apple, prune, pear, and cherry orchards are grown in areas where air movement is good and the frost hazard is low. Mint, hops, and vegetable crops can be grown, but are of minor importance. Dairying and raising beef cattle are of major importance. In general, the native range vegetation is badly depleted or gone. The vegetation now is chiefly annual grasses or weeds.

Payette, the county seat, is near the mouth of the Payette River. Fruitland and New Plymouth are the other towns in the county. The county is crossed by Interstate 80 N, U.S. Highway 30, and U.S. Highway 95. Most of the farm-to-market roads are paved. Electric power, telephone, natural gas, railroad, truck and bus lines, and school bus services are available. Food production, processing, and packaging are the main industries. Mobile homes and church furniture are manufactured.

Irrigation water is plentiful, and the climate is favorable for a variety of crops.

[1] Italic figures in parentheses refer to Literature Cited, page 94.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in Payette County, where they are located, and how they can be used. The soil scientists went into the county knowing they likely would find many soils they had already seen and perhaps some they had not. They observed the steepness, length, and shape of slopes; the size and speed of streams; 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 that has not been changed much by leaching or by the action of plant roots.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. The *soil series* and the *soil phase* are the categories of soil classification most used in a local survey.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Greenleaf and Moulton, for example, are the names of two soil series. All the soils in the United States that have the same series name are essentially alike in those characteristics that affect their behavior in the undisturbed landscape.

Soils of one series can differ in texture of the surface layer and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, Tindahay coarse sandy loam, 3 to 7 percent slopes, is one of several phases within the Tindahay series.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, trees, 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 mapping units. On most maps detailed enough to be useful in planning the management of farms and fields, a mapping unit is nearly equivalent to a soil phase. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil phase.

Some mapping units are made up of soils of different series or of different phases within one series. Two such kinds of mapping units are shown on the soil map of Payette County: soil complexes and soil associations.

A soil complex consists of areas of two or more soils, so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area of a complex contains some of each of the two or more dominant soils, and the pattern and relative proportions are about the same in all areas. Generally, the name of a soil complex consists of the names of the dominant soils, joined by a hyphen. Gem-Bakeoven complex is an example.

A soil association is made up of adjacent soils that occur as areas large enough to be shown individually on the soil map, but are shown as one unit because the time and effort required to delineate them separately cannot be justified. There is a considerable degree of uniformity in pattern and relative extent of the dominant soils, but the soils may differ greatly one from another. The name of an association consists of the names of the dominant soils, joined by a hyphen. Lolalita-Saralegui association is an example.

In most areas surveyed there are places where the soil material is so rocky, so shallow, so severely eroded, or so variable that it has not been classified by soil series. These places are shown on the soil map and are described in the survey, but they are called land types and are given descriptive names. Riverwash and Rock outcrop are examples.

While a soil survey is in progress, soil scientists take soil samples needed for laboratory measurements and for engineering tests. Laboratory data from the same kind of soil in other places are also assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kind of soil. Yields under defined management are estimated for the soils.

Soil scientists observe how soils behave when used as a growing place for native and cultivated plants and as material for structures, foundations for structures, or covering for structures. They relate this behavior to properties of the soils. For example, they observe that filter fields for onsite disposal of sewage fail on a given kind of soil, and they relate this to the slow permeability of the soil or its high water table. They see that streets, road pavements, and foundations for houses are cracked on a named kind of soil, and they relate this failure to the high shrink-swell potential of the soil material. Thus, they use observation and knowledge of soil properties, together with available research data, to predict limitations or suitability of soils for present and potential uses.

After data have been collected and tested for the key, or benchmark, soils in a survey area, the soil scientists set up trial groups of soils. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others. They then adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under current methods of use and management.

General Soil Map

The general soil map at the back of this survey shows, in color, the soil associations in Payette County. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern.

A general soil map that shows soil associations is useful to people who want a general idea of the soils in a county, who want to compare different parts of a county, or who want to know the location of large tracts that are suitable for a certain kind of land use. Such a map is a useful general guide in managing a watershed, a wooded tract, or a wildlife area or in planning engineering works, recreational facilities, and community developments. It is not a suitable map for planning the management of a farm or field or for selecting the exact location of a road, building, or similar structure, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect their management.

The nine soil associations in Payette County are described on the following pages.

The soil associations in this survey have been grouped into four general kinds of landscapes for broad interpretative purposes. Each of the broad groups and their included soil associations are described in the following pages. The terms for texture used in the title for several of the associations apply to the typical texture of the surface layer of the major soils in the association. For example, in the title of association 2, the words "loams and coarse sandy loams" refer to the texture of the surface layer.

Deep to Very Shallow Soils on Hilly Dissected High Terraces and Foothills

The deep to very shallow soils on hilly dissected high terraces and foothills are very gently sloping to very steep and well drained. They are extremely stony loams to coarse sandy loams formed in residuum of basalt and in old alluvial sediment. They are mainly in the northern and northeastern parts of the county.

Elevation of these soils ranges from 2,200 to 4,650 feet, and annual precipitation from 9 to 18 inches. The annual air temperature ranges from 40° to 50° F., and the frost-free season is 110 to 145 days. The soils are used for livestock grazing, wildlife, and watershed.

Two soil associations in Payette County are on hilly dissected high terraces and foothills. They make up 38 percent of the county.

1. Bakeoven-Reywat-Gross association

Very gently sloping to very steep, very shallow to moderately deep, well-drained stony loams and extremely stony loams on foothills

This association is in the northeastern part of the county. The landscape is one of very gently sloping to strongly sloping ridgetops and moderately steep to steep canyon walls on the rough foothills. The soils formed in residuum weathered from basalt. The vegetation is bunchgrasses, annual grasses, forbs, and shrubs. Elevation ranges from 2,500 to 4,650 feet. Mean annual precipitation is 12 to 18 inches, mean annual air temperature is 40° to 50° F., and the frost-free season is 110 to 145 days.

This association makes up about 9 percent of the county. It is about 26 percent Bakeoven soils, 21 percent Reywat soils, 15 percent Gross soils, and 38 percent Gem, Newell, and Ruckles soils and Rock land.

Bakeoven soils are on the ridgetops and the south- and east-facing canyon walls. They have a surface layer of extremely stony loam and are less than 10 inches deep over basalt. Reywat soils also are on ridgetops and south- and east-facing canyon walls. They have a surface layer of extremely stony loam and are 10 to 20 inches deep over basalt. Gross soils are on steep north-facing canyon walls. They have a surface layer of stony loam and are 20 to 40 inches deep over basalt.

This association is used mainly for livestock grazing, wildlife, and watershed. An adequate plant cover and good grazing management minimize the loss of soil through erosion. Most of the association is easily accessible to livestock. Water for livestock is needed in some areas.

2. Haw-Saralegui association

Very gently sloping to steep, deep, well-drained loams and coarse sandy loams on hilly dissected terraces

This association is in the northern part of the county. The landscape is one of very gently sloping to strongly sloping ridgetops, alluvial fans, bottom land, and moderately steep to steep dissected terraces. The soils formed in old, medium-textured to coarse-textured alluvial material derived from acid igneous rock. The vegetation is bunchgrasses, annual grasses, forbs, and shrubs. Elevation ranges from 2,200 to 3,000 feet. Mean annual precipitation is 9 to 16 inches, mean annual air temperature is 45° to 52° F., and the frost-free season is 120 to 145 days.

This association makes up about 29 percent of the county. It is about 42 percent Haw soils, 15 percent Saralegui soils, and 43 percent Van Dusen, Lolalita, Tindahay, Cashmere, Harpt, Lankbush, Payette, Ruckles, and Ager soils, deep variant.

Haw soils are on ridgetops and north- and east-facing slopes. They have a surface layer of loam and a subsoil of clay loam. At higher elevations Saralegui soils are on ridgetops and the west- and south-facing slopes, and at lower elevations they are on north- and east-facing slopes. Saralegui soils have a coarse sandy loam surface layer and a sandy loam subsoil. Both soils are more than 60 inches deep.

This association is used for livestock grazing, wildlife, and watershed. An adequate plant cover and good grazing management minimize the loss of soil through

erosion. Seeding is needed on most of the range. The association is easily accessible to livestock. Water for livestock is needed in some areas.

Moderately Deep and Deep Soils on Dissected High Terraces

The moderately deep and deep soils on dissected high terraces are very gently sloping to very steep and well drained. They are silt loams to coarse sandy loams formed in alluvial sands that have been covered with a thin layer of loess. They are mainly in the central and southern parts of the county.

Elevation of these soils ranges from 2,200 to 3,000 feet, and annual precipitation from 9 to 12 inches. The annual air temperature is 50° to 52° F., and the frost-free season is 140 to 160 days. The soils are used for irrigated crops, livestock grazing, wildlife, and watershed.

Two soil associations in Payette County are on dissected high terraces. They make up 34 percent of the county.

3. Power-Lolalita association

Very gently sloping to very steep, deep, well-drained silt loams, sandy loams, and coarse sandy loams on dissected terraces

This association is in the central part of the county (fig. 2). It occupies the very gently sloping to strongly sloping remains of a high terrace and the moderately steep to very steep sides at the edge of the terrace and along the dissecting drainageways. The soils formed in old medium-textured to moderately coarse textured alluvium that has a thin cover of loess. The vegetation is mainly annual grasses, forbs, and shrubs. Elevation ranges from 2,200 to 3,000 feet. Mean annual precipitation is 9 to 12 inches, mean annual air temperature is 50° to 52° F., and the frost-free season is 140 to 160 days.

This association makes up about 6 percent of the county. It is about 35 percent Power soils, 20 percent Lolalita soils, and 45 percent Elijah, Lankbush, Tindahay, Clems, Vickery, Purdam, Saralegui, and Harpt soils and Terrace escarpments.

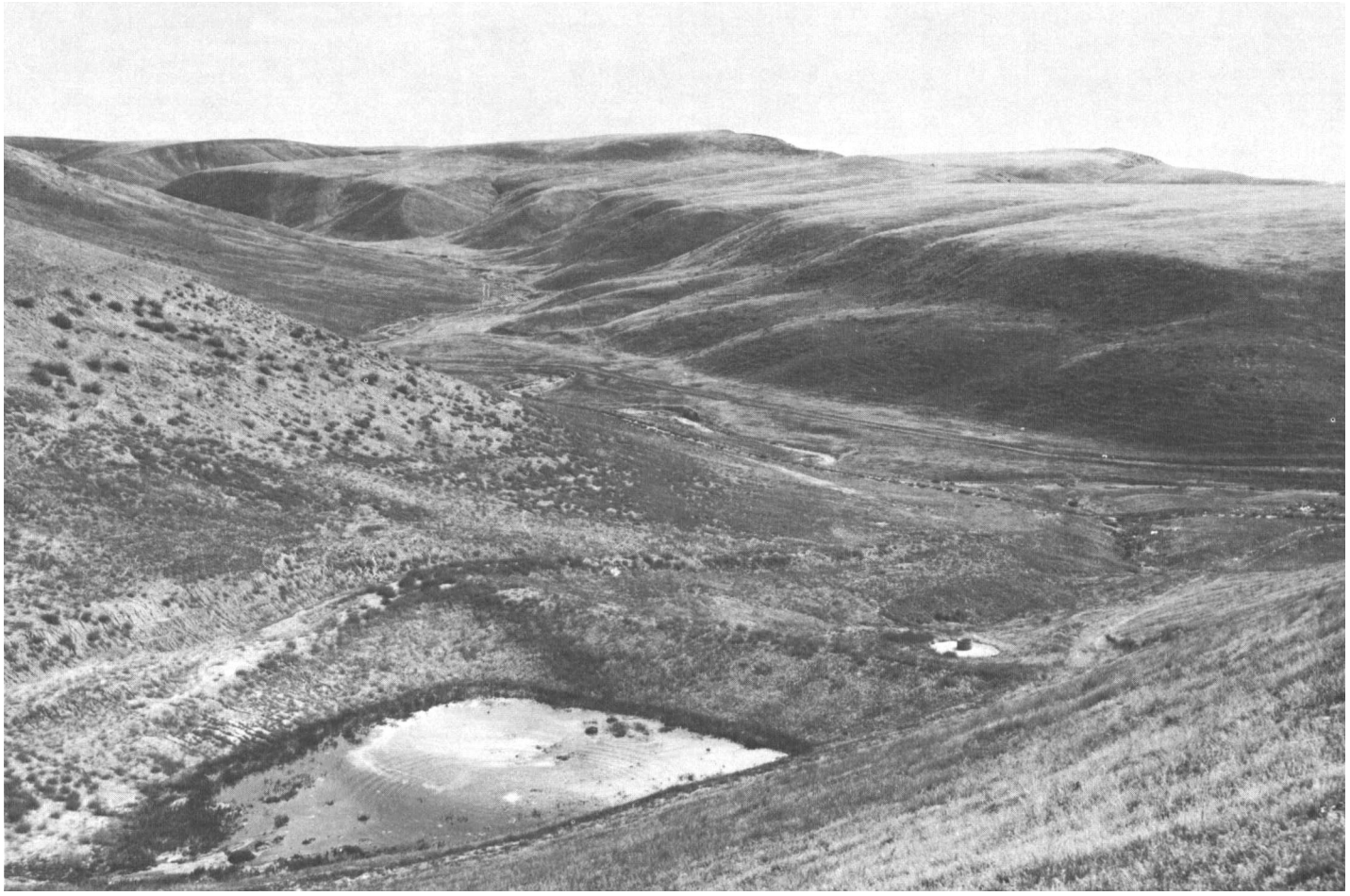

***Figure 2.*—Stock pond in range of poor condition on Power-Lolalita association. The soil on bottom land is Harpt loam, 3 to 7 percent slopes. The steep soils on both sides of the bottom are Lolalita-Saralegui association, steep. The soils on the terrace at upper right are Power-Elijah silt loams, 3 to 7 percent slopes.**

Power soils are on the terrace top. They have a surface layer of silt loam and a subsoil of silty clay loam and are more than 40 inches deep over a hardpan. Lolalita soils are on the steep south- and west-facing slopes, and are sandy loam or coarse sandy loam to a depth of more than 60 inches.

Some of the very gently sloping to strongly sloping soils of the association are sprinkler irrigated and used for crops. Other soils are used for livestock grazing. All are used for wildlife and watershed. Good grazing management and water management minimize the loss of soil through erosion. Seeding is needed on most of the range. Under irrigation, these soils are suited to hay, pasture, and small grain. On Power soils and some of the less extensive soils in the association, the practice of plowing to a depth of about 3 feet increases production, because it increases the rate of water intake and the amount of water available to plants.

4. Elijah-Purdam association

Very gently sloping to moderately sloping, well-drained silt loams that are moderately deep over a hardpan; on dissected terraces

This association is in the southern part of the county and on the high terrace north of the Payette River. It is mostly on very gently sloping to moderately sloping plateaus dissected by drainageways that are strongly sloping to steep. The soils formed in old medium-textured to coarse-textured alluvium covered with a thin layer of loess. The vegetation is range and some irrigated crops. In areas of range the plant cover is annual grasses, forbs, and shrubs. Elevation ranges from 2,300 to 3,000 feet. Mean annual precipitation is 9 to 12 inches, mean annual air temperature is 50° to 52° F., and the frost-free season is 140 to 160 days.

This association makes up about 28 percent of the county. It is about 18 percent Elijah soils, 12 percent Purdam soils, and 70 percent Jenness, Emerson, Lanktree, Lankbush, Lolalita, Chilcott, Truesdale, Turbyfill, Tindahay, Vickery, Saralegui, and Sebree soils.

Elijah and Purdam soils are very gently sloping to moderately sloping and are on ridgetops. They have a surface layer of silt loam and a subsoil of silty clay loam and are 20 to 40 inches deep over a hardpan. Elijah soils have an indurated hardpan, and Purdam soils have a weakly cemented hardpan.

This association is used mainly for livestock grazing, wildlife, and watershed. Some very gently sloping to strongly sloping soils are used for irrigated crops. Good grazing management and water management reduce the loss of soil through erosion. Seeding is needed on most of the range. Under irrigation, these soils are suited to hay, pasture, and small grain. Plowing the major soils and some of the minor soils about 3 feet deep increases production by improving the rate of water intake and increasing the amount of water available to plants.

Deep Soils on Stream Bottoms, Alluvial Fans, and Low Terraces

The deep soils on stream bottoms, alluvial fans, and low terraces are nearly level to moderately sloping and well drained to poorly drained. They are silty clay loams to loamy coarse sands formed in recent alluvium. They are mainly in the central and western parts of the county along the Payette and Snake Rivers.

Elevation of these soils ranges from 2,100 to 2,600 feet, and annual precipitation from 9 to 13 inches. The annual air temperature is 48° to 52° F., and the frost-free season is 140 to 160 days. The soils are used mainly for irrigated crops, wildlife, and some livestock grazing.

Three soil associations in Payette County are on stream bottoms, alluvial fans, and low terraces. They make up 13 percent of the county.

5. Haw-Harpt-Tindahay association

Nearly level to moderately sloping, deep, well-drained loams and sandy loams on stream bottoms and alluvial fans

This association occupies gently sloping to moderately sloping alluvial fans and narrow drainageways and the nearly level to very gently sloping bottoms of Big Willow Creek and Little Willow Creek in the north-central part of the county. It is also in the larger drainageways that extend from the mouth of Little Willow Creek to the Washington County boundary. The soils formed in recent alluvium. The vegetation is mainly irrigated crops. In areas of range the plant cover is annual grasses, forbs, and shrubs. Elevation ranges from 2,150 to 2,600 feet. Mean annual precipitation is 9 to 13 inches, mean annual air temperature is 48° to 52° F., and the frost-free season is 140 to 150 days.

This association makes up about 5 percent of the county. It is about 28 percent Haw soils, 25 percent Harpt soils, 18 percent Tindahay soils, and 29 percent Cashmere, Lolalita, Lankbush, Newell, and Lanktree soils.

Haw soils are on the stream bottoms and alluvial fans. They have a surface layer of loam and a subsoil of loam and clay loam and are more than 60 inches deep (fig. 3). Harpt soils are on the lower parts of alluvial fans. They are loams and are more than 60 inches deep. Tindahay soils are on the alluvial fans above Harpt soils. They have a surface layer of coarse sandy loam or loamy coarse sand and a substratum of loamy coarse sand and coarse sandy loam. These soils are more than 60 inches deep.

This association is used for irrigated crops, livestock grazing, wildlife, and watershed. An adequate plant cover on range and good water management minimize the loss of soil through erosion. Seeding and good grazing management are needed. Under irrigation, these soils are well suited to all crops commonly grown in the county.

6. Moulton-Letha-Notus association

Nearly level and very gently sloping, deep, poorly drained and somewhat poorly drained fine sandy loams and coarse sandy loams on stream bottoms

This association occupies nearly level and very gently sloping bottoms along the Payette River and

Figure 3.—DuPitus alfalfa hay on Haw-Harpt-Tindahay association. The soil is Haw loam, 3 to 7 percent slopes. Upper right shows the edge of the Power-Lolalita association.

Snake River. The soils formed in recent alluvium. The vegetation is irrigated crops. Elevation ranges from 2,100 to 2,350 feet. Mean annual precipitation is 9 to 12 inches, mean annual air temperature is 50° to 52° F., and the frost-free season is 140 to 160 days.

This association makes up about 5 percent of the county. It is about 40 percent Moulton soils, 20 percent Letha soils, 15 percent Notus soils, and 25 percent Chance, Falk, Baldock, Bowman, and Emerson soils and Riverwash.

All these soils are intermingled throughout the association. Moulton soils are poorly drained fine sandy loams and are 20 to 40 inches deep over coarse sand and gravel. Letha soils are somewhat poorly drained and are calcareous, strongly alkaline fine sandy loams more than 40 inches deep over sand and gravel. Notus soils are somewhat poorly drained coarse sandy loams and are 10 to 20 inches deep over sand and gravel.

This association is used for irrigated crops and wildlife. Crop rotation, water management, and installation of drainage systems maintain soil fertility and improve the soil. Drainage is difficult because no suitable outlets are available. Drainage helps in reclaiming soils that are high in salts, including sodium. The soils are better suited to pasture and other forage crops than to other uses.

7. *Baldock-Greenleaf variant association*

Nearly level and very gently sloping, deep, somewhat poorly drained silt loams and silty clay loams on stream bottoms and low terraces

This association occupies nearly level and very gently sloping bottoms and low terraces along the Payette and Snake Rivers. The soils formed in recent alluvium. The vegetation is irrigated crops. Elevation ranges from 2,100 to 2,350 feet. Mean annual precipitation is 9 to 12 inches, mean annual air temperature is 50° to 52° F., and the frost-free season is 140 to 160 days.

This association makes up about 3 percent of the county. It is about 50 percent Baldock soils, 25 percent Greenleaf soils, wet variant, and 25 percent Letha, Chance, Moulton, Falk, and Bowman soils and Riverwash.

Baldock soils have a surface layer of silty clay loam and a substratum of silt loam and fine sandy loam. They are on bottoms and low terraces along the rivers

and are more than 60 inches deep. Greenleaf soils, wet variant, are on low terraces. They have a surface layer of silt loam and a subsoil of silty clay loam and heavy silt loam. They also are more than 60 inches deep.

This association is used for irrigated crops and wildlife. Management that conserves the soil and water helps in maintaining good crop yields. Under irrigation, these soils are suited to most crops grown in the county. In undrained areas the high water table limits production of crops to soils that have a shallow root zone.

Deep Soils on Intermediate Terraces

The deep soils on intermediate terraces are nearly level to moderately steep and well drained. They are silt loams and fine sandy loams that formed in lake-laid silts and wind-laid sands. They are mainly in the central and southwestern parts of the county.

Elevation of these soils ranges from 2,200 to 2,800 feet, and annual precipitation from 9 to 12 inches. The annual air temperature is 50° to 52° F., and the frost-free season is 140 to 160 days. The soils are used mainly for irrigated crops and wildlife.

Two soil associations in Payette County are on intermediate terraces. They make up 15 percent of the county.

8. Greenleaf-Nyssaton association

Nearly level to moderately steep, deep, well-drained silt loams on intermediate terraces

This association occupies the nearly level to moderately steep intermediate terrace south of the Payette River. The towns of New Plymouth and Fruitland are on this terrace. The soils formed in lake-laid silts. Elevation ranges from 2,200 to 2,700 feet. Mean annual precipitation is 9 to 12 inches, mean annual air temperature is 50° to 52° F., and the frost-free season is 140 to 160 days.

This association makes up about 8 percent of the county. It is about 80 percent Greenleaf soils, 15 percent Nyssaton soils, and 5 percent Clems, Owyhee, and Jenness soils and the Harpt soils, wet variant.

The soils are intermingled throughout the association. Greenleaf soils have a surface layer of silt loam and a subsoil of heavy silt loam. They are 20 to 40 inches deep over laminated lake-laid silt. Nyssaton soils are calcareous silt loams that are 20 to 40 inches deep over laminated lake-laid silt.

This association is used for irrigated crops and wildlife. Crop rotation and water management minimize the loss of soil through erosion. Under irrigation, these soils are well suited to all crops commonly grown in the county.

9. Owyhee-Clems association

Nearly level to moderately steep, deep, well-drained silt loams and fine sandy loams on intermediate terraces

This association occupies nearly level to moderately steep intermediate terraces and the edges of the terraces along the western side of the county from Payette south to Canyon County. The soils formed in lake-laid silts and wind-laid sands. The vegetation is irrigated crops. Elevation ranges from 2,200 to 2,800 feet. Mean annual precipitation is 9 to 12 inches, mean annual air temperature is 50° to 52° F., and the frost-free season is 140 to 160 days.

This association makes up about 7 percent of the county. It is about 35 percent Owyhee soils, 30 percent Clems soils, and 35 percent Nyssaton, Greenleaf, Truesdale, Turbyfill, and Jenness soils, the Harpt soils, wet variant, and Terrace escarpments.

Owyhee soils are on the east side of the association. They are silt loams that are 20 to 40 inches deep over laminated lake-laid silt. Clems soils are along the west side of the terraces. They are fine sandy loams more than 40 inches deep.

This association is used for irrigated crops and wildlife. Crop rotation and water management minimize the loss of soil through erosion. Under irrigation, these soils are well suited to all crops commonly grown in the county.

Descriptions of the Soils

This section describes the soil series and mapping units in Payette County. Each soil series is described in detail, and then, briefly, each mapping unit in that series. Unless specifically mentioned otherwise, it is to be assumed that what is stated about the soil series holds true for the mapping units in that series. Thus, to get full information about any one mapping unit, it is necessary to read both the description of the mapping unit and the description of the soil series to which it belongs.

An important part of the description of each soil series is the soil profile, that is, the sequence of layers from the surface downward to rock or other underlying material. Each series contains two descriptions of this profile. The first is brief and in terms familiar to the layman. The second is much more detailed and is for those who need to make thorough and precise studies of soils. Color terms are for dry soil unless otherwise stated. Reaction for all representative profiles was determined in the field using color indicators. The profile described in the series is representative of mapping units in that series. If the profile of a given mapping unit differs from the one described for the series, differences are stated in describing the mapping unit, or they are apparent in the name of the mapping unit.

As mentioned in the section "How This Survey Was Made," not all mapping units are members of a soil series. Terrace escarpments, for example, does not belong to a soil series but, nevertheless, is listed in alphabetic order along with the soil series.

Following the names of each mapping unit is a symbol in parentheses. This symbol identifies the mapping unit on the detailed soil map. The slope is shown, in parentheses, after the mapping unit name if it was not a part of the correlated mapping unit name. Listed at the end of each description of a mapping unit are the capability unit, range site, or windbreak

suitability group to which the mapping unit has been assigned. No designation at the end of the mapping unit description means that the soil is not used for that purpose. The page for the description of each capability unit and range site can be found by referring to the "Guide to Mapping Units" at the back of this survey.

The approximate acreage and proportionate extent of each mapping unit are shown in table 1. Many of the terms used in describing soils can be found in the

TABLE 1.—*Approximate acreage and proportionate extent of the soils*

Soil	Acres	Percent	Soil	Acres	Percent
Ager clay, deep variant, 7 to 12 percent slopes	460	0.2	Lolalita complex, very steep	523	0.2
Ager clay, deep variant, 12 to 30 percent slopes	1,524	.6	Lolalita-Lankbush complex, 12 to 30 percent slopes, eroded	8,149	3.2
Baldock silt loam	3,590	1.4	Lolalita-Saralegui association, steep	23,001	9.0
Baldock silt loam, saline-alkali	955	.4	Moulton fine sandy loam	5,791	2.2
Baldock silt loam, strongly saline-alkali	522	.2	Moulton fine sandy loam, slightly saline-alkali	341	.1
Baldock silty clay loam	693	.3	Newell clay loam, 1 to 3 percent slopes	1,035	.4
Bowman loam	1,463	.6	Newell stony clay loam, 3 to 12 percent slopes	466	.2
Cashmere sandy loam, 0 to 3 percent slopes	1,000	.4	Notus coarse sandy loam	2,188	.8
Cashmere sandy loam, 3 to 7 percent slopes	641	.2	Nyssaton silt loam, 0 to 1 percent slopes	262	.1
Chance fine sandy loam	1,174	.5	Nyssaton silt loam, 1 to 3 percent slopes	1,334	.5
Clems fine sandy loam, 0 to 3 percent slopes	3,465	1.3	Nyssaton silt loam, 3 to 7 percent slopes	795	.3
Clems fine sandy loam, 3 to 7 percent slopes	872	.3	Nyssaton silt loam, 7 to 12 percent slopes	613	.2
Clems fine sandy loam, 7 to 12 percent slopes	808	.3	Nyssaton silt loam, 12 to 30 percent slopes	649	.3
Clems fine sandy loam, 12 to 30 percent slopes	563	.2	Owyhee silt loam, 0 to 1 percent slopes	559	.2
Elijah-Chilcott silt loams, 3 to 7 percent slopes	11,222	4.3	Owyhee silt loam, 1 to 3 percent slopes	1,955	.8
Elijah-Sebree silt loams, 1 to 3 percent slopes	2,308	.9	Owyhee silt loam, 3 to 7 percent slopes	1,711	.7
Elijah-Vickery silt loams, 7 to 12 percent slopes	3,366	1.3	Owyhee silt loam, 7 to 12 percent slopes, eroded	1,177	.5
Elijah-Vickery silt loams, 7 to 12 percent slopes, eroded	1,581	.6	Owyhee silt loam, 12 to 30 percent slopes, eroded	983	.4
Emerson sandy loam	1,890	.7	Payette coarse sandy loam, 30 to 65 percent slopes	1,262	.5
Falk fine sandy loam	627	.2	Payette-Van Dusen association, steep	14,219	5.5
Gem-Bakeoven complex, 2 to 30 percent slopes	2,796	1.1	Power-Elijah silt loams, 1 to 3 percent slopes	478	.2
Gem-Bakeoven complex, 30 to 65 percent slopes	2,814	1.1	Power-Elijah silt loams, 3 to 7 percent slopes	9,902	3.8
Greenleaf silt loam, 0 to 1 percent slopes	4,673	1.8	Power-Elijah silt loams, 7 to 12 percent slopes	4,680	1.8
Greenleaf silt loam, 1 to 3 percent slopes	6,966	2.7	Power-Purdam silt loams, 7 to 12 percent slopes	5,178	2.0
Greenleaf silt loam, 3 to 7 percent slopes	2,173	.8	Purdam-Power silt loams, 1 to 3 percent slopes	479	.2
Greenleaf silt loam, 3 to 7 percent slopes, eroded	2,009	.8	Purdam-Power silt loams, 3 to 7 percent slopes	6,164	2.4
Greenleaf silt loam, 7 to 12 percent slopes, eroded	537	.2	Reywat-Bakeoven complex, 2 to 30 percent slopes	3,333	1.3
Greenleaf silt loam, 12 to 30 percent slopes, eroded	338	.1	Reywat-Bakeoven complex, 30 to 60 percent slopes	6,376	2.4
Greenleaf silt loam, saline-alkali, 1 to 3 percent slopes	453	.2	Riverwash	1,564	.6
Greenleaf silt loam, wet variant	2,146	.8	Rock outcrop-Bakeoven complex, 60 to 80 percent slopes	563	.2
Greenleaf silt loam, wet variant, saline-alkali	789	.3	Ruckles stony loam, 7 to 20 percent slopes	305	.1
Gross stony loam, 30 to 65 percent slopes	1,164	.5	Ruckles-Bakeoven extremely stony loam, 2 to 30 percent slopes	1,386	.5
Gross-Bakeoven complex, 30 to 65 percent slopes	3,811	1.5	Ruckles-Bakeoven extremely stony loams, 30 to 65 percent slopes	565	.2
Harpt loam, 0 to 1 percent slopes	383	.1	Saralegui coarse sandy loam, 1 to 12 percent slopes	561	.2
Harpt loam, 1 to 3 percent slopes	571	.2	Saralegui coarse sandy loam, 12 to 30 percent slopes	1,256	.5
Harpt loam, 3 to 7 percent slopes	708	.3	Saralegui complex, 30 to 60 percent slopes	474	.2
Harpt loam, 7 to 12 percent slopes	1,826	.7	Saralegui-Haw complex, 12 to 30 percent slopes, eroded	3,659	1.4
Harpt loam, wet variant	709	.3	Terrace escarpments	1,334	.5
Haw loam, 0 to 1 percent slopes	656	.3	Tindahay coarse sandy loam, 3 to 7 percent slopes	456	.2
Haw loam, 1 to 3 percent slopes	3,020	1.2	Tindahay coarse sandy loam, 7 to 12 percent slopes	663	.3
Haw loam, 3 to 7 percent slopes	6,009	2.3	Tindahay-Cashmere complex, 7 to 12 percent slopes	2,383	1.0
Haw loam, 7 to 12 percent slopes	4,003	1.6	Tindahay loamy coarse sand, 12 to 30 percent slopes	510	.2
Haw loam, 12 to 30 percent slopes	4,188	1.6	Truesdale fine sandy loam, 3 to 7 percent slopes	586	.2
Haw loam, 12 to 30 percent slopes, eroded	5,884	2.3	Truesdale fine sandy loam, 7 to 12 percent slopes	326	.1
Haw loam, 30 to 65 percent slopes	6,057	2.3	Turbyfill fine sandy loam, 1 to 3 percent slopes	401	.2
Haw very stony loam, 2 to 12 percent slopes	963	.4	Turbyfill fine sandy loam, 3 to 7 percent slopes	268	.1
Jenness loam, 0 to 1 percent slopes	1,177	.5	Turbyfill fine sandy loam, 7 to 12 percent slopes	351	.1
Jenness loam, 1 to 3 percent slopes	2,591	1.0	Van Dusen-Haw loams, 30 to 65 percent slopes	2,191	.9
Lankbush sandy loam, 3 to 7 percent slopes	616	.2			
Lankbush sandy loam, 12 to 30 percent slopes, eroded	3,623	1.4	Total	257,920	100.0
Lankbush-Purdam complex, 12 to 30 percent slopes	15,314	6.0			
Lanktree-Haw complex, 0 to 3 percent slopes	1,568	.6			
Lanktree-Haw complex, 3 to 7 percent slopes	286	.1			
Letha fine sandy loam	1,095	.4			
Letha fine sandy loam, slightly saline-alkali	1,511	.6			
Lolalita sandy loam, 1 to 3 percent slopes	266	.1			
Lolalita sandy loam, 3 to 7 percent slopes	1,034	.4			
Lolalita sandy loam, 7 to 12 percent slopes	656	.3			
Lolalita sandy loam, 12 to 30 percent slopes	378	.1			

Glossary at the back of this survey, and more detailed information about the terminology and methods of soil mapping can be obtained from the Soil Survey Manual (*7*).

Ager Series, Deep Variant

The Ager series, deep variant, consists of well-drained soils on dissected terraces. These soils formed in material weathered from semiconsolidated ash tuff or siltstone. Slopes are 7 to 60 percent. Elevation is 2,500 to 3,000 feet. The vegetation is annual grasses, forbs, and shrubs. Precipitation is 12 to 13 inches, mean annual air temperature is 45° to 50° F., and the frost-free season is 120 to 140 days.

In a representative profile the surface layer is about 25 inches thick. It is grayish-brown clay in the upper 3 inches and grayish-brown and brown silty clay in the lower 22 inches. The substratum to a depth of 60 inches is brown and pale-brown clay loam. The soil is mildly alkaline and moderately alkaline in the surface layer and moderately alkaline and strongly alkaline in the substratum. It is slightly calcareous between depths of 25 and 40 inches.

Permeability is slow when the soil is wet. The root zone is more than 60 inches deep and holds 10 to 12 inches of water available to plants. Cracks as much as 1 inch wide and 2 feet or more deep form during the dry period that begins in July and extends into September.

Ager soils are used for range, wildlife, and watershed. Shrinking and swelling make them unsuitable as construction sites for buildings.

Representative profile of Ager clay, deep variant, 12 to 30 percent slopes, 800 feet east of northwest corner of sec. 7, T. 9 N., R. 3 W., in an area used as range:

A11—0 to 3 inches, grayish-brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) when moist; moderate, fine and medium, granular structure; very hard when dry, firm when moist, very sticky and very plastic when wet; many very fine and fine roots; many very fine irregular pores; mildly alkaline; abrupt, smooth boundary. 2 to 4 inches thick.

A12—3 to 8 inches, grayish-brown (10YR 5/2) silty clay, dark grayish brown (10YR 4/2) when moist; strong, coarse, prismatic structure parting to moderate, medium and fine, granular; very hard when dry, firm when moist, very sticky and very plastic when wet; many very fine roots; many very fine irregular pores; moderately alkaline; clear, smooth boundary. 4 to 6 inches thick.

A13—8 to 19 inches, grayish-brown (10YR 5/2) silty clay, dark grayish brown (10YR 4/2) when moist; strong, coarse, prismatic structure parting to moderate, medium, angular blocky; very hard when dry, firm when moist, very sticky and very plastic when wet; common very fine and fine roots; common very fine irregular pores; about 1 percent very fine pebbles; pressure faces; slickensides; moderately alkaline; gradual, smooth boundary. 4 to 11 inches thick.

A14—19 to 25 inches, brown (10YR 5/3) silty clay, dark brown (10YR 4/3) moist; moderate, medium and coarse, angular blocky structure; very hard when dry, firm when moist, very sticky and very plastic when wet; few very fine and fine roots; few very fine pores; about 1 percent very fine pebbles; pressure faces; slickensides; moderately alkaline; gradual, smooth boundary. 4 to 6 inches thick.

C1ca—25 to 40 inches, brown (10YR 5/3) heavy clay loam, dark brown (10YR 4/3) when moist; weak, medium, subangular blocky structure; hard when dry, firm when moist, sticky and plastic when wet; common very fine tubular pores; about 1 percent very fine pebbles; slightly calcareous, few splotches of calcium carbonate; moderately alkaline; gradual, smooth boundary. 10 to 20 inches thick.

C2—40 to 60 inches, pale-brown (10YR 6/3) clay loam, dark brown (10YR 4/3) when moist; massive; hard when dry, firm when moist, sticky and plastic when wet; about 1 percent very fine pebbles; strongly alkaline.

The A horizon ranges from dark grayish brown to pale brown. The C2 horizon is grayish brown or pale brown in hue of 10YR or 2.5Y. Reaction in the A11 and A12 horizons ranges from neutral to moderately alkaline. In the C2 horizon it ranges from moderately alkaline to strongly alkaline.

Ager clay, deep variant, 7 to 12 percent slopes (AGD).—This soil is in irregularly shaped areas 10 to 260 acres in size. Included in mapping are areas of Saralegui and Lankbush soils. Runoff is medium, and the erosion hazard is moderate. The soil is used for range, wildlife, and watershed. Capability unit IVe–5 nonirrigated; Dense Clay range site, 12- to 16-inch precipitation zone.

Ager clay, deep variant, 12 to 30 percent slopes (AGE).—This soil is in irregularly shaped areas 5 to 200 acres in size. It has the profile described as representative of the variant. Included in mapping are areas of Saralegui, Haw, and Lankbush soils. Runoff is medium, and the erosion hazard is high. The soil is used for range, wildlife, and watershed. Capability unit VIe–2 nonirrigated; Dense Clay range site, 12- to 16-inch precipitation zone.

Bakeoven Series

The Bakeoven series consists of well-drained soils on foothills. These soils formed in residuum derived from basalt. Slopes are 2 to 85 percent. Elevation is 3,000 to 4,650 feet. The vegetation is bunchgrasses, forbs, and shrubs. Precipitation is 12 to 16 inches, mean annual air temerature is 45° to 50° F., and the frost-free season is 115 to 135 days.

In a representative profile the surface layer is brown extremely stony loam about 3 inches thick. The subsoil is brown extremely stony loam and clay loam about 5 inches thick. Basalt bedrock is at a depth of 8 inches. The soil is neutral and noncalcareous.

Permeability is moderately slow over the basalt. The root zone is less than 10 inches deep and holds less than 1.5 inches of water available to plants.

These soils are used for range, wildlife, and watershed.

The Bakeoven soils in Payette County are mapped only with Gem, Gross, Reywat, and Ruckles soils.

Representative profile of Bakeoven extremely stony loam in an area of Reywat-Bakeoven complex, 30 to 60 percent slopes, in the northeast corner of the county, 540 feet west, 50 feet north of the center of sec. 28, T. 9 N., R. 1 W., in a noncultivated area:

A1—0 to 3 inches, brown (10YR 4/3) extremely stony loam, dark brown (7.5YR 3/2) when moist; moderate, fine and very fine, granular structure; slightly hard when dry, friable when moist, slightly sticky and slightly plastic when wet; many very fine roots; many very fine irregular pores; about 30 percent stones and 10 percent angular gravel; neutral; abrupt, smooth boundary. 1 to 3 inches thick.

B1—3 to 6 inches, brown (10YR 4/3) extremely stony loam, dark brown (7.5YR 3/2) when moist; moderate, fine, angular blocky structure; slightly hard when dry, friable when moist, slightly sticky and slightly plastic when wet; common very fine roots; many very fine irregular pores; about 30 percent stones and 10 percent angular gravel; neutral; abrupt, smooth boundary. 1 to 3 inches thick.

B2t—6 to 8 inches, brown (7.5YR 4/4) extremely stony clay loam, dark brown (7.5YR 3/2) when moist; moderate, fine, subangular blocky structure; hard when dry, firm when moist, sticky and plastic when wet; common very fine roots; many very fine irregular pores; about 30 percent stones and 20 percent angular gravel; thin continuous clay films on ped surfaces; neutral; abrupt, smooth boundary. 2 to 4 inches thick.

R—8 inches, basalt.

The A horizon is grayish brown to very dark grayish brown or brown. The B2t horizon is loam, sandy clay loam, or clay loam. In places it has no clay films. The percent by volume of basalt gravel, cobblestones, or stones ranges from 35 to 75 percent.

Baldock Series

The Baldock series consists of somewhat poorly drained soils on low terraces and bottoms along the Payette and Snake Rivers. These soils formed in recent alluvium. Slopes are 0 to 2 percent. Elevation is 2,100 to 2,350 feet. Precipitation is 9 to 12 inches, mean annual air temperature is 50° to 52° F., and the frost-free season is 140 to 160 days.

In a representative profile the surface layer is gray silty clay loam about 23 inches thick. The substratum to a depth of about 48 inches is light brownish-gray silt loam. To a depth of 60 inches it is light brownish-gray fine sandy loam. The soil is moderately alkaline to very strongly alkaline. The upper 23 inches is slightly calcareous.

Permeability is moderately slow. The root zone is more than 60 inches deep and holds 10 to 13 inches of water available to plants. A seasonal high water table fluctuates between depths of 3 and 5 feet.

Baldock soils are used for irrigated crops, pasture, and wildlife.

Representative profile of Baldock silty clay loam (0 to 2 percent slopes), about 3 miles southeast of Payette, 390 feet north, 1,650 feet west of southwest corner of sec. 12, T. 8 N., R. 5 W., in an area used as pasture:

A11—0 to 11 inches, gray (2.5Y 6/1) silty clay loam, dark gray (10YR 4/1) when moist, very dark gray (10YR 3/1) when moist and crushed; weak, fine, subangular blocky structure; very hard when dry, firm when moist, sticky and plastic when wet; many fine roots; common very fine tubular and irregular pores; slightly calcareous; strongly alkaline; clear, smooth boundary. 6 to 12 inches thick.

A12—11 to 23 inches, gray (2.5Y 6/1) silty clay loam, dark gray (10YR 4/1) when moist, very dark gray (10YR 3/1) when moist and crushed; weak, medium and coarse, subangular blocky structure; very hard when dry, firm when moist, sticky and plastic when wet; common very fine roots and many fine roots; many very fine tubular pores; slightly calcareous; strongly alkaline; gradual, wavy boundary. 10 to 15 inches th k.

IIC1—23 to 48 inches, light brownish-gra 10YR 6/2) silt loam, dark grayish brown (R 4/2) when moist; few, fine, faint, yello -brown (10YR 5/4) mottles; weak, coarse, subangular blocky structure; very hard when dry, friable when moist, slightly sticky and slightly plastic when wet; few very fine roots; many very fine and few medium tubular pores; moderately alkaline; clear, smooth boundary. 17 to 26 inches thick.

IIIC2—48 to 60 inches, light brownish-gray (2.5Y 6/2) fine sandy loam, dark grayish brown (2.5Y 4/2) when moist; common, fine, distinct, reddish-brown (5YR 5/4) and light-brown (7.5YR 6/4) mottles; massive; very hard when dry, very friable when moist, nonsticky and nonplastic when wet; many very fine irregular pores; moderately alkaline.

The A horizon is light brownish gray, gray, or light gray. The IIC1 horizon is light brownish-gray or light-gray silt loam or loam. The IIIC2 horizon is white to light brownish-gray loam, silt loam, fine sandy loam, or sandy loam. Loose sand and gravel are below a depth of 40 inches in some places. Mottles are below a depth of 11 inches.

Baldock silt loam (0 to 2 percent slopes) (Ba).—This soil is along the Payette and Snake Rivers, in irregularly shaped areas 5 to 80 acres in size. It is outside the range defined for the Baldock series because it is less than 15 percent fine and coarser sand and less than 18 percent clay between depths of 10 and 40 inches. These differences, however, do not alter its use and behavior. In irregularly shaped spots, which make up to 5 percent of the mapping unit, the soluble salt content is slight or moderate and the exchangeable sodium content is moderate or high.

Included with this soil in mapping are small areas of Baldock soils that have a surface layer of loam or gravelly loam and areas of a soil that has a subsoil of silty clay loam but is otherwise similar to this Baldock soil. Also included are areas of Bowman, Chance, Moulton, and Notus soils.

Runoff is slow, and the erosion hazard is slight or none. The soil is used for alfalfa, corn, small grain, sugar beets, pasture, and wildlife. Capability unit IIIw–6 irrigated; windbreak suitability group 3.

Baldock silt loam, saline-alkali (0 to 2 percent slopes) (Bc).—This soil is in irregularly shaped areas 5 to 80 acres in size along the Payette and Snake Rivers. It is outside the range defined for the Baldock series because it is less than 15 percent fine and coarser sand and less than 18 percent clay between depths of 10 and 40 inches. These differences, however, do not alter its use and behavior. In about 5 to 35 percent of this mapping unit, the soil contains soluble salts and exchangeable sodium in amounts that impair plant growth (fig. 4). Included with this soil in mapping are small areas that have a loam surface layer and areas of Bowman, Chance, Moulton, and Notus soils.

Runoff is slow, and the erosion hazard is slight or none. The soil is used for alfalfa, corn, small grain, sugar beets, pasture, and wildlife. Capability unit IVw–3 irrigated; windbreak suitability group 3.

Baldock silt loam, strongly saline-alkali (0 to 2 percent slopes) (Bd).—This soil is in irregularly shaped areas 15 to 225 acres in size. It is outside the range defined for the Baldock series because it is less than 15 percent fine and coarser sand and less than 18 percent clay between depths of 10 and 40 inches. These differences, however, do not alter its use and behavior. A hardpan occurs at a depth of about 50 inches. The

Figure 4.—**Baldock silt loam, saline-alkali, along the Payette River. The bare spots are high in content of exchangeable sodium. Terrace escarpments is in the background.**

soil is very strongly alkaline to a depth of about 26 inches and strongly alkaline to a depth of 50 inches. Included in mapping are small areas of Chance soils.

Runoff is slow, and the erosion hazard is slight or none. The soil is used for corn, sugar beets, pasture, and wildlife. Capability unit IVw–3 irrigated.

Baldock silty clay loam (0 to 2 percent slopes) (Bk).—This soil is in long, irregularly shaped depressions 10 to 60 acres in size along the Payette and Snake Rivers. It has the profile described as representative of the series. Included in mapping are small areas of Letha soils and Baldock silt loam. Runoff is slow, and the erosion hazard is slight or none. The soil is used for alfalfa, corn, small grain, sugar beets, pasture, and wildlife. Capability unit IIIw–6 irrigated; windbreak suitability group 3.

Bowman Series

The Bowman series consists of poorly drained soils on low terraces and bottoms along the Payette and Snake Rivers. These soils formed in recent alluvium. Slopes are 0 to 2 percent. Elevation is 2,100 to 2,350 feet. Precipitation is 9 to 12 inches, mean annual air temperature is 50° to 52° F., and the frost-free season is 140 to 160 days.

In a representative profile the surface layer is grayish-brown loam about 14 inches thick. The substratum to a depth of about 32 inches is light-gray loam and fine sandy loam. To a depth of 60 inches it is white and reddish-yellow coarse sand and gravel. The soil is mildly alkaline to strongly alkaline. The upper 25 inches is calcareous.

Permeability is moderate. The root zone is more than 60 inches deep and holds 6 to 8 inches of water available to plants. A seasonal high water table fluctuates between depths of 1 and 3 feet.

Bowman soils are used for irrigated crops, pasture, and wildlife.

Representative profile of Bowman loam (0 to 2 percent slopes), west of Payette, 2,650 feet north, 480 feet west of the southeast corner of sec. 32, T. 9 N., R. 5 W., in an area used as pasture:

Apca—0 to 8 inches, grayish-brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) when moist; weak, fine, subangular blocky structure; hard when dry, friable when moist, slightly sticky and slightly plastic when wet; many fine and medium roots; many very fine tubular pores; moderately

calcareous; moderately alkaline; clear, smooth boundary. 8 to 14 inches thick.

A12ca—8 to 14 inches, grayish-brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) when moist; common, fine, faint, brown (10YR 4/3) mottles; weak, medium, subangular blocky structure; very hard when dry, friable when moist, slightly sticky and slightly plastic when wet; many very fine and fine roots; many very fine and few fine tubular pores; moderately calcareous, few lime veins and spots; strongly alkaline; clear, wavy boundary. 4 to 10 inches thick.

C1—14 to 25 inches, light-gray (2.5Y 6/1) loam and thin layers of sand, dark gray (2.5Y 4/1) when moist; many, medium, distinct, yellowish-brown (10YR 5/4) mottles and few brown (7.5YR 5/4) mottles; massive; hard when dry, friable when moist, slightly sticky and slightly plastic when wet; few very fine roots; common very fine tubular pores; slightly calcareous, few lime veins and spots; strongly alkaline; abrupt, smooth boundary. 8 to 15 inches thick.

IIC2—25 to 32 inches, light-gray (2.5Y 6/1) fine sandy loam, dark gray (2.5Y 4/1) when moist; many, medium, distinct, brown (7.5YR 5/4) mottles; massive; hard when dry, very friable when moist, slightly sticky and slightly plastic when wet; many very fine tubular pores; moderately alkaline; abrupt, smooth boundary. 6 to 8 inches thick.

IIIC3—32 to 60 inches, white (10YR 8/2) and reddish-yellow (7.5YR 8/6) coarse sand and gravel, light gray (2.5Y 7/2) and brown (7.5YR 5/4) when moist; single grained; loose when dry and moist, nonsticky and nonplastic when wet; mildly alkaline.

The A horizon is dark gray or grayish brown. The C1 and IIC2 horizons are light-gray or light brownish-gray loam to sandy loam. Loose sand and gravel are below a depth of 30 to 40 inches. The soil is moderately calcareous to slightly calcareous to a depth of about 24 inches. Depth to mottles is less than 10 inches.

Bowman loam (0 to 2 percent slopes) (Bo).—This soil is in irregularly shaped areas 5 to 50 acres in size along the Payette and Snake Rivers. It has the profile described as representative of the series. Included in mapping are small areas of Baldock, Moulton, Chance, and Notus soils. Runoff is slow, and the erosion hazard is slight or none. The soil is used for alfalfa, corn, small grain, sugar beets, pasture, and wildlife. Capability unit IIIw–6 irrigated; windbreak suitability group 3.

Cashmere Series

The Cashmere series consists of well-drained soils on fans, terraces, and stream bottoms. These soils formed in alluvium. Slopes are 0 to 12 percent. Elevation is 2,200 to 3,000 feet. The vegetation is perennial grasses, annual grasses, forbs, and brush in areas not irrigated. Precipitation is 10 to 12 inches, mean annual air temperature is 48° to 50° F., and the frost-free season is 140 to 155 days.

In a representative profile the surface layer is grayish-brown sandy loam about 10 inches thick. The subsoil is pale-brown sandy loam about 18 inches thick. The substratum extends to a depth of about 60 inches. The upper 18 inches is pale-brown sandy loam, and the lower 14 inches is light brownish-gray loamy sand. The soil is neutral in the surface layer and mildly alkaline below.

Permeability is moderately rapid. The root zone is more than 60 inches deep and holds 5 to 7 inches of water available to plants.

Cashmere soils are used for irrigated crops, pasture, range, and wildlife.

Representative profile of Cashmere sandy loam, 3 to 7 percent slopes, north of Payette, 900 feet south, 300 feet east of northwest corner of sec. 13, T. 9 N., R. 5 W., in an orchard:

Ap—0 to 10 inches, grayish-brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) when moist; weak, fine, granular structure; soft when dry, very friable when moist, nonsticky and nonplastic when wet; many very fine and fine roots; many very fine irregular pores; neutral; abrupt, smooth boundary. 8 to 12 inches thick.

B2—10 to 28 inches, pale-brown (10YR 6/3) sandy loam, dark brown (10YR 3/3) when moist; weak, coarse, prismatic structure; soft when dry, very friable when moist, nonsticky and nonplastic when wet; many very fine and medium roots; few very fine tubular pores; mildly alkaline; clear, smooth boundary. 14 to 20 inches thick.

C1—28 to 46 inches, pale-brown (10YR 6/3) sandy loam, brown (10YR 5/3) when moist; massive; soft when dry, very friable when moist, nonsticky and nonplastic when wet; few very fine roots; few very fine tubular pores; mildly alkaline; gradual, smooth boundary. 16 to 25 inches thick.

IIC2—46 to 60 inches, light brownish-gray (10YR 6/2) loamy sand, grayish brown (10YR 5/2) when moist; single grained; loose when dry and moist, nonsticky and nonplastic when wet; mildly alkaline; slightly calcareous.

The A horizon is grayish brown or dark grayish brown. The B horizon is light brownish-gray, pale-brown, or brown fine sandy loam to coarse sandy loam. The C horizon is very pale brown, pale-brown, or light brownish-gray sandy loam or coarse sandy loam above a depth of 40 inches and coarse sandy loam or loamy sand below. The soil is noncalcareous to a depth of 40 inches or more.

Cashmere sandy loam, 0 to 3 percent slopes (CaB).—This soil is in long strips and on alluvial fans in areas 10 to 80 acres in size. It has a profile similar to the one described as representative of the series, but the surface layer is 10 to 12 inches thick. Included with this soil in mapping are small areas of Harpt, Lolalita, and Tindahay soils. Also included are areas of a soil, similar to this Cashmere soil, that has a buried surface layer.

Runoff is slow. The erosion hazard is slight in nonirrigated areas and slight to moderate in irrigated areas. The soil is used for alfalfa, corn, small grain, orchards, sugar beets, pasture, potatoes, range, and wildlife. Capability units IIe–3 irrigated and VIc–1 nonirrigated; Loamy range site, 8- to 12-inch precipitation zone; windbreak suitability group 1.

Cashmere sandy loam, 3 to 7 percent slopes (CaC).—This soil is in strips and on alluvial fans 15 to 60 acres in size. It has the profile described as representative of the series. Included in mapping are small areas of Harpt, Lolalita, and Tindahay soils. Also included are areas of a soil, similar to this Cashmere soil, that has a buried surface layer.

Runoff is medium. The erosion hazard is moderate in nonirrigated areas and high in irrigated areas. The soil is used for alfalfa, corn, small grain, orchards, sugar beets, pasture, potatoes, range, and wildlife. Most of the melons grown in the county are on this soil (fig. 5). Capability units IIIe–3 irrigated and

Figure 5.—**Cantaloupe plants under hotcaps on Cashmere sandy loam, 3 to 7 percent slopes. Soils in the background are Lolalita-Saralegui association, steep. The area is about 4 miles north of Payette.**

VIe–2 nonirrigated; Loamy range site, 8- to 12-inch precipitation zone; windbreak suitability group 2.

Chance Series

The Chance series consists of poorly drained soils along channels or swales of the river bottoms. These soils formed in old alluvium. Slopes are 0 to 2 percent. Elevation is 2,100 to 2,300 feet. The vegetation is water-tolerant plants. Precipitation is 9 to 12 inches, mean annual air temperature is 50° to 52° F., and the frost-free season is 140 to 160 days.

In a representative profile the surface layer is grayish-brown fine sandy loam about 8 inches thick. The subsoil is gray fine sandy loam about 22 inches thick. The upper part of the substratum is light-gray sand about 18 inches thick. The lower part, to a depth of 60 inches, is gravel and sand. The soil is mildly alkaline and moderately alkaline.

Permeability is moderately rapid. The root zone is more than 60 inches deep and holds 5 to 7 inches of water available to plants. A seasonal high water table fluctuates between depths of 1 and 2 feet.

Chance soils are used for pasture and wildlife. They are not irrigated, but in places receive runoff from irrigated soils.

Representative profile of Chance fine sandy loam (0 to 2 percent slopes), southeast of Payette, 1,260 feet north and 150 feet west of center of sec. 14, T. 8 N., R. 5 W., in an area used as pasture:

A1g—0 to 8 inches, grayish-brown (2.5Y 5/2) fine sandy loam, very dark grayish brown (2.5Y 3/2) when moist; many, medium, faint, dark grayish-brown (10YR 4/2) mottles; weak, medium, granular structure; soft when dry, very friable when moist, nonsticky and nonplastic when wet; many fine roots; many very fine irregular pores; moderately alkaline; gradual, smooth boundary. 4 to 8 inches thick.

Bg1—8 to 24 inches, gray (5Y 5/1) fine sandy loam, very dark gray (5Y 3/1) when moist; many, medium, prominent, dark-brown (7.5YR 3/2) mottles; weak, fine, angular blocky structure; soft when dry, friable when moist, slightly sticky and slightly plastic when wet; common fine roots; many very fine tubular pores; mildly alkaline; abrupt, smooth boundary. 10 to 20 inches thick.

Bg2—24 to 30 inches, gray (5Y 5/1) fine sandy loam, very dark gray (5Y 3/1) when moist; many, medium, prominent, reddish-brown (5YR 4/4) mottles; massive; soft when dry, friable when moist, nonsticky and nonplastic when wet; many very fine tubular

pores; mildly alkaline; abrupt, smooth boundary. 4 to 6 inches thick.

IIC1g—30 to 48 inches, light-gray (2.5Y 7/2) sand, light brownish gray (2.5Y 6/2) when moist; many, fine, distinct, reddish-yellow (7.5YR 6/6) mottles; single grained; loose when dry and moist, nonsticky and nonplastic when wet; mildly alkaline; gradual, wavy boundary. 15 to 20 inches thick.

IIIC2—48 to 60 inches, gravel and sand.

The A horizon is grayish brown to very dark gray. The B horizon is gray fine sandy loam or sandy loam. Depth to sand or sand and gravel is 20 to 40 inches.

Chance fine sandy loam (0 to 2 percent slopes) (Ch).—This soil is in long, narrow to very narrow areas 5 to 160 acres in size. Included in mapping are very small areas of Notus, Moulton, and Bowman soils. Runoff is very slow or ponded, and the erosion hazard is slight to none. The soil is used for pasture and wildlife. Capability unit Vw nonirrigated.

Chilcott Series

The Chilcott series consists of well-drained soils on dissected high terraces. These soils formed in a thin layer of loess and in the underlying moderately coarse textured and coarse textured alluvial deposits. Slopes are 1 to 12 percent. Elevation is 2,300 to 2,800 feet. The vegetation is annual grasses, forbs, and shrubs in areas not irrigated. Precipitation is 9 to 11 inches, mean annual air temperature is 50° to 52° F., and the frost-free season is 140 to 160 days.

In a representative profile the surface layer is light-gray silt loam about 7 inches thick. The subsoil is about 16 inches thick. The upper 8 inches is brown clay, and the lower part is light yellowish-brown clay loam. The substratum to a depth of about 27 inches is very pale brown sandy loam. Below this is a strongly cemented or indurated hardpan that extends to a depth of about 50 inches. Below the pan is white and very pale brown sand. The soil is mildly alkaline in the surface layer and moderately alkaline below. The substratum just above the hardpan is strongly calcareous.

Permeability is slow over the hardpan. The root zone is 20 to 40 inches deep and holds 4 to 7 inches of water available to plants.

These soils are used for irrigated crops, pasture, range, and wildlife.

The Chilcott soils in Payette County are mapped only with Elijah soils.

Representative profile of Chilcott silt loam in an area of Elijah-Chilcott silt loams, 3 to 7 percent slopes, southeast of New Plymouth, 1,750 feet north, 75 feet west of the southeast corner of sec. 19, T. 6 N., R. 3 W., in an area used as range:

A2—0 to 7 inches, light-gray (10YR 7/2) silt loam, dark grayish brown (10YR 4/2) when moist; moderate, very thin, platy structure parting to very weak, very fine, granular; soft when dry, very friable when moist, slightly sticky and slightly plastic when wet; many very fine roots; many very fine and medium vesicular pores; mildly alkaline; abrupt, smooth boundary. 5 to 10 inches thick.

B2t—7 to 15 inches, brown (10YR 5/3) clay, dark brown (10YR 4/3) when moist; moderate, coarse, prismatic structure parting to strong, medium, subangular blocky; very hard when dry, firm when moist, very sticky and very plastic when wet; many very fine roots; few very fine tubular pores; medium continuous clay films on vertical surfaces; light-gray (10YR 7/2) coatings on top of peds; moderately alkaline; clear, smooth boundary. 7 to 14 inches thick.

B3—15 to 23 inches, light yellowish-brown (10YR 6/4) clay loam, dark brown (10YR 4/3) when moist; weak, coarse, subangular blocky structure; hard when dry, friable when moist, sticky and plastic when wet; few very fine roots; many very fine tubular pores; few thin clay films on peds; moderately alkaline; abrupt, wavy boundary. 4 to 12 inches thick.

C1ca—23 to 27 inches, very pale brown (10YR 7/3) sandy loam, yellowish brown (10YR 5/4) when moist; massive; hard when dry, friable when moist, nonsticky and nonplastic when wet; few very fine roots; common very fine tubular pores; strongly calcareous; moderately alkaline; abrupt, wavy boundary. 0 to 8 inches thick.

C2sicam—27 to 50 inches, white (10YR 8/2) hardpan, light reddish-brown (5YR 6/3) root mat, very pale brown (10YR 7/3) with reddish-brown (5YR 4/4) coats when moist; extremely hard when dry, extremely firm when moist, hardest in upper 4 to 5 inches and gets softer with depth; mainly strongly cemented, but upper part indurate; very strongly calcareous; moderately alkaline; gradual, smooth boundary. 15 to 25 inches thick.

IIC3—50 to 60 inches, white (10YR 8/2) and very pale brown (10YR 7/4) quartz sand, white (10YR 8/2) and yellow (10YR 7/6) when moist; single grained; loose when dry and moist, nonsticky and nonplastic when wet; moderately calcareous; moderately alkaline.

In areas under sagebrush this soil has a thin discontinuous A1 horizon of grayish-brown silt loam. The A2 horizon is light gray or light brownish gray. The B2t horizon is clay, silty clay, sandy clay, or clay loam. It has prismatic, columnar, angular blocky, or subangular blocky structure. Depth to the calcareous material ranges from 15 to 25 inches. Depth to the hardpan ranges from 20 to 40 inches.

Clems Series

The Clems series consists of well-drained soils formed in wind- and water-deposited sandy loam and silt loam soil material on the intermediate terrace northeast of Payette and also on the terrace west of Fruitland. Slopes are 0 to 30 percent. Elevation is 2,200 to 2,500 feet. Precipitation is 9 to 11 inches, mean annual air temperature is 50° to 52° F., and the frost-free season is 140 to 160 days.

In a representative profile the surface layer is grayish-brown fine sandy loam about 9 inches thick. The subsoil is brown fine sandy loam about 24 inches thick. The upper part of the substratum is 19 inches of light brownish-gray fine sandy loam. The lower part to a depth of 60 inches is light-gray and white silt loam. The soil is neutral to a depth of about 52 inches and moderately alkaline and calcareous below.

Permeability is moderately rapid. The root zone is more than 60 inches deep and holds 8 to 10 inches of water available to plants.

Clems soils are used for irrigated crops, homesites, and wildlife.

Representative profile of Clems fine sandy loam, 0 to 3 percent slopes, northwest of Fruitland, 100 feet south, 1,200 feet west of the center of sec. 15, T. 8 N., R. 5 W., in an orchard:

Ap—0 to 9 inches, grayish-brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) when moist; weak, thin, platy structure parting to weak, very fine, granular; soft when dry, very friable when moist, nonsticky and nonplastic when wet; many fine and few coarse roots; many very fine irregular pores; neutral; abrupt, smooth boundary. 3 to 10 inches thick.

B21—9 to 19 inches, brown (10YR 5/3) fine sandy loam, very dark grayish brown (10YR 3/2) when moist; very weak, coarse, prismatic structure parting to very weak, medium and coarse, subangular blocky; soft when dry, very friable when moist, nonsticky and nonplastic when wet; many fine and few coarse roots; very thin slightly darker coatings on vertical faces of prisms; common very fine irregular pores; neutral; clear, smooth boundary. 3 to 12 inches thick.

B22—19 to 33 inches, brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) when moist; weak, medium, subangular blocky structure and weak, ¼- to ¾-inch nodules; hard when dry, very friable when moist, nonsticky and nonplastic when wet; many fine and few coarse roots; common very fine irregular pores; neutral; gradual, smooth boundary. 10 to 20 inches thick.

C1—33 to 52 inches, light brownish-gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) when moist; massive; soft when dry, very friable when moist, nonsticky and nonplastic when wet; few very fine roots; common very fine irregular pores; neutral; abrupt, smooth boundary. 7 to 25 inches thick.

IIC2ca—52 to 58 inches, light-gray (10YR 7/2) silt loam, grayish brown (10YR 5/2) when moist; massive; very hard when dry, very firm when moist, nonsticky and nonplastic when wet; slightly calcareous nodules of soil material surrounded by strongly calcareous matrix; moderately alkaline; abrupt, smooth boundary. 0 to 12 inches thick.

IIC3ca—58 to 60 inches, white (10YR 8/2) silt loam; massive; very hard when dry, very firm when moist, nonsticky and nonplastic when wet; strongly calcareous; moderately alkaline.

The A1 horizon is grayish brown, brown, or light brownish gray. The C1 horizon is light brownish-gray, pale-brown, or light-gray fine sandy loam or loamy fine sand. Layers of silt loam, loam, sandy loam, loamy sand, or sand are below a depth of 40 inches. Depth to lime ranges from 45 to 60 inches.

Clems fine sandy loam, 0 to 3 percent slopes (C1B).—This soil is in long areas 10 to 1,200 acres in size. It has the profile described as representative of the series. Included with it in mapping are small areas of Owyhee soils and areas of a soil that has a surface layer of light-gray loamy fine sand. Runoff is slow, and the erosion hazard is slight to moderate. The soil is used for alfalfa, corn, potatoes, orchards (fig. 6), small grain, sugar beets, pasture, homesites, and wild-

Figure 6.—**Prune orchard west of Fruitland on Clems fine sandy loam, 0 to 3 percent slopes. The soil is well suited to orchards. The cover crop is orchardgrass.**

life. Capability unit IIe–3 irrigated; windbreak suitability group 1.

Clems fine sandy loam, 3 to 7 percent slopes (ClC).—This soil is in long, narrow areas 10 to 150 acres in size. It has a profile similar to the one described as representative of the series, but the surface layer is 6 to 8 inches thick. Included with this soil in mapping are small areas of Owyhee soils and areas of a soil that has a surface layer of light-gray loamy fine sand. Runoff is medium, and the erosion hazard is high. The soil is used for alfalfa, corn, potatoes, orchards, small grain, sugar beets, pasture, and wildlife. Capability unit IIIe–3 irrigated; windbreak suitability group 2.

Clems fine sandy loam, 7 to 12 percent slopes (ClD).—This soil is in long, narrow areas 10 to 160 acres in size. It has a profile similar to the one described as representative of the series, but the surface layer is 4 to 6 inches thick. Included with this soil in mapping are small areas of a soil that has a surface layer of light-gray loamy fine sand. Runoff is medium, and the erosion hazard is very high. The soil is used for alfalfa, small grain, orchards, pasture, and wildlife. Capability unit IVe–2 irrigated; windbreak suitability group 2.

Clems fine sandy loam, 12 to 30 percent slopes (ClE).—This soil is in long areas 10 to 40 acres in size. It has a profile similar to the one described as representative of the series, but the surface layer is 3 to 6 inches thick. Included with this soil in mapping are small areas of a soil that has a surface layer of brown or pale-brown loamy fine sand. Runoff is medium. The erosion hazard is high in nonirrigated areas and very high in irrigated areas. The soil is used for alfalfa, pasture, and wildlife. Capability units VIe–1 irrigated and VIe–2 nonirrigated.

Elijah Series

The Elijah series consists of well-drained soils on high terraces. These soils formed in a thin layer of loess and in the underlying medium-textured to coarse-textured alluvial deposits. Slopes are 1 to 12 percent. Elevation is 2,300 to 2,800 feet. The vegetation is annual grasses, forbs, and shrubs in areas not irrigated. Precipitation is 9 to 11 inches, mean annual air temperature is 50° to 52° F., and the frost-free season is 140 to 160 days.

In a representative profile the surface layer is light brownish-gray silt loam about 12 inches thick. The subsoil is brown silty clay loam about 13 inches thick. The substratum is about 8 inches of pale-brown loam over an indurated silica-calcium carbonate hardpan at a depth of 33 inches. The soil is moderately alkaline, and the substratum is slightly calcareous.

Permeability is moderately slow over the hardpan. The root zone is 20 to 40 inches deep and holds 3 to 8 inches of water available to plants.

These soils are used for irrigated crops, range, and wildlife.

The Elijah soils in Payette County are mapped only with Chilcott, Power, Sebree, and Vickery soils.

Representative profile of Elijah silt loam in an area of Elijah-Chilcott silt loams, 3 to 7 percent slopes, north of New Plymouth, 1,700 feet north, 2,000 feet east of southwest corner of sec. 13, T. 8 N., R. 4 W., in an area used as range:

A21—0 to 6 inches, light brownish-gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) when moist; moderate, thin, platy structure parting to moderate, fine and very fine, granular; soft when dry, friable when moist, nonsticky and nonplastic when wet; many very fine and fine roots; common very fine tubular pores; moderately alkaline; abrupt, smooth boundary. 4 to 7 inches thick.

A22—6 to 12 inches, light brownish-gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) when moist; moderate, medium, subangular blocky structure; slightly hard when dry, firm when moist, slightly sticky and slightly plastic when wet; few very fine roots; many very fine tubular pores; moderately alkaline; abrupt, smooth boundary. 0 to 7 inches thick.

B21t—12 to 17 inches, brown (10YR 5/3) silty clay loam, dark brown (10YR 4/3) when moist; weak, medium, prismatic structure parting to strong, medium and coarse, subangular blocky; hard when dry, very firm when moist, sticky and plastic when wet; many very fine tubular pores; medium, nearly continuous, dark grayish-brown (10YR 4/2) when moist clay films on vertical and horizontal ped faces and pore surfaces; moderately alkaline; clear, smooth boundary. 3 to 7 inches thick.

B22t—17 to 25 inches, brown (10YR 5/3) silty clay loam, dark brown (10YR 4/3) when moist; moderate, coarse, subangular blocky structure; hard when dry, very firm when moist, sticky and plastic when wet; many very fine tubular pores; medium, patchy, dark grayish-brown (10YR 4/2) clay films on vertical and horizontal ped faces and pore surfaces; moderately alkaline; abrupt, smooth boundary. 4 to 9 inches thick.

IIC1ca—25 to 33 inches, pale-brown (10YR 6/3) loam, dark yellowish brown (10YR 4/4) when moist; massive; very hard when dry, very firm when moist, nonsticky and nonplastic when wet; many very fine tubular pores; slightly calcareous; moderately alkaline; abrupt, smooth boundary. 0 to 14 inches thick.

IIC2sicam—33 to 36 inches, alternate layers of silica and silica calcium carbonate, 1 to 2 millimeters thick, in an indurated pan that is about 1 inch thick over strongly calcareous material that is similar to the IIC1ca horizon, but has splotches and veins of calcium carbonate that is about 1 inch thick over another indurated pan.

IIC3—36 to 60 inches, white (10YR 8/2) and very pale brown (10YR 7/4) quartz sand, white (10YR 8/2) and yellow (10YR 7/6) when moist; single grained; loose when dry and moist, nonsticky and nonplastic when wet; moderately calcareous; moderately alkaline.

The A horizon is light brownish gray or pale brown. The B2t horizon is clay loam or silty clay loam. Depth to the Cca horizon is 12 to 30 inches. Depth to the hardpan ranges from 20 to 40 inches. The pan is strongly cemented to indurated. It overlies loam, sandy loam, sand, or gravel.

Elijah-Chilcott silt loams, 3 to 7 percent slopes (EcC).—This mapping unit is about 50 percent Elijah silt loam, 20 percent Chilcott silt loam, and 20 percent Vickery silt loam. Chilcott, Elijah, and Vickery soils have the profiles described as representative of their respective series. Elijah and Chilcott soils are in depressions between low mounds of Vickery soil. In irrigated areas the mounds have been leveled.

Included with these soils in mapping are small areas that are about 10 percent Lankbush, Power, Purdam, and Sebree soils. Also included are areas of a light

brownish-gray silt loam that is less than 20 inches deep over a hardpan and areas where the soil has been deep plowed to a depth of about 35 inches.

Runoff is medium. The erosion hazard is moderate in nonirrigated areas and high in irrigated areas. This mapping unit is used for alfalfa, corn, small grain, orchards, sugar beets, potatoes, pasture, range, and wildlife. Capability units IIIe–8 irrigated and VIe–2 nonirrigated; Loamy range site, 8- to 12-inch precipitation zone; windbreak suitability group 2.

Elijah-Sebree silt loams, 1 to 3 percent slopes (EeB).—This mapping unit is about 50 percent Elijah silt loam, 20 percent Vickery silt loam, 15 percent Chilcott silt loam, and 10 percent Sebree silt loam. The Sebree soil has the profile described as representative of the Sebree series. Elijah, Chilcott, and Sebree soils are in depressions between low mounds of Vickery soils. In irrigated areas the mounds have been leveled.

Included with these soils in mapping are small areas that are about 5 percent Lankbush soils and a light brownish-gray silt loam that is less than 20 inches deep over a hardpan. Also included are areas where the soil has been deep plowed to a depth of about 35 inches.

Runoff is slow. The erosion hazard is slight in nonirrigated areas and moderate in irrigated areas. This mapping unit is used for alfalfa, corn, small grain, orchards, sugar beets, potatoes, pasture, range, and wildlife. Capability units IIIe–6 irrigated and VIc–1 nonirrigated; Loamy range site, 8- to 12-inch precipitation zone; windbreak suitability group 1 for Elijah soil, Sebree is unsuitable.

Elijah-Vickery silt loams, 7 to 12 percent slopes (ElD).—This mapping unit is about 65 percent Elijah silt loam and 30 percent Vickery silt loam. These soils have profiles similar to those described as representative of their series, but the surface layer is 2 or 3 inches thinner. Elijah soils are in depressions between low mounds of Vickery soils. In irrigated areas the mounds have been leveled. Included with these soils in mapping are small areas that are about 5 percent Chilcott, Lankbush, and Sebree soils and areas where the soil has been deep plowed to a depth of about 35 inches.

Runoff is medium. The erosion hazard is moderate in nonirrigated areas and very high in irrigated areas. This mapping unit is used for alfalfa, corn, small grain, orchards, pasture, range, and wildlife. Capability units IVe–1 irrigated and VIe–2 nonirrigated; Loamy range site, 8- to 12-inch precipitation zone; windbreak suitability group 2.

Elijah-Vickery silt loams, 7 to 12 percent slopes, eroded (ElD2).—This mapping unit is about 55 percent Elijah silt loam and 40 percent Vickery silt loam. These soils have profiles similar to the ones described as representative of their series, but 5 to 10 inches of the original surface layer has been removed by erosion and the present surface layer is a mixture of subsoil and plow layer material. Elijah soils are in depressions between mounds of Vickery silt loam. In irrigated areas the mounds have been leveled. Included in mapping are small areas that are about 5 percent Lankbush and Sebree soils and areas where the soil has been deep plowed to a depth of about 35 inches.

Runoff is medium. The erosion hazard is moderate in nonirrigated areas and very high in irrigated areas. This mapping unit is used for alfalfa, corn, small grain, orchards, pasture, range, and wildlife. Capability units IVe–1 irrigated and VIe–2 nonirrigated; Loamy range site, 8- to 12-inch precipitation zone; windbreak suitability group 2.

Emerson Series

The Emerson series consists of well-drained soils on river and stream bottoms. These soils formed in alluvium. Slopes are 0 to 2 percent. Elevation is 2,100 to 2,350 feet. Precipitation is 9 to 12 inches, mean annual air temperature is 50° to 52° F., and the frost-free season is 140 to 160 days.

In a representative profile the surface layer is pale-brown sandy loam about 12 inches thick. The upper part of the substratum is pale-brown sandy loam about 14 inches thick. The middle part is about 10 inches of pale-brown loamy coarse sand. The lower part to a depth of 60 inches is white and yellow sand. The soil is neutral and mostly noncalcareous. It is slightly calcareous in the upper part of the substratum.

Permeability is moderately rapid. The root zone is more than 60 inches deep and holds 3 to 6 inches of water available to plants.

Emerson soils are used for irrigated crops, pasture, and wildlife.

Representative profile of Emerson sandy loam (0 to 2 percent slopes), south of New Plymouth, 1,420 feet west of northeast corner of sec. 27, T. 7 N., R. 4 W., in a cultivated field:

A1—0 to 12 inches, pale-brown (10YR 6/3) sandy loam, dark grayish brown (10YR 4/2) when moist; weak, very fine, granular structure; slightly hard when dry, friable when moist, nonsticky and nonplastic when wet; many very fine, fine, and medium roots; neutral; abrupt, smooth boundary. 5 to 14 inches thick.

C1—12 to 26 inches, pale-brown (10YR 6/3) sandy loam, dark grayish brown (10YR 4/2) when moist; very weak, coarse, subangular blocky structure; hard when dry, friable when moist, nonsticky and nonplastic when wet; few very fine roots; few very fine tubular pores; slightly calcareous; neutral; clear, smooth boundary. 12 to 28 inches thick.

IIC2—26 to 36 inches, pale-brown (10YR 6/3) loamy coarse sand, brown (10YR 5/3) when moist; massive; loose when dry, very friable when moist, nonsticky and nonplastic when wet; few very fine roots; neutral; abrupt, smooth boundary. 10 to 20 inches thick.

IIIC3—36 to 60 inches, mostly white (10YR 8/2) and some yellow (10YR 8/6) coarse sand; single grained; loose when dry and moist, nonsticky and nonplastic when wet; neutral.

The A horizon is light brownish gray, pale brown, or grayish brown. The profile is sandy loam, fine sandy loam, or coarse sandy loam to a depth of 20 to 40 inches and is underlain by coarse sand, loose gravel, or loamy coarse sand. In some places a small amount of carbonates is on the underside of pebbles in the lower part of the profile.

Emerson sandy loam (0 to 2 percent slopes) (Em).—This soil is in irregularly shaped areas 10 to 600

acres in size. Included in mapping are small areas of Notus, Falk, and Moulton soils. Runoff is slow, and the erosion hazard is slight to moderate. The soil is used for alfalfa, corn, small grain, potatoes, sugar beets, pasture, and wildlife. Capability unit IIe–3 irrigated; windbreak suitability group 5.

Falk Series

The Falk series consists of somewhat poorly drained soils on stream bottoms. These soils formed in alluvium. Slopes are 0 to 2 percent. Elevation is 2,100 to 2,400 feet. Precipitation is 9 to 12 inches, mean annual air temperature is 50° to 52° F., and the frost-free season is 140 to 160 days.

In a representative profile the surface layer is grayish-brown fine sandy loam about 10 inches thick. The upper part of the substratum is grayish-brown and pale-brown fine sandy loam about 25 inches thick. The lower part to a depth of 60 inches is white and reddish-yellow sand and gravel. The soil is neutral throughout.

Permeability is moderately rapid. The root zone is more than 60 inches deep and holds 6 to 7 inches of water available to plants. A seasonal high water table fluctuates between depths of 3 and 4 feet.

Falk soils are used for irrigated crops and wildlife.

Representative profile of Falk fine sandy loam (0 to 2 percent slopes), southeast of Payette, 2,260 feet east, 770 feet south of the northwest corner sec. 13, T. 8 N., R. 5 W., in a cultivated field:

Ap—0 to 10 inches, grayish-brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) when moist; very weak, very fine, granular structure; slight hard when dry, very friable when moist, nonsticky and nonplastic when wet; few fine and medium roots; many fine and very fine pores; neutral; abrupt, smooth boundary. 5 to 10 inches thick.

C1—10 to 16 inches, grayish-brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) when moist; weak, coarse, subangular blocky structure; slightly hard when dry, very friable when moist, nonsticky and nonplastic when wet; many fine roots; few coarse and common fine pores; neutral; clear, wavy boundary. 4 to 12 inches thick.

C2—16 to 26 inches, pale-brown (10YR 6/3) fine sandy loam, dark brown (10YR 4/3) when moist; very weak, medium and coarse, subangular structure; slightly hard when dry, friable when moist, nonsticky and nonplastic when wet; few fine and coarse roots; many very fine and fine tubular pores; neutral; gradual, wavy boundary. 6 to 15 inches thick.

C3—26 to 35 inches, pale-brown (10YR 6/3) fine sandy loam, dark yellowish brown (10YR 4/4) when moist; few, medium, faint, gray (10YR 6/1) mottles and few, medium, distinct, yellowish-brown (10YR 5/4) mottles; very weak, medium, subangular blocky structure; soft when dry, very friable when moist, nonsticky and nonplastic when wet; few fine and coarse roots; few very fine, fine, and medium tubular pores; neutral; abrupt, smooth boundary. 6 to 20 inches thick.

IIC4—35 to 60 inches, white (10YR 8/2) and reddish-yellow (7.5YR 8/6) sand and gravel, light gray (2.5Y 7/2) and brown (7.5YR 5/4) when moist; single grained; loose when dry and moist, nonsticky and nonplastic when wet; neutral.

The A horizon is light brownish gray, grayish brown, or pale brown. The C horizon is fine sandy loam or sandy loam. Depth to loose sand or gravel is 20 and 40 inches. Depth to mottles also is 20 to 40 inches.

Falk fine sandy loam (0 to 2 percent slopes) (Fa).—This soil is in oval-shaped areas 5 to 30 acres in size along the Payette and Snake Rivers. Included with it in mapping are Chance, Notus, and Moulton soils. Runoff is slow, and the erosion hazard is slight or none. The soil is used for alfalfa, corn, small grain, sugar beets, potatoes, pasture, and wildlife. Capability unit IIIw–1 irrigated; windbreak suitability group 4.

Gem Series

The Gem series consists of well-drained soils. These soils formed in material weathered from basalt. Slopes are 2 to 65 percent. Elevation is 3,000 to 4,650 feet. The vegetation is perennial grasses, annual grasses, forbs, and shrubs. Precipitation is 13 to 15 inches, mean annual air temperature is 45° to 50° F., and the frost-free season is 115 to 135 days.

In a representative profile the surface layer is grayish-brown extremely stony clay loam about 11 inches thick. The subsoil is grayish-brown and pinkish-gray gravelly clay about 12 inches thick. The substratum is yellow decomposed basalt about 4 inches thick over bedrock. The soil is neutral and mildly alkaline. It is slightly calcareous above the bedrock.

Permeability is slow over the basalt. The root zone is 20 to 40 inches deep and holds 3 to 7 inches of water available to plants.

Gem soils are used for range, wildlife, and watershed.

Representative profile of Gem extremely stony clay loam in an area of Gem-Bakeoven complex, 2 to 30 percent slopes, in the northeast corner of the county, 2,100 feet east, 780 feet north of southwest corner of sec. 30, T. 9 N., R. 1 W., in a noncultivated area:

A1—0 to 3 inches, grayish-brown (10YR 5/2) extremely stony clay loam, very dark grayish brown (10YR 3/2) when moist; weak, thin, platy structure; slightly hard when dry, friable, when moist, sticky and plastic when wet; many very fine roots; many very fine irregular pores; about 15 percent stones and 10 percent angular gravel; neutral; clear, wavy boundary. 2 to 5 inches thick.

A3—3 to 11 inches, grayish-brown (10YR 5/2) extremely stony clay loam, very dark grayish brown (10YR 3/2) when moist; weak, fine and medium, subangular blocky structure; slightly hard when dry, friable when moist, sticky and plastic when wet; many very fine roots and few coarse roots; many very fine tubular pores; about 15 percent stones and 20 percent angular gravel; mildly alkaline; clear, wavy boundary. 2 to 10 inches thick.

B1t—11 to 17 inches, grayish-brown (10YR 5/2) gravelly clay loam, dark brown (10YR 3/3) when moist; moderate, medium, prismatic structure parting to moderate, medium and coarse, subangular blocky; hard when dry, firm when moist, very sticky and very plastic when wet; many very fine roots; common very fine tubular pores; about 5 percent stones and 25 percent angular gravel; mildly alkaline; abrupt, wavy boundary. 2 to 6 inches thick.

B2t—17 to 23 inches, pinkish-gray (7.5YR 6/2) gravelly clay, dark brown (7.5YR 4/3) when moist; moderate, medium, prismatic structure parting to moderate, coarse, subangular blocky; extremely hard when dry, extremely firm when moist, very sticky and very plastic when wet; few very fine roots;

few very fine tubular pores; about 5 percent stones and 25 percent angular gravel; medium continuous clay films on all surfaces; slickensides 10° to 45° from horizontal; neutral; clear, smooth boundary. 5 to 23 inches thick.

C—23 to 27 inches, yellow (10YR 7/6) highly decomposed basalt with clay in the cracks, yellowish brown (10YR 5/6) when moist; slightly calcareous; mildly alkaline; abrupt, wavy boundary. 2 to 8 inches thick.

R—27 inches, basalt bedrock.

The A horizon is dark grayish brown or grayish brown. The B2t horizon ranges from light brownish-gray to pinkish-gray heavy clay loam or clay. Reaction is slightly acid to mildly alkaline. Depth to lime is 20 inches or more, and depth to bedrock is 20 to 40 inches.

Gem-Bakeoven complex, 2 to 30 percent slopes (GBE).—This mapping unit is about 55 percent Gem extremely stony clay loam and 30 percent Bakeoven extremely stony loam. The Gem soil has the profile described as representative of the Gem series. It is in long, narrow, oval-shaped mounds on the tops and sides of ridges. The Bakeoven soil is between the mounds.

Included with these soils in mapping are small areas where the surface layer is clay loam, areas of stony Reywat soils, and small areas of Rock outcrop. Also included are areas of a soil that is similar to this Gem soil but is more than 40 inches deep over basalt bedrock.

Runoff is medium or rapid, and the erosion hazard is moderate to high. This mapping unit is used for range, wildlife, and watershed. Capability unit VIIs–1 nonirrigated; Gem soil in Stony range site, 12- to 16-inch precipitation zone; Bakeoven soil in Very Shallow range site, 8- to 16-inch precipitation zone.

Gem-Bakeoven complex, 30 to 65 percent slopes (GBF).—This mapping unit is about 50 percent Gem extremely stony clay loam and 40 percent Bakeoven extremely stony loam. The Gem soil is in long, narrow mounds on side slopes. The Bakeoven soil is between the mounds.

Included with these soils in mapping are small areas that are stony, others that are nonstony, and small areas of Rock outcrop and Gross and Reywat soils. Also included are areas of a soil that is similar to this Gem soil but is more than 40 inches deep over basalt bedrock.

Runoff is very rapid, and the erosion hazard is very high. This mapping unit is used for range, wildlife, and watershed. Capability unit VIIs–1 nonirrigated; Gem soil in Steep Stony Slope range site, 12- to 16-inch precipitation zone; Bakeoven soil in Very Shallow range site, 8- to 16-inch precipitation zone.

Greenleaf Series

The Greenleaf series consists of well-drained soils on intermediate terraces. These soils formed in alluvial and lacustrine sediment. Slopes are 0 to 30 percent. Elevation is 2,200 to 2,700 feet. Precipitation is 9 to 12 inches, mean annual air temperature is 50° to 52° F., and the frost-free season is 140 to 160 days.

In a representative profile (fig. 7) the surface layer is light brownish-gray silt loam about 10 inches thick.

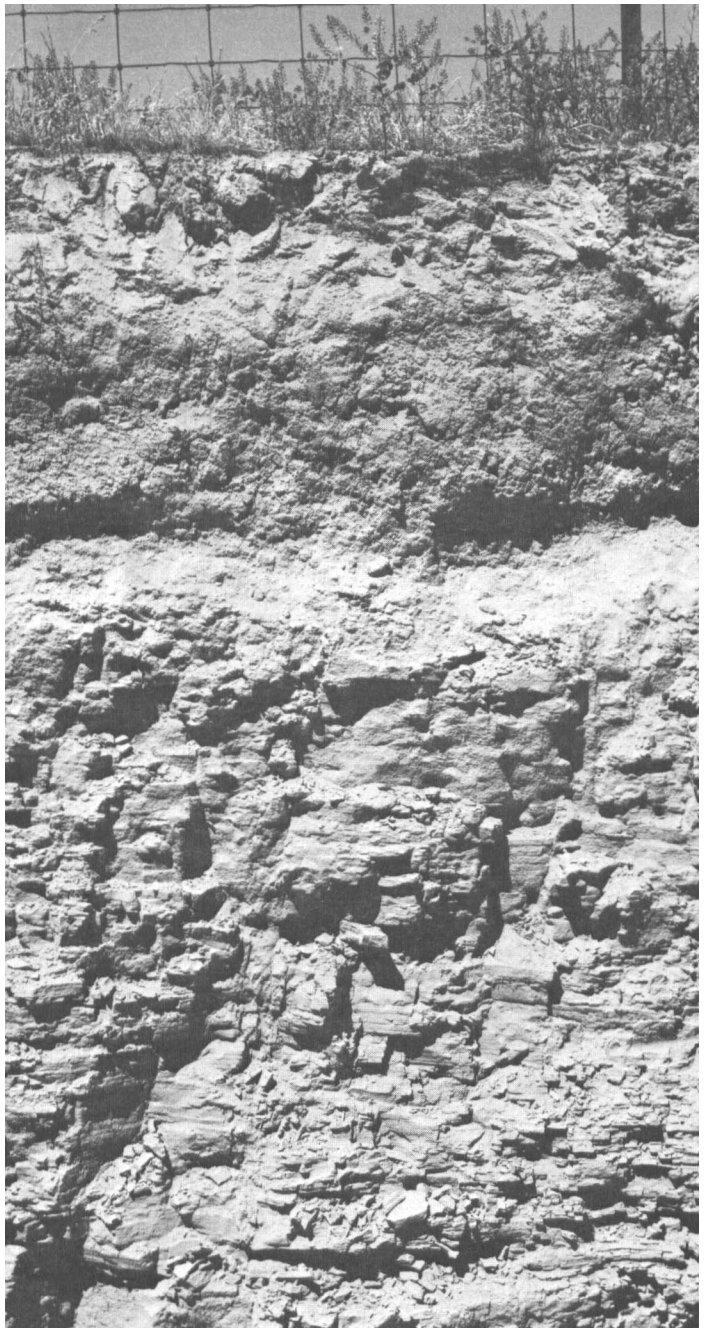

***Figure* 7.—Profile of a Greenleaf silt loam about 5 feet thick. The A horizon is 12 inches of weak granular silt loam. The B horizon is about 12 inches of subangular blocky silty clay loam. The 6-inch layer below the B horizon is a silty Clca horizon. The lower half of the profile consists of laminated lacustrine sediments.**

The upper part of the subsoil is light brownish-gray heavy silt loam about 16 inches thick. The lower part is light-gray silty clay loam about 7 inches thick. The substratum to a depth of 60 inches is light-gray silt. The soil is moderately alkaline in the surface layer and strongly alkaline to mildly alkaline in the subsoil and substratum. It is calcareous in the lower part of the subsoil and in the substratum.

Permeability is moderately slow. The root zone is more than 60 inches deep and holds 11 to 13 inches of water available to plants. The soil is deep enough that deep cuts can be made in leveling for irrigation. Slopes as much as 12 percent are generally leveled to less than 1 percent.

Greenleaf soils are used for irrigated crops, wildlife, and homesites.

Representative profile of Greenleaf silt loam, 0 to 1 percent slopes, west of New Plymouth, 140 feet north, 40 feet west of the center of the NW¼ sec. 8, T. 7 N., R. 4 W., in a cultivated field:

Ap—0 to 10 inches, light brownish-gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) when moist; weak, medium and fine, granular structure; slightly hard when dry, friable when moist, slightly sticky and slightly plastic when wet; many very fine and fine roots; common fine irregular pores; moderately alkaline; abrupt, smooth boundary. 6 to 14 inches thick.

B21t—10 to 17 inches, light brownish-gray (10YR 6/2) heavy silt loam, dark grayish brown (10YR 4/2) when moist; moderate, coarse, prismatic structure parting to weak, coarse, subangular blocky; very hard when dry, firm when moist, sticky and plastic when wet; many very fine roots; few fine tubular pores; medium continuous clay films on peds and in pores; common fine manganese concretions; mildly alkaline; clear, wavy boundary. 5 to 8 inches thick.

B22t—17 to 26 inches, light brownish-gray (10YR 6/2) heavy silt loam, dark grayish brown (10YR 4/2) when moist; moderate, medium, subangular blocky structure; hard when dry, firm when moist, slightly sticky and slightly plastic when wet; many very fine and few coarse roots; common very fine tubular pores; medium continuous clay films on peds and in pores; slightly calcareous; mildly alkaline; clear, smooth boundary. 0 to 10 inches thick.

B3tca—26 to 33 inches, light-gray (2.5Y 7/2) light silty clay loam, grayish brown (2.5Y 5/2) when moist; weak, medium, subangular blocky structure; hard when dry, firm when moist, slightly sticky and slightly plastic when wet; few very fine and coarse roots; common very fine tubular pores; moderately calcareous; strongly alkaline; abrupt, wavy boundary. 2 to 7 inches thick.

C1ca—33 to 42 inches, light-gray (10YR 7/1) silt, light brownish gray (10YR 6/2) when moist; strong, thin, platy structure and weak, medium, subangular blocky; hard when dry, firm when moist, slightly sticky and slightly plastic when wet; few very fine roots; common very fine tubular pores; strongly calcareous; moderately alkaline; abrupt, smooth boundary. 6 to 13 inches thick.

C2ca—42 to 60 inches, light-gray (10YR 7/2) silt, grayish brown (10YR 5/2) when moist; strong, thin, platy structure; extremely hard when dry, very firm when moist, slightly sticky and slightly plastic when wet; few very fine tubular pores; moderately calcareous; moderately alkaline.

The A horizon is light brownish gray or light gray. The B2t horizon is light brownish gray or pale brown and has a weighted average clay content of 18 to 28 percent. The C horizon is light gray or pale brown. Strata or pockets of sand occur in places in the C horizon. The depth to lime ranges from 16 to 24 inches. In a few places the platy structure is very weakly cemented on the top surface of the plates. The cemented areas are discontinuous and do not prevent downward movement of water or roots.

Greenleaf silt loam, 0 to 1 percent slopes (GeA).—This soil is in irregularly shaped areas 10 to 360 acres in size. It has the profile described as representative of the series. Included in mapping are small areas of the Greenleaf wet variant, the Nyssaton and Owyhee soils, and alkali spots. Runoff is very slow, and the erosion hazard is slight or none. The soil is used for alfalfa, corn, mint, small grain, potatoes, sugar beets, onions, orchards, pasture, wildlife, and homesites. Capability unit I–1 irrigated; windbreak suitability group 1.

Greenleaf silt loam, 1 to 3 percent slopes (GeB).—This soil is in irregularly shaped areas 10 to 160 acres in size. Included in mapping are areas of the Greenleaf wet variant, the Nyssaton and Owyhee soils, and alkali spots. Also included are areas where the soil has been deep plowed to a depth of about 35 inches. Runoff is slow, and the erosion hazard is moderate. The soil is used for alfalfa, corn, mint, orchards, onions, potatoes, small grain, sugar beets, pasture, wildlife, and homesites. Capability unit IIe–2 irrigated; windbreak suitability group 1.

Greenleaf silt loam, 3 to 7 percent slopes (GeC).—This soil is in long, narrow areas 5 to 80 acres in size. It has a profile similar to the one described as representative of the series, but the surface layer is about 8 inches thick. Included with this soil in mapping are areas of Nyssaton and Owyhee soils. Also included are about 120 acres that are as much as 25 percent alkali spots. Spot symbols identify this acreage on the soil map.

Runoff is medium, and the erosion hazard is high. The soil is used for alfalfa, corn, orchards, potatoes, small grain, sugar beets, pasture, and wildlife. Capability unit IIIe–2 irrigated; windbreak suitability group 2.

Greenleaf silt loam, 3 to 7 percent slopes, eroded (GeC2).—This soil is in long, narrow areas 5 to 60 acres in size. It has a profile similar to the one described as representative of the series, but 2 to 6 inches of the original surface layer has been removed by erosion and the present surface layer is a mixture of subsoil and plow layer material. Included with this soil in mapping are areas of Nyssaton and Owyhee soils and alkali spots. Runoff is medium, and the erosion hazard is high. The soil is used for alfalfa, corn, orchards, potatoes, small grain, sugar beets, pasture, and wildlife. Capability unit IIIe–2 irrigated; windbreak suitability group 2.

Greenleaf silt loam, 7 to 12 percent slopes, eroded (GeD2).—This soil is in long, narrow areas 5 to 20 acres in size. It has a profile similar to the one described as representative of the series, but 4 to 8 inches of the original surface layer has been removed by erosion and the present surface layer is a mixture of subsoil and plow layer material. Included with this soil in mapping are areas of Nyssaton and Owyhee soils. Runoff is medium, and the erosion hazard is very high. The soil is used for alfalfa, corn, orchards, small grain, pasture, and wildlife. Capability unit IVe–1 irrigated; windbreak suitability group 2.

Greenleaf silt loam, 12 to 30 percent slopes, eroded (GeE2).—This soil is in long, narrow areas 5 to 90 acres in size along the edges of terraces. This soil has a profile similar to the one described as representative of the series, but 4 to 8 inches of the original surface layer has been removed by erosion and the present surface layer is a mixture of subsoil and plow layer

material. Included with this soil in mapping are areas of Nyssaton soils.

Runoff is rapid, and the erosion hazard is very high. The soil is used for alfalfa, small grain, pasture, and wildlife. Capability unit VIe–1 irrigated.

Greenleaf silt loam, saline-alkali, 1 to 3 percent slopes (GfB).—This mapping unit is about 75 percent Greenleaf silt loam and 25 percent spotty alkali areas, or slickspots. The Greenleaf soil is on terraces, and the spotty alkali areas are in faint, small, round depressions. The Greenleaf soil has the profile described as representative of the series. The spotty alkali area resembles the Greenleaf soil. It has a surface layer of pale brown silt loam and a subsoil of pale brown or very pale brown light silty clay loam. The subsoil is moderately alkaline or strongly alkaline and is high in content of exchangeable sodium. Included with these soils in mapping are areas of Nyssaton and Owyhee soils.

Runoff is slow, and the erosion hazard is moderate. The soil is used for alfalfa, corn, orchards, onions, potatoes, small grain, sugar beets, pasture, wildlife, and homesites. Capability unit IIe–2 irrigated; windbreak suitability group 1.

Greenleaf Series, Wet Variant

The Greenleaf series, wet variant, consists of somewhat poorly drained soils on terraces, fans, and stream bottoms along the Payette River. These soils formed in alluvium or lacustrine deposits. Slopes are 0 to 2 percent. Elevation is 2,150 to 2,300 feet. Precipitation is 9 to 12 inches, mean annual air temperature is 50° to 52° F., and the frost-free season is 140 to 160 days.

In a representative profile the surface layer is grayish-brown silt loam about 5 inches thick. The subsoil is light brownish-gray and pale-brown silty clay loam and heavy silt loam about 25 inches thick. The substratum is light brownish-gray silt loam to a depth of 60 inches. The soil is mainly moderately alkaline. The substratum is moderately calcareous.

Permeability is moderately slow. The root zone is more than 60 inches deep and holds 12 to 15 inches of water available to plants. A seasonal high water table fluctuates between depths of 3 to 5 feet. Before irrigation, these soils were well drained.

Greenleaf soils, wet variant, are used for irrigated crops, pasture, and wildlife.

Representative profile of Greenleaf silt loam, wet variant, saline-alkali (0 to 2 percent slopes), southeast of Payette, 500 feet south, 100 feet east of north quarter corner of sec. 22, T. 8 N., R. 5 W., in a cultivated field:

Ap1—0 to 2 inches, grayish-brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) when moist; moderate, fine, granular structure; slightly hard when dry, friable when moist, slightly sticky and slightly plastic when wet; common very fine roots; many fine and very fine irregular pores; moderately alkaline; clear, smooth boundary. 1 to 3 inches thick.

Ap2—2 to 5 inches, grayish-brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) when moist; weak, fine, subangular blocky structure parting to weak, very fine, granular; slightly hard when dry, friable when moist, slightly sticky and slightly plastic when wet; many very fine and fine roots; many medium tubular pores; mildly alkaline; clear, smooth boundary. 3 to 5 inches thick.

B21t—5 to 13 inches, light brownish-gray (10YR 6/2) silty clay loam, dark brown (10YR 3/3) when moist; weak, medium, prismatic structure parting to moderate, fine, angular blocky; hard when dry, firm when moist, sticky and plastic when wet; many fine roots; common medium tubular pores; thin patchy clay films on vertical and horizontal surfaces; moderately alkaline; clear, wavy boundary. 5 to 10 inches thick.

B22t—13 to 19 inches, pale-brown (10YR 6/3) heavy silt loam, dark brown (10YR 3/3) when moist; weak, medium, prismatic structure parting to moderate, medium, subangular blocky; hard when dry, firm when moist, sticky and plastic when wet; many fine roots; common medium tubular pores; thin continuous clay films on ped surfaces; many 1- to 2-centimeter cicada nodules; moderately alkaline; clear, wavy boundary. 5 to 10 inches thick.

B3—19 to 30 inches, pale-brown (10YR 6/3) heavy silt loam, dark brown (10YR 3/3) when moist; moderate, medium, subangular blocky structure; hard when dry, firm when moist, sticky and plastic when wet; few very fine roots; many very fine tubular pores; thin patchy clay films on ped surfaces; moderately alkaline; abrupt, wavy boundary. 8 to 15 inches thick.

Cca—30 to 60 inches, light brownish-gray (10YR 6/2) silt loam, grayish brown (10YR 5/2) when moist; few, fine, distinct, dark reddish-brown (5YR 3/4) when moist mottles; massive; hard when dry, firm when moist, sticky and plastic when wet; moderately calcareous; moderately alkaline.

The Ap horizon is light brownish gray, grayish brown, light gray, or brown. The B2t horizon is silt loam, silty clay loam, or loam. The C horizon is white to light brownish-gray loam or silt loam. In places pockets or strata of sand are below a depth of 40 inches. Lime accumulations are between depths of 20 and 40 inches. Depth to mottles is 15 to 35 inches.

Greenleaf silt loam, wet variant (0 to 2 percent slopes) (Gm).—This soil is in irregularly shaped areas 5 to 160 acres in size along the Payette River. It has the profile described as representative of the variant. In spots the soil material is slight or moderate in content of soluble salt and moderate or high in content of exchangeable sodium. These spots make up as much as 5 percent of the acreage. Included with this soil in mapping are small areas of Baldock soils.

Runoff is slow, and the erosion hazard is slight or none. The soil is used for alfalfa, corn, small grain, sugar beets, pastures, and wildlife. Capability unit IIIw–6 irrigated; windbreak suitability group 3.

Greenleaf silt loam, wet variant, saline-alkali (0 to 2 percent slopes) (Gn).—This soil is in irregularly shaped areas 10 to 160 acres in size along the Payette River. It has the profile described as representative of the variant. In about 5 to 35 percent of the area the soil is slight or moderate in content of soluble salt and moderate or high in content of exchangeable sodium. Included with this soil in mapping are small areas of Baldock soils.

Runoff is slow, and the erosion hazard is slight or none. The soil is used for alfalfa, corn, small grain, sugar beets, pasture, and wildlife. Capability unit IVw–3 irrigated; windbreak suitability group 3.

Gross Series

The Gross series consists of well-drained soils on north-facing slopes of foothills. These soils formed in material weathered from basalt. Slopes are 30 to 65 percent. Elevation is 3,000 to 4,650 feet. The vegetation is perennial grasses, annual grasses, forbs, and shrubs. Precipitation is 16 to 18 inches, mean annual air temperature is 40° to 45° F., and the frost-free season is 110 to 130 days.

In a representative profile the surface layer is very dark grayish-brown stony loam about 18 inches thick. The subsoil is brown stony clay loam about 20 inches thick. Basalt bedrock is at a depth of 38 inches. The soil is neutral throughout.

Permeability is moderately slow over the basalt. The root zone is 20 to 40 inches deep and holds 2 to 8 inches of water available to plants.

Gross soils are used for range, wildlife, and watershed.

Representative profile of Gross stony loam, 30 to 65 percent slopes, in the northeast corner of the county, 830 feet west and 620 feet south of the center of sec. 28, T. 9 N., R. 1 W., in an area used as range:

A11—0 to 11 inches, very dark grayish-brown (10YR 3/2) stony loam, black (10YR 2/1) when moist; moderate, medium, granular structure; soft when dry, very friable when moist, slightly sticky and slightly plastic when wet; many very fine roots; many, very fine, irregular pores; about 10 percent stones and cobbles; neutral; gradual, smooth boundary. 3 to 12 inches thick.

A12—11 to 18 inches, very dark grayish-brown (10YR 3/2) stony loam, very dark brown (10YR 2/2) when moist; weak, medium, subangular blocky structure; slightly hard when dry, friable when moist, slightly sticky and slightly plastic when wet; many very fine roots; about 10 percent stones and cobbles; common very fine tubular pores; neutral; clear, smooth boundary. 5 to 8 inches thick.

B21t—18 to 23 inches, brown (7.5YR 5/2) stony clay loam, dark brown (10YR 3/3) when moist; moderate, medium, subangular blocky structure; slightly hard when dry, firm when moist, slightly sticky and slightly plastic when wet; many very fine and few fine roots; about 10 percent stones and cobbles; common very fine tubular pores; neutral; clear, smooth boundary. 5 to 8 inches thick.

B22t—23 to 34 inches, brown (7.5YR 5/3) stony clay loam, dark brown (10YR 3/3) when moist; moderate, medium, subangular blocky structure; hard when dry, firm when moist, sticky and slightly plastic when wet; few very fine roots; many very fine and fine tubular pores; about 15 percent stones and cobbles; thin patchy clay films on vertical and horizontal ped faces and pore surfaces; neutral; diffuse, broken boundary. 3 to 11 inches thick.

B23t—34 to 38 inches, similar to B22t horizon, but grading into stony clay loam that is about 20 percent stones and cobbles. 2 to 6 inches thick.

R—38 inches, basalt.

The A horizon is dark grayish brown or very dark grayish brown. The B2t horizon is heavy loam or clay loam. Depth to bedrock ranges from 20 to 40 inches.

Gross stony loam, 30 to 65 percent slopes (GOF).—This soil is in irregularly shaped areas 30 to 100 acres in size. It has the profile described as representative of the series. Included in mapping are areas of Bakeoven, Gem, and Reywat soils. Runoff is very rapid, and the erosion hazard is very high. The soil is used for range, wildlife, and watershed. Capability unit VIIe–1 nonirrigated; Steep Slope range site, 16-to 22-inch precipitation zone; less than 47° F.

Gross-Bakeoven complex, 30 to 65 percent slopes (GRF).—This mapping unit is about 60 percent Gross stony loam and 25 percent Bakeoven extremely stony loam. The Gross soil is on north-facing slopes, and the Bakeoven soil is on the ridges. The Bakeoven soil has a profile similar to the one described under the heading "Bakeoven Series," but the surface layer is very dark grayish brown or dark grayish brown and the soil is less stony. Included with these soils in mapping are areas that are about 15 percent Rock outcrop, Gem soils, and Gross and Bakeoven soils, 65 to 80 percent slopes.

Runoff is rapid, and the erosion hazard is very high. This mapping unit is used for range, wildlife, and watershed. Capability unit VIIs–1 nonirrigated; Gross soil in Steep Slope range site, 16- to 22-inch precipitation zone; less than 47° F; Bakeoven soil in Very Shallow range site, 8- to 16-inch precipitation zone.

Harpt Series

The Harpt series consists of well-drained soils on fans, terraces, and stream bottoms. These soils formed in alluvium. Slopes are 0 to 12 percent. Elevation is 2,200 to 3,000 feet. The vegetation is annual grasses, forbs, and shrubs in areas not irrigated. Precipitation is 10 to 12 inches, mean annual air temperature is 48° to 50° F., and the frost-free season is 140 to 155 days.

In a representative profile the soil is grayish-brown and brown loam to a depth of 60 inches. It is neutral to a depth of about 21 inches and mildly alkaline below.

Permeability is moderate. The root zone is more than 60 inches deep and holds 9 to 11 inches of water available to plants.

Harpt soils are used for irrigated crops, range, and wildlife.

Representative profile of Harpt loam, 0 to 1 percent slopes, on Little Willow Creek drainageway, 800 feet east, 240 feet south of the northwest corner of sec. 9, T. 8 N., R. 4 W., in a noncultivated area:

A11—0 to 7 inches, grayish-brown (10YR 5/2) loam, dark brown (10YR 3/3) when moist; strong, thin and thick, platy structure; slightly hard when dry, very friable when moist, nonsticky and nonplastic when wet; many very fine roots; many very fine pores; neutral; clear, smooth boundary. 6 to 12 inches thick.

A12—7 to 21 inches, brown (10YR 5/3) loam, dark brown (10YR 3/3) when moist; weak, medium, subangular blocky structure; slightly hard when dry, very friable when moist, slightly sticky and slightly plastic when wet; many very fine and few fine and medium roots; many very fine pores; neutral; gradual, smooth boundary. 10 to 15 inches thick.

A13—21 to 45 inches, grayish-brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) when moist; weak, fine and medium, subangular blocky structure; slightly hard when dry, firm when moist, slightly sticky and slightly plastic when wet; few very fine roots; many very fine pores; mildly alkaline; abrupt, wavy boundary. 10 to 28 inches thick.

Cca—45 to 60 inches, grayish-brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) when moist; mod-

erate, coarse, subangular blocky structure; hard when dry, firm when moist, slightly sticky and nonplastic when wet; slightly calcareous; common fine lime veins occupy about 5 to 25 percent of the surfaces; mildly alkaline.

The A horizon is brown, dark grayish brown, or grayish brown. The C horizon has subangular blocky structure or in places is structureless. In places the profile is stratified with sand, loamy sand, sandy loam, or coarse sandy loam below a depth of 30 inches. Below a depth of 40 inches, the profile is slightly calcareous to noncalcareous.

Harpt loam, 0 to 1 percent slopes (HaA).—This soil is in long, narrow, fan-shaped areas 5 to 60 acres in size. It has the profile described as representative of the series. Included in mapping are areas of Jenness and Lolalita soils and the Harpt wet variant. Runoff is very slow, and the erosion hazard is slight or none. The soil is used for alfalfa, corn, small grain, sugar beets, orchards, potatoes, pasture, range, and wildlife. Capability units I–1 irrigated and IVc–1 nonirrigated; Loamy range site, 8- to 12-inch precipitation zone; windbreak suitability group 1.

Harpt loam, 1 to 3 percent slopes (HaB).—This soil is in long, narrow, fan-shaped areas 5 to 110 acres in size. Included in mapping are areas of Jenness and Tindahay soils and the Harpt wet variant. Runoff is slow. The erosion hazard is slight to none in nonirrigated areas and moderate in irrigated areas. The soil is used for alfalfa, corn, small grain, sugar beets, orchards, potatoes, pasture, range, and wildlife. Capability units IIe–2 irrigated and IVc–1 nonirrigated; Loamy range site, 8- to 12-inch precipitation zone; windbreak suitability group 1.

Harpt loam, 3 to 7 percent slopes (HaC).—This soil is in long, narrow, fan-shaped areas 5 to 120 acres in size. Included with it in mapping are areas of Cashmere, Haw, Jenness, and Tindahay soils. Runoff is medium. The erosion hazard is moderate in nonirrigated areas and high in irrigated areas. The soil is used for alfalfa, corn, small grain, sugar beets, orchards, potatoes, pasture, range, and wildlife. Capability units IIIe–2 irrigated and IVe–5 nonirrigated; Loamy range site, 8- to 12-inch precipitation zone; windbreak suitability group 2.

Harpt loam, 7 to 12 percent slopes (HaD).—This soil is in long, narrow, fan-shaped areas 5 to 160 acres in size. Included with it in mapping are areas of Cashmere, Haw, and Tindahay soils. Runoff is medium. The erosion hazard is moderate in nonirrigated areas and very high in irrigated areas. The soil is used for alfalfa, corn, small grain, orchards, pasture, range, and wildlife. Capability units IVe–1 irrigated and IVe–5 nonirrigated; Loamy range site, 8- to 12-inch precipitation zone; windbreak suitability group 2.

Harpt Series, Wet Variant

The Harpt series, wet variant, consists of somewhat poorly drained soils on stream bottoms. These soils formed in alluvium. Slopes are 0 to 2 percent. Elevation is 2,100 to 2,800 feet. Precipitation is 9 to 12 inches, mean annual air temperature is 50° to 52° F., and the frost-free season is 140 to 160 days.

In a representative profile the surface layer is grayish-brown loam about 10 inches thick. The upper part of the substratum is mottled pale-brown loam about 14 inches thick. The next 23 inches is mottled brown loam. The lower part of the substratum, to a depth of 60 inches, is pale-brown fine sandy loam. The soil is neutral throughout.

Permeability is moderate. The root zone is more than 60 inches deep and holds 9 to 11 inches of water available to plants. A seasonal water table fluctuates between depths of 3 and 4 feet.

The Harpt soils, wet variant, are used for irrigated crops and wildlife. They are a good source of topsoil.

Representative profile of Harpt loam, wet variant (0 to 2 percent slopes), south of New Plymouth, 2,300 feet east, 100 feet north of the southwest corner of sec. 9, T. 7 N., R. 4 W., in an area used as pasture:

Ap—0 to 10 inches, grayish-brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) when moist; strong, medium, granular structure; soft when dry, very friable when moist, slightly sticky and slightly plastic when wet; many very fine, fine, and coarse roots and few very coarse roots; common very fine irregular pores; few earthworm castings; neutral; abrupt, smooth boundary. 8 to 12 inches thick.

C1—10 to 24 inches, pale-brown (10YR 6/3) loam, brown (10YR 4/3) when moist; common, fine, distinct, dark yellowish-brown (10YR 3/4) when moist mottles; weak, medium, subangular blocky structure; soft when dry, very friable when moist, slightly sticky and slightly plastic when wet; few very fine roots; many very fine tubular pores; neutral; clear, smooth boundary. 10 to 20 inches thick.

C2—24 to 47 inches, brown (10YR 5/3) loam, dark brown (10YR 4/3) when moist; common, fine, distinct, dark-brown (10YR 3/3) when moist mottles; weak, medium, subangular blocky structure and few oval nodules; hard when dry, firm when moist, slightly sticky and slightly plastic when wet; few very fine roots; common very fine tubular pores; neutral; clear, smooth boundary. 15 to 30 inches thick.

C3—47 to 60 inches, pale-brown (10YR 6/3) fine sandy loam, brown (10YR 5/3) when moist; massive; hard when dry, friable when moist, nonsticky and nonplastic when wet; neutral.

The A horizon is dark gray, dark grayish brown, or grayish brown. The C horizon between depths of 8 and 40 inches is loam, silt loam, or very fine sandy loam. Depth to mottles is 8 to 20 inches. Mottles range from few to many and from faint to prominent. Reaction ranges from slightly acid to mildly alkaline. In places loose sand and gravel are below a depth of 40 inches.

Harpt loam, wet variant (0 to 2 percent slopes) (He).—This soil is in long, narrow areas 5 to 50 acres in size along drainageways south of the Payette River. Included with it in mapping are areas of Baldock, Jenness, and Moulton soils. Runoff is slow, and the erosion hazard is slight or none. The soil is used for alfalfa, corn, small grain, sugar beets, pasture, and wildlife. Capability unit IIIw–1 irrigated; windbreak suitability group 4.

Haw Series

The Haw series consists of well-drained soils on ridgetops of dissected terraces, on alluvial fans, and on stream bottoms. These soils formed in old medium-textured to coarse-textured sediment and alluvium. Slopes are 0 to 65 percent. Elevation is 2,150 to 3,000 feet. The vegetation is annual grasses, perennial

grasses, forbs, and shrubs in areas not irrigated. Precipitation is 12 to 14 inches, mean annual air temperature is 48° to 52° F., and the frost-free season is 130 to 160 days.

In a representative profile the surface layer is grayish-brown loam about 7 inches thick. The subsoil is about 21 inches thick. It is grayish-brown clay loam in the upper part and brown clay loam in the lower part. The substratum is light brownish-gray sandy loam to a depth of 60 inches. The soil is neutral in the surface layer and subsoil and moderately alkaline and slightly calcareous in the substratum.

Permeability is moderately slow. The root zone is more than 60 inches deep and holds 8 to 10 inches of water available to plants.

Haw soils are used for irrigated crops, range, wildlife, and watershed.

Representative profile of Haw loam, 3 to 7 percent slopes, near Little Willow Creek, 1,500 feet north, 400 feet west of the southwest corner of sec. 28, T. 9 N., R. 4 W., in an area used as range:

A11—0 to 3 inches, grayish-brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) when moist; moderate, thin, platy structure parting to weak, very fine, granular; slightly hard when dry, friable when moist, slightly sticky and slightly plastic when wet; many fine roots; many very fine and fine tubular pores; neutral; clear, smooth boundary. 0 to 4 inches thick.

A12—3 to 7 inches, similar to A11 horizon but has weak, fine, subangular structure parting to moderate, fine, granular; neutral; clear, smooth boundary. 3 to 8 inches thick.

B1t—7 to 9 inches, grayish-brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) when moist; moderate, medium, subangular structure; hard when dry, firm when moist, sticky and plastic when wet; many fine roots; many fine tubular pores; thin patchy clay films on ped surfaces; light-gray (10YR 7/2) coatings on ped surfaces; neutral; clear, smooth boundary. 2 to 8 inches thick.

B21t—9 to 17 inches, grayish-brown (10YR 5/2) clay loam, dark brown (10YR 3/3) when moist; moderate, medium, prismatic structure parting to strong, medium and fine, angular blocky; very hard when dry, very firm when moist, sticky and very plastic when wet; common fine roots in the cracks; common very fine tubular pores; medium continuous clay films on ped surfaces; neutral; clear, wavy boundary. 7 to 12 inches thick.

B22t—17 to 28 inches, brown (10YR 5/3) clay loam, dark brown (10YR 3/3) when moist; moderate, fine, subangular blocky structure; slightly hard when dry, friable when moist, sticky and plastic when wet; common fine roots; many very fine and fine tubular pores; thin nearly continuous clay films on ped surfaces; neutral; gradual, smooth boundary. 11 to 15 inches thick.

Cca—28 to 60 inches, light brownish-gray (2.5Y 6/2) sandy loam, dark grayish brown (2.5Y 4/2) when moist; massive; slightly hard when dry, friable when moist, slightly sticky and slightly plastic when wet; few fine roots; many very fine and fine tubular pores; slightly calcareous; moderately alkaline.

The A horizon is grayish brown or light brownish gray. The B2t horizon is grayish-brown, brown, or dark-brown clay loam to light sandy clay loam. The C horizon is pale-brown or light brownish-gray loam or sandy loam. In places it is white to pale-yellowish sand, loamy sand, or coarse sandy loam. Depth to lime is 24 to 36 inches. Reaction ranges from neutral to moderately alkaline.

Haw loam, 0 to 1 percent slopes (HIA).—This soil is in long, irregularly shaped areas 5 to 300 acres in size along drainageways mainly north of the Payette River. It has a profile similar to the one described as representative of the series, but the surface layer is about 10 inches thick. Included with this soil in mapping are small areas of Harpt and Tindahay soils.

The frost-free season ranges from 140 to 160 days. Runoff is slow, and the erosion hazard is slight or none. The soil is used for alfalfa, corn, mint, small grain, sugar beets, onions, orchards, potatoes, pasture, range and wildlife. Capability units I–1 irrigated and IVc–1 nonirrigated; Loamy range site, 12- to 16-inch precipitation zone; windbreak suitability group 1.

Haw loam, 1 to 3 percent slopes (HIB).—This soil is in long, irregularly shaped areas 5 to 150 acres in size along drainageways. It has a profile similar to the one described as representative of the series, but the surface layer is 8 to 10 inches thick. Included with this soil in mapping are small areas of Harpt, Tindahay, Lanktree, and Lankbush soils and the Ager soils, deep variant.

Runoff is slow. The erosion hazard is slight or none in nonirrigated areas and moderate in irrigated areas. The soil is used for alfalfa, corn, mint, small grain, sugar beets, onions, orchards, potatoes, pasture, range, and wildlife. Capability units IIe–2 irrigated and IVc–1 nonirrigated; Loamy range site, 12- to 16-inch precipitation zone; windbreak suitability group 1.

Haw loam, 3 to 7 percent slopes (HIC).—This soil is in irregularly shaped areas 5 to 500 acres in size on ridgetops and along drainageways. It has the profile described as representative of the series.

Included with this soil in mapping are small areas of Harpt, Tindahay, and Lankbush soils and the Ager soils, deep variant. Also included, along the northern boundary of the county, are areas of a soil that has a surface layer of grayish-brown silt loam 18 inches thick, a subsoil of brown clay 15 inches thick, and underlying material of loam to a depth of 60 inches.

Runoff is medium. The erosion hazard is moderate in nonirrigated areas and high in irrigated areas. The soil is used for alfalfa, corn, small grain, orchards, potatoes, sugar beets, pasture, range, wildlife, and watershed. Capability units IIIe–2 irrigated and IVe–5 nonirrigated; Loamy range site, 12- to 16-inch precipitation zone; windbreak suitability group 2.

Haw loam, 7 to 12 percent slopes (HID).—This soil is in irregularly shaped areas 10 to 160 acres in size at the edges of ridgetops. It has a profile similar to the one described as representative of the series, but the surface layer is 6 to 8 inches thick. Included with this soil in mapping are areas of Lankbush and Saralegui soils and the Ager soils, deep variant.

The frost-free season ranges from 130 to 145 days. Runoff is medium. The erosion hazard is moderate in nonirrigated areas and very high in irrigated areas. The soil is used for alfalfa, small grain, pasture, range, wildlife, and watershed. Capability units IVe–1 irrigated and IVe–5 nonirrigated; Loamy range site, 12- to 16-inch precipitation zone; windbreak suitability group 2.

Haw loam, 12 to 30 percent slopes (HIE).—This soil is in irregularly shaped areas 10 to 160 acres in

size. It has a profile similar to the one described as representative of the series, but the surface layer is only 4 to 6 inches thick. Included with this soil in mapping are areas of Lankbush, Saralegui, and Lolalita soils and the Ager soils, deep variant.

The frost-free season ranges from 130 to 145 days. Runoff is rapid. The erosion hazard is high in nonirrigated areas and very high in irrigated areas. The soil is used for alfalfa, small grain, pasture, range, wildlife, and watershed. Capability units VIe–1 irrigated and VIe–2 nonirrigated; Loamy range site, 12- to 16-inch precipitation zone.

Haw loam, 12 to 30 percent slopes, eroded (HIE2).—This soil is in irregularly shaped areas 10 to 320 acres in size. It has a profile similar to the one described as representative of the series, but the surface layer is only 3 to 5 inches thick. Included with this soil in mapping are areas of Lankbush, Saralegui, and Lolalita soils and the Ager soils, deep variant.

The frost-free season ranges from 130 to 145 days. Runoff is rapid, and the erosion hazard is high. The soil is used for alfalfa, pasture, range, wildlife, and watershed. Capability unit VI–2 nonirrigated; Loamy range site, 12- to 16-inch precipitation zone.

Haw loam, 30 to 65 percent slopes (HMF).—This soil is in irregularly shaped areas 15 to 1,000 acres in size. It has a profile similar to the one described as representative of the series, but the surface layer is only 2 to 5 inches thick. Included with this soil in mapping are areas of Lankbush, Saralegui, and Lolalita soils and the Ager soils, deep variant.

The frost-free season ranges from 130 to 145 days. Runoff is very rapid, and the erosion hazard is very high. The soil is used for range, wildlife, and watershed. Capability unit VIIe–1 nonirrigated; Steep Slope range site, 12- to 16-inch precipitation zone.

Haw very stony loam, 2 to 12 percent slopes (HVD).—This soil is in irregularly shaped areas 15 to 260 acres in size on ridgetops. It has a profile similar to the one described as representative of the series, but it is very stony.

Included with this soil in mapping are areas of Haw loam and Ruckles soils. Also included is a soil that has a surface layer of light brownish-gray to brown clay loam about 12 inches thick, a subsoil of dark yellowish-brown clay about 5 inches thick, and underlying material of sandstone.

The frost-free season ranges from 130 to 145 days. Runoff is medium, and the erosion hazard is moderate to high. The soil is used for range, wildlife, and watershed. Capability unit VIIs–1 nonirrigated; Loamy range site, 12- to 16-inch precipitation zone; windbreak suitability group 2.

Jenness Series

The Jenness series consists of well-drained soils on fans, terraces, and stream bottoms. These soils formed in alluvium. Slopes are 0 to 3 percent. Elevation is 2,200 to 3,000 feet. The vegetation is annual grasses, forbs, and shrubs in areas not irrigated. Precipitation is 9 to 12 inches, mean annual air temperature is 50° to 52° F., and the frost-free season is 140 to 160 days.

In a representative profile the surface layer is light brownish-gray loam about 2 inches thick. The next layer, transitional between the surface layer and the substratum, also is light brownish-gray loam and is about 14 inches thick. The upper part of the substratum is pale-brown loam about 20 inches thick. Below this, to a depth of 60 inches, is stratified very pale brown sand and coarse sandy loam. The soil is neutral in the surface layer and mildly alkaline below.

Permeability is moderate. The root zone is more than 60 inches deep and holds 8 to 10 inches of water available to plants.

Jenness soils are used for irrigated crops, range, and wildlife. They are a good source of topsoil.

Representative profile of Jenness loam, 0 to 1 percent slopes, south of New Plymouth, 1,560 feet north, 1,580 feet east of the southwest corner of sec. 15, T. 6 N., R. 4 W., in a noncultivated area:

A1—0 to 2 inches, light brownish-gray (10YR 6/2) loam, very dark grayish brown (10YR 3/2) when moist; weak, fine, granular structure; slightly hard when dry, friable when moist, slightly sticky and slightly plastic when wet; many fine and very fine roots; common very fine tubular pores; neutral; clear, smooth boundary. 2 to 6 inches thick.

AC—2 to 16 inches, light brownish-gray (10YR 6/2) loam, dark yellowish brown (10YR 3/4) when moist; coarse, subangular blocky structure; slightly hard when dry, friable when moist, slightly sticky and slightly plastic when wet; many very fine roots; many very fine irregular pores; mildly alkaline; gradual, smooth boundary. 0 to 18 inches thick.

C1—16 to 36 inches, pale-brown (10YR 6/3) loam, dark brown (10YR 3/3) when moist; massive; slightly hard when dry, friable when moist, slightly sticky and slightly plastic when wet; few very fine roots; many fine irregular pores; mildly alkaline; clear, wavy boundary. 9 to 25 inches thick.

IIC2—36 to 42 inches, very pale brown (10YR 7/3) coarse sandy loam, brown (10YR 4/3) when moist; massive; slightly hard when dry and very friable when moist, nonsticky and nonplastic when wet; few very fine roots; many very fine irregular pores; mildly alkaline; abrupt, smooth boundary. 0 to 10 inches thick.

IIIC3—42 to 47 inches, very pale brown (10YR 7/3) sand, dark yellowish brown (10YR 4/4) when moist; single grained; loose when dry and moist; nonsticky and nonplastic when wet; mildly alkaline; clear wavy boundary. 0 to 10 inches thick.

IVC4—47 to 51 inches, very pale brown (10YR 7/3) coarse sandy loam, brown (10YR 4/3) when moist; massive; slightly hard when dry, very friable when moist, nonsticky and nonplastic when wet; mildly alkaline; clear, wavy boundary. 0 to 5 inches thick.

VC5—51 to 60 inches, very pale brown (10YR 7/3) sand, dark yellowish brown (10YR 4/4) when moist; single grained; loose when dry and moist, nonsticky and nonplastic when wet; mildly alkaline.

The A1 horizon is light brownish gray or pale brown. The C horizon is light brownish-gray, pale brown, or very pale brown loam or silt loam that has weak subangular blocky structure or is massive. Stratification with loamy sand, sandy loam, or sand is common below a depth of 40 inches.

Jenness loam, 0 to 1 percent slopes (JeA).—This soil is in long, narrow, fan-shaped areas 10 to 200 acres in size along intermittent drainageways on dissected terraces. It has the profile described as representative of the series. Included with this soil in map-

ping are areas of Emerson, Harpt, Lankbush, and Lolalita soils.

Runoff is very slow, and the erosion hazard is slight or none. The soil is used for alfalfa, corn, mint, potatoes, pasture, small grain, sugar beets, range, and wildlife. Capability units I–1 irrigated and VIc–1 nonirrigated; Loamy range site, 8- to 12-inch precipitation zone; windbreak suitability group 1.

Jenness loam, 1 to 3 percent slopes (JeB).—This soil is in long, narrow, fan-shaped alluvial areas 10 to 260 acres along intermittent drainageways on dissected terraces. Included with this soil in mapping are areas of Harpt and Lankbush soils and Jenness loam, 3 to 7 percent slopes.

Runoff is slow. The erosion hazard is slight in nonirrigated areas and moderate in irrigated areas. The soil is used for alfalfa, corn, mint, potatoes, pasture, small grain, sugar beets, range, and wildlife. Capability units IIe–2 irrigated and VIc–1 nonirrigated; Loamy range site, 8- to 12-inch precipitation zone; windbreak suitability group 1.

Lankbush Series

The Lankbush series consists of well-drained soils on dissected terraces. There soils formed in coarse textured and moderately coarse textured, lake-laid sediment or alluvium. Slopes are 3 to 30 percent. Elevation is 2,300 to 3,000 feet. The vegetation is annual grasses, forbs, and shrubs in areas not irrigated. Precipitation is 9 to 12 inches, mean annual air temperature is 50° to 52° F., and the frost-free season is 140 to 160 days.

In a representative profile the surface layer is light brownish-gray sandy loam about 12 inches thick. The subsoil is brown and pale-brown sandy clay loam about 18 inches thick. The substratum to a depth of about 41 inches is pale-brown sandy loam. To a depth of 60 inches it is very pale brown granitic sand. The soil is neutral to a depth of about 41 inches and mildly alkaline below.

Permeability is moderately slow. The root zone is more than 60 inches deep and holds 6 to 8 inches of water available to plants.

Lankbush soils are used for irrigated crops, range, wildlife, and watershed.

Representative profile of Lankbush sandy loam, 12 to 30 percent slopes, eroded, southeast of New Plymouth, 2,750 feet north, 50 feet west of southeast corner of sec. 12, T. 6 N., R. 4 W., in an area used as range:

A1—0 to 12 inches, light brownish-gray (10YR 6/2) sandy loam, very dark grayish brown (10YR 3/2) when moist; weak, fine, granular structure; soft when dry, very friable when moist, nonsticky and nonplastic when wet; many very fine and fine roots; many very fine irregular pores; neutral; clear, smooth boundary. 2 to 14 inches thick.

B21t—12 to 20 inches, brown (10YR 5/3) sandy clay loam, dark grayish brown (10YR 4/2) when moist; weak, medium, prismatic structure parting to moderate, medium, subangular blocky; slightly hard when dry, firm when moist, slightly sticky and plastic when wet; common fine and medium roots; common fine tubular pores; medium patchy clay films on ped faces and pore surfaces; neutral; clear, smooth boundary. 6 to 10 inches thick.

B22t—20 to 30 inches, pale-brown (10YR 6/3) sandy clay loam, dark brown (10YR 3/3) when moist; moderate, medium and coarse, subangular blocky structure; hard when dry, firm when moist, slightly sticky and slightly plastic when wet; few fine and medium roots; many fine tubular pores; thin patchy clay films on vertical ped faces and pore surfaces; neutral; clear, smooth boundary. 6 to 16 inches thick.

C1—30 to 41 inches, pale-brown (10YR 6/3) sandy loam, brown (10YR 5/3) when moist; massive; slightly hard when dry, firm when moist, nonsticky and nonplastic when wet; few very fine and medium roots; neutral; abrupt, smooth boundary. 0 to 12 inches thick.

IIC2—41 to 60 inches, very pale brown (10YR 7/4) granitic sand; single grained; loose when dry and moist; mildly alkaline.

The A horizon is light brownish gray or light gray. The B2t horizon is sandy clay loam, coarse sandy clay loam, or clay loam. Reaction ranges from neutral to moderately alkaline throughout.

Lankbush sandy loam, 3 to 7 percent slopes (LaC).—This soil is in long, irregularly shaped areas 10 to 120 acres in size. Included with it in mapping are areas of Lanktree, Lolalita, Power, Purdam, and Sebree soils.

Runoff is medium. The erosion hazard is moderate in nonirrigated areas and high in irrigated areas. This soil is used for alfalfa, corn, orchards, pasture, potatoes, sugar beets, small grain, range, and wildlife. Capability units IIIe–3 irrigated and VIe–2 nonirrigated; Loamy range site, 8- to 12-inch precipitation zone; windbreak suitability group 2.

Lankbush sandy loam, 12 to 30 percent slopes, eroded (LaE2).—This soil is in long, irregularly shaped areas 10 to 160 acres in size. It has the profile described as representative of the series. Included with this soil in mapping are areas of Tindahay and Lolalita soils.

Runoff is medium. The erosion hazard is high in nonirrigated areas and very high in irrigated areas. This soil is used for alfalfa, pasture, small grain, range, wildlife, and watershed. Capability units VIe–1 irrigated and VIe–2 nonirrigated; Loamy range site, 8- to 12-inch precipitation zone.

Lankbush-Purdam complex, 12 to 30 percent slopes (LbE).—This mapping unit is about 65 percent Lankbush sandy loam and 25 percent Purdam silt loam. The Lankbush soil is in the steeper areas. The Purdam soil has slopes of 12 to 15 percent and is on ridges.

Included with these soils in mapping are areas of Jenness, Power, Sebree, and Vickery soils. These included soils make up about 10 percent of the mapping unit.

Runoff is rapid. The erosion hazard is high in nonirrigated areas and very high in irrigated areas. This mapping unit is used for alfalfa, small grain, pasture, range, wildlife, and watershed. Capability units VIe–1 irrigated and VIe–2 nonirrigated; Loamy range site, 8- to 12-inch precipitation zone.

Lanktree Series

The Lanktree series consists of well-drained soils on intermittent stream bottoms and fans. These soils formed in old alluvium. Slopes are 0 to 7 percent. Elevation is 2,300 to 2,800 feet. The vegetation is annual

grasses, forbs, and shrubs in areas not irrigated. Precipitation is 12 to 13 inches, mean annual air temperature is 48° to 50° F., and the frost-free season is 130 to 145 days.

In a representative profile the surface layer is light brownish-gray silt loam about 6 inches thick. The subsurface layer is light-gray silty clay loam about 6 inches thick. The subsoil is brown and pale-brown silty clay loam about 10 inches thick. The substratum is stratified pale-brown coarse sandy loam and very pale brown silt loam to a depth of 60 inches. The soil is moderately alkaline throughout. It is slightly calcareous below a depth of 22 inches.

Permeability is slow. The root zone is more than 60 inches deep and holds 11 to 13 inches of water available to plants.

Lanktree soils are used for irrigated crops, range, wildlife, and watershed.

Representative profile of Lanktree silt loam in an area of Lanktree-Haw complex, 0 to 3 percent slopes, 800 feet south, 500 feet west of the northeast corner of sec. 33, T. 9 N., R. 3 W., in an area used as range:

A1—0 to 6 inches, light brownish-gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) when moist; weak, medium, platy structure; hard when dry, firm when moist, slightly sticky and slightly plastic when wet; many very fine and fine roots; many very fine tubular pores; moderately alkaline; abrupt, smooth boundary. 0 to 6 inches thick.

A2—6 to 12 inches, light-gray (10YR 7/1) silty clay loam, dark grayish brown (10YR 4/2) when moist; moderate, medium, subangular blocky structure; hard when dry, friable when moist, slightly sticky and slightly plastic when wet; many very fine and fine roots; many very fine tubular pores; moderately alkaline; abrupt, smooth boundary. 5 to 9 inches thick.

B2t—12 to 20 inches, brown (10YR 5/3) silty clay loam, very dark grayish brown (10YR 3/2) when moist; strong, medium, prismatic structure parting to moderate, medium, subangular blocky; very hard when dry, very firm when moist, sticky and very plastic when wet; few very fine and fine roots; medium continuous clay films on vertical and horizontal ped faces and pore surfaces; moderately alkaline; abrupt, smooth boundary. 5 to 13 inches thick.

B3t—20 to 22 inches, pale-brown (10YR 6/3) silty clay loam, dark grayish brown (10YR 4/2) when moist, weak, coarse, subangular blocky structure; hard when dry, firm when moist, slightly sticky and slightly plastic when wet; few very fine roots; common very fine tubular pores; moderately alkaline; abrupt, smooth boundary. 0 to 4 inches thick.

IIC1—22 to 28 inches, pale-brown (10YR 6/3) coarse sandy loam, dark grayish brown (10YR 4/2) when moist; massive; slightly hard when dry, firm when moist, nonsticky and nonplastic when wet; few very fine roots; few fine tubular pores; slightly calcareous; moderately alkaline; abrupt, smooth boundary. 0 to 30 inches thick.

IIIC2—28 to 60 inches, very pale brown (10YR 7/3) silt loam, yellowish brown (10YR 5/4) when moist; massive; slightly hard when dry, firm when moist, slightly sticky and slightly plastic when wet; slightly calcareous; moderately alkaline.

The A1 horizon is light brownish gray or light gray. The B2t horizon is light brownish-gray, pale-brown, or brown clay, heavy clay loam, heavy silty clay loam, or heavy sandy clay loam. The depth to stratified sand, loamy sand, or sandy loam is more than 20 inches. Depth to lime ranges from 15 to 35 inches.

Lanktree-Haw complex, 0 to 3 percent slopes (LcB).—This mapping unit is about 55 percent Lanktree silt loam and 40 percent Haw loam. The Lanktree soil is in depressions between areas of Haw soils. It has the profile described as representative of the Lanktree series. Included with these soils in mapping are areas of Harpt soils, which make up about 5 percent of the mapping unit.

Runoff is slow, and the erosion hazard is slight. This mapping unit is used for alfalfa, corn, pasture, small grain, range, wildlife, and watershed. Capability units IIe–2 irrigated and IVc–1 nonirrigated; Loamy range site, 12- to 16-inch precipitation zone; windbreak suitability group 1.

Lanktree-Haw complex, 3 to 7 percent slopes (LcC).—This mapping unit is about 50 percent Lanktree silt loam and 45 percent Haw loam. The Lanktree soil is in depressions between areas of Haw soils. Included with these soils in mapping are areas of Harpt soils, which make up about 5 percent of the mapping unit.

Runoff is medium. The erosion hazard is moderate in nonirrigated areas and high in irrigated areas. This mapping unit is used for alfalfa, corn, pasture, small grain, range, wildlife, and watershed. Capability units IIIe–2 irrigated and IVe–5 nonirrigated; Loamy range site, 12- to 16-inch precipitation zone; windbreak suitability group 2.

Letha Series

The Letha series consists of somewhat poorly drained soils on low terraces and bottoms along the Payette and Snake Rivers. These soils formed in alluvium. Slopes are 0 to 2 percent. Elevation is 2,100 to 2,350 feet. Precipitation is 9 to 12 inches, mean annual air temperature is 50° to 52° F., and the frost-free season is 140 to 160 days.

In a representative profile the surface layer is light brownish-gray fine sandy loam about 16 inches thick. The upper part of the substratum is pale-brown fine sandy loam and loam about 31 inches thick. The lower part to a depth of 60 inches is light-gray and white loamy sand. The soil is moderately alkaline and strongly alkaline in the surface layer and moderately alkaline to very strongly alkaline in the subsoil and substratum. It is slightly calcareous to moderately calcareous.

Permeability is slow. The root zone is more than 60 inches deep and holds 8 to 11 inches of water available to plants. A seasonal high water table fluctuates between depths of 3 and 4 feet.

Letha soils are used for irrigated crops and wildlife.

Representative profile of Letha fine sandy loam (0 to 1 percent slopes), north of New Plymouth, 2,140 feet south, 410 feet west of the northeast corner of sec. 34, T. 8 N., R. 4 W., in a cultivated field:

Ap—0 to 12 inches, light brownish-gray (2.5Y 6/2) fine sandy loam, dark grayish brown (2.5Y 4/2) when moist; weak, very fine, granular structure; slightly hard when dry, very friable when moist, nonsticky and nonplastic when wet; few very fine, fine, and coarse roots; many very fine irregular pores; slightly calcareous; moderately alkaline; abrupt, smooth boundary. 8 to 12 inches thick.

A3—12 to 16 inches, light brownish-gray (2.5Y 6/2) fine

sandy loam, dark grayish brown (2.5Y 4/2) when moist; weak, medium and coarse, subangular blocky structure; slightly hard when dry, very friable when moist, nonsticky and nonplastic when wet; few very fine and medium roots; many very fine irregular pores; slightly calcareous; strongly alkaline; clear, smooth boundary. 0 to 8 inches thick.

C1ca—16 to 20 inches, pale-brown (10YR 6/3) fine sandy loam, dark brown (10YR 4/3) when moist; moderate, medium, prismatic structure parting to moderate, medium and coarse, subangular blocky; very hard when dry, friable when moist, slightly sticky and plastic when wet; few very fine and fine roots; common very fine tubular pores; thin dark-colored films on vertical and horizontal ped surfaces; moderately calcareous; very strongly alkaline; clear, smooth boundary. 2 to 7 inches thick.

C2ca—20 to 27 inches, pale-brown (10YR 6/3) fine sandy loam, dark brown (10YR 4/3) when moist; weak, coarse, subangular blocky structure; very hard when dry, friable when moist, slightly sticky and nonplastic when wet; few very fine and fine roots; common very fine tubular pores; very thin darker coatings on vertical ped faces; moderately calcareous; very strongly alkaline; clear, smooth boundary. 5 to 10 inches thick.

C3—27 to 31 inches, pale-brown (10YR 6/3) loam, dark brown (10YR 4/3) when moist; weak, coarse, subangular blocky structure; hard when dry, friable when moist, slightly sticky and nonplastic when wet; few very fine roots; many very fine and few coarse pores; slightly calcareous; very strongly alkaline; clear, smooth boundary. 2 to 6 inches thick.

C4—31 to 47 inches, pale-brown (10YR 6/3) fine sandy loam, dark brown (10YR 4/3) when moist; many, medium, faint, brown (10YR 4/3) mottles; weak, coarse, subangular blocky structure; hard when dry, friable when moist, slightly sticky and nonplastic when wet; few very fine roots; many very fine tubular pores; slightly calcareous; strongly alkaline; abrupt, smooth boundary. 10 to 20 inches thick.

IIC2—47 to 60 inches, 80 percent light-gray (10YR 7/2) and 20 percent white (10YR 8/2) loamy sand, brownish yellow (10YR 6/6) when moist; single grained; loose when dry and moist, nonsticky and nonplastic when wet; moderately alkaline.

The A horizon is light gray, light brownish gray, or very pale brown. The C1ca horizon has moderate or strong prismatic and subangular blocky structure. Some areas are underlain by sand or gravel below a depth of 40 inches. Depth to mottles is 20 to 40 inches. Reaction is slightly alkaline to very strongly alkaline, depending on the stage of reclamation.

Letha fine sandy loam (0 to 1 percent slopes) (Le).—This soil is in irregularly shaped areas 10 to 120 acres in size. It has the profile described as representative of the series. Included in mapping are areas of Chance, Falk, Moulton, and Notus soils. Runoff is slow, and the erosion hazard is slight or none. The soil is used for corn, sugar beets, pasture, and wildlife. Capability unit IVw–3 irrigated.

Letha fine sandy loam, slightly saline-alkali (0 to 2 percent slopes) (Lf).—This soil is in irregularly shaped areas 15 to 80 acres in size. It has a profile similar to the one described as representative of the series, but the surface layer is only mildly alkaline and the substratum is only moderately alkaline.

Included with this soil in mapping are areas of Baldock, Chance, Falk, Moulton, and Notus soils. Runoff is slow, and the erosion hazard is slight or none. The soil is used for corn, sugar beets, small grain, pasture and wildlife. Capability unit IIIw–6 irrigated; windbreak suitability group 4.

Lolalita Series

The Lolalita series consists of well-drained soils on fans and the sides of highly dissected terraces. These soils formed in moderately coarse textured sediment and alluvium. Slopes are 1 to 80 percent. Elevation is 2,200 to 3,000 feet. The vegetation is annual grasses, forbs, and shrubs in areas not irrigated. Precipitation is 9 to 12 inches, mean annual air temperature is 50° to 52° F., and the frost-free season is 140 to 160 days.

In a representative profile the soil is mainly pale-brown sandy loam to a depth of 48 inches. Below this, to a depth of 60 inches, it is light brownish-gray sandy loam. It is mildly alkaline and moderately alkaline to a depth of 48 inches and slightly calcareous below a depth of 48 inches.

Permeability is moderately rapid. The root zone is more than 60 inches deep and holds 6 to 8 inches of water available to plants.

Lolalita soils are used for irrigated crops, range, wildlife, and watershed.

Representative profile of Lolalita sandy loam, 7 to 12 percent slopes, south of Fruitland, 2,240 feet east, 250 feet south of northwest corner of sec. 25, T. 7 N., R. 5 W., in an uncultivated area:

A11—0 to 1 inch, grayish-brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) when moist; weak, very fine, granular structure; soft when dry, very friable when moist, nonsticky and nonplastic when wet; abundant fine roots; many very fine irregular pores; mildly alkaline; abrupt, smooth boundary. 0 to 2 inches thick.

A12—1 to 7 inches, pale-brown (10YR 6/3) sandy loam, dark grayish brown (10YR 4/2) when moist; weak, fine, granular structure; soft when dry, very friable when moist, nonsticky and nonplastic when wet; many fine roots; many very fine irregular pores; mildly alkaline; clear, smooth boundary. 0 to 6 inches thick.

C1—7 to 14 inches, pale-brown (10YR 6/3) sandy loam, dark brown (10YR 4/3) when moist; very weak, fine, subangular blocky structure; soft when dry, very friable when moist, nonsticky and nonplastic when wet; many fine roots; many very fine irregular pores; mildly alkaline; gradual, smooth boundary. 5 to 30 inches thick.

C2—14 to 48 inches, pale-brown (10YR 6/3) sandy loam, brown (10YR 4/3) when moist; massive; soft when dry, very friable when moist, nonsticky and nonplastic when wet; many fine roots; many very fine irregular pores; mildly alkaline; gradual, smooth boundary. 20 to 35 inches thick.

C3ca—48 to 60 inches, light brownish-gray (2.5Y 6/2) sandy loam, light olive brown (2.5Y 5/4) when moist; massive; soft when dry, friable when moist, nonsticky and nonplastic when wet; no roots; common very fine irregular pores; slightly calcareous; moderately alkaline.

The A horizon is light brownish gray, grayish brown, or pale brown. The C horizon is sandy loam or coarse sandy loam. Reaction is neutral to moderately alkaline. The depth of carbonates is more than 40 inches. In places no carbonates occur.

Lolalita sandy loam, 1 to 3 percent slopes (LlB).—This soil is in alluvial areas 10 to 80 acres in size. Included in mapping are areas of Emerson, Jenness, and

Tindahay soils. Runoff is slow. The erosion hazard is slight in nonirrigated areas and moderate in irrigated areas. The soil is used for alfalfa, corn, small grain, orchards, pasture, potatoes, sugar beets, range, wildlife, and watershed. Capability units IIe–3 irrigated and VIc–1 nonirrigated; Loamy range site; 8- to 12-inch precipitation zone; windbreak suitability group 1.

Lolalita sandy loam, 3 to 7 percent slopes (LIC).—This soil is on alluvial fans in areas 5 to 80 acres in size. Included with it in mapping are small areas of Jenness, Emerson, and Tindahay soils and other small areas of soils that have a surface layer of coarse sandy loam and gravelly loam. The erosion hazard is moderate in nonirrigated areas and high in irrigated areas. The soil is used for alfalfa, corn, small grain, orchards, pasture, potatoes, sugar beets, range, wildlife, and watershed. Capability units IIIe–3 irrigated and VIe–2 nonirrigated; Loamy range site, 8- to 12-inch precipitation zone; windbreak suitability group 2.

Lolalita sandy loam, 7 to 12 percent slopes (LID).—This soil is in long, fan-shaped alluvial areas 10 to 140 acres in size. It has the profile described as representative of the series. Included in mapping are small areas of Emerson and Tindahay soils and other small areas where the surface layer is coarse sandy loam and gravelly loam.

Runoff is medium. The erosion hazard is moderate in nonirrigated areas and very high in irrigated areas. The soil is used for alfalfa, small grain, orchards, pasture, range, wildlife, and watershed. Capability units IVe-2 irrigated and VIe-2 nonirrigated; Loamy range site, 8- to 12-inch precipitation zone; windbreak suitability group 2.

Lolalita sandy loam, 12 to 30 percent slopes (LIE).—This soil is in irregularly shaped areas 10 to 80 acres in size. Included with it in mapping are small areas of Lankbush and Tindahay soils and small areas of Lolalita soils that have a surface layer of coarse sandy loam, gravelly loam, or cobbly loam.

Runoff is medium or rapid, and the erosion hazard is high. The soil is used for range, wildlife, and watershed. Capability unit VIe–2 nonirrigated; Loamy range site, 8- to 12-inch precipitation zone.

Lolalita complex, very steep (65 to 80 percent slopes) (LMG).—This mapping unit is about 60 percent Lolalita coarse sandy loam and 35 percent Rough broken land. The Lolalita soil is on the lower parts of south-facing slopes. Rough broken land occupies the upper, steeper parts. Included in mapping are small areas where the surface layer is sandy loam and gravelly loam.

The Lolalita soil has a profile similar to the one described as representative of the series, but the surface layer is less than 4 inches thick. Runoff is very rapid, and the erosion hazard is very high. The soil is used for wildlife and watershed.

Rough broken land is very steep, but ordinarily not stony. It is broken by numerous intermittent drainage channels and is deeply dissected by narrow V-shaped valleys and sharp divides. Soil slipping is common. Runoff is high, and geologic erosion is active. The land supports some vegetation and has limited use for grazing. It also provides habitat for wildlife. Capability unit VIIIs–1 nonirrigated.

Lolalita-Lankbush complex, 12 to 30 percent slopes, eroded (LOE2).—This mapping unit is about 55 percent Lolalita coarse sandy loam and 40 percent Lankbush sandy loam. These soils have profiles similar to the ones described as representative of the series, but 4 to 6 inches of the original surface layer has been removed by erosion. The Lolalita soil is along the intermittent drainageways and in steep areas, and the Lankbush soil is in the less steep, more stable areas. Included with these soils in mapping are areas of Lolalita sandy loam and gravelly loam and Tindahay soils that make up about 5 percent of the mapping unit.

Runoff is medium or rapid, and the erosion hazard is high. This mapping unit is used for range, wildlife, and watershed. Capability unit VIe–2 nonirrigated; Loamy range site, 8- to 12-inch precipitation zone.

Lolalita-Saralegui association, steep (30 to 60 percent slopes) (LSF).—This mapping unit is about 20 to 65 percent Lolalita coarse sandy loam, 15 to 45 percent Saralegui coarse sandy loam, and 10 to 30 percent Haw loam. The Saralegui soil has the profile described as representative of the Saralegui series. The Lolalita soil has a profile similar to the one described as representative of the Lolalita series, but the surface layer is coarse sandy loam. Where the Lolalita soil is on south-facing slopes, the Saralegui soil is on north-facing slopes, but at lower elevations. Where the Haw soil is on north-facing slopes, the Saralegui soil is on south-facing slopes, but at higher elevations.

Included with these soils in mapping are areas that are about 5 percent Lankbush and Van Dusen soils and the Ager soils, deep variant. Also included is a grayish-brown clay loam that is 20 to 40 inches deep over siltstone.

Runoff is very rapid, and the erosion hazard is very high. This mapping unit is used for range, wildlife, and watershed. Capability unit VIIe–1 nonirrigated; Lolalita and Saralegui soils in Steep Granitic range site, 8- to 12-inch precipitation zone; Haw soil in Steep Slope range site, 12- to 16-inch precipitation zone.

Moulton Series

The Moulton series consists of poorly drained soils on low terraces and stream bottoms. These soils formed in alluvium. Slopes are 0 to 2 percent. Elevation is 2,100 to 2,350 feet. Precipitation is 9 to 12 inches, mean annual air temperature is 50° to 52° F., and the frost-free season is 140 to 160 days.

In a representative profile the surface layer is grayish-brown fine sandy loam about 8 inches thick. The substratum to a depth of about 30 inches is light brownish-gray and light-gray fine sandy loam. Below this to a depth of 60 inches it is sand and gravel. The soil is neutral throughout and contains no lime.

Permeability is moderately rapid. The root zone is more than 60 inches deep and holds 5 to 6 inches of water available to plants. A seasonal water table fluctuates between depths of 2 and 4 feet.

Moulton soils are used for irrigated crops, wildlife, and homesites.

Representative profile of Moulton fine sandy loam (0 to 2 percent slopes), near the mouth of Little Willow Creek, 1,700 feet south of the center of sec. 17, T. 8 N., R. 4 W., in a cultivated field:

Ap—0 to 8 inches, grayish-brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) when moist; weak, fine, granular structure; slightly hard when dry, friable when moist, slightly sticky and nonplastic when wet; many very fine and few medium roots; many very fine pores; neutral; abrupt, smooth boundary. 4 to 8 inches thick.

C1g—8 to 15 inches, light brownish-gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) when moist; massive; soft when dry, very friable when moist, nonsticky and nonplastic when wet; few very fine roots; many very fine pores; common, medium, faint, dark yellowish-brown (10YR 4/4) when moist mottles; neutral; clear, smooth boundary. 0 to 12 inches thick.

C2g—15 to 30 inches, light-gray (10YR 7/2) fine sandy loam, light brownish gray (10YR 6/2) when moist; massive; soft when dry, very friable when moist, nonsticky and nonplastic when wet; few very fine roots; many very fine pores; many, medium, distinct, dark yellowish-brown (10YR 4/4) when moist mottles; neutral; abrupt, smooth boundary. 0 to 22 inches thick.

IIC3g—30 to 60 inches, sand and gravel; single grained; loose; neutral.

The C horizon is fine sandy loam or sandy loam. Depth to sand and gravel is 10 to 40 inches. Depth to mottles is 8 to 20 inches.

Moulton fine sandy loam (0 to 2 percent slopes) (Mo).—This soil is in long, irregularly shaped areas 10 to 160 acres in size. It has the profile described as representative of the series. Included in mapping are small areas of Baldock, Bowman, Chance, and Notus soils; small areas of soils that have a surface layer of gravelly sandy loam; and other small areas of soils that are grayish-brown fine sandy loam 40 to 60 inches deep over sand and gravel.

Runoff is slow, and the erosion hazard is slight or none. The soil is used for alfalfa, corn, pasture (fig. 8), small grain, sugar beets, wildlife, and homesites. Capability unit IIIw–1 irrigated; windbreak suitability group 4.

Moulton fine sandy loam, slightly saline-alkali (0 to 2 percent slopes) (Mu).—This soil is in irregularly shaped areas 10 to 40 acres in size. It has a profile similar to the one described as representative of the series, but is slightly saline and is as much as 5 percent alkali spots, which are unsuitable for most crops. Included with this soil in mapping are areas of Baldock and Letha soils. Runoff is slow, and the erosion hazard is slight or none. The soil is used for alfalfa,

Figure 8—**Ladino clover and orchardgrass cut for hay on Moulton fine sandy loam near the Payette River.**

corn, small grain, pasture, sugar beets, and wildlife. Capability unit IIIw–6 irrigated; windbreak suitability group 4.

Newell Series

The Newell series consists of well-drained soils on stream bottoms, fans, and toe slopes. These soils formed in alluvium and colluvium derived from basaltic materials. Slopes are 1 to 12 percent. Elevation is 2,300 to 3,000 feet. The vegetation is bunchgrasses, annual grasses, forbs, shrubs, and willows in areas not irrigated. Precipitation is 12 to 14 inches, mean annual air temperature is 48° to 50° F., and the frost-free season is 140 to 155 days.

In a representative profile the surface layer is dark grayish-brown and dark-brown clay loam about 15 inches thick. The subsoil is grayish-brown and dark-gray clay loam about 16 inches thick. The substratum to a depth of about 51 inches is grayish-brown silt loam. Below this, it is light brownish-gray fine sandy loam to a depth of 60 inches. The soil is neutral to a depth of about 15 inches, mildly alkaline between depths of about 15 and 31 inches, and moderately alkaline and slightly calcareous between depths of about 31 and 60 inches.

Permeability is moderately slow. The root zone is more than 60 inches deep and holds 11 to 12 inches of water available to plants.

Newell soils are used for irrigated crops, range, wildlife, and watershed.

Representative profile of Newell clay loam, 1 to 3 percent slopes, along Little Willow Creek, 1,280 feet north, 1,075 feet east of the southwest corner of sec. 13, T. 9 N., R. 3 W., in a cultivated field:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) when moist; strong, fine and very fine, granular structure; slightly hard when dry, friable when moist, sticky and plastic when wet; many very fine roots; many fine irregular pores; neutral; abrupt, wavy boundary. 6 to 10 inches thick.

A12—8 to 15 inches, dark-gray (10YR 4/1) clay loam, very dark gray (10YR 3/1) when moist; strong, very fine and fine, subangular blocky structure; hard when dry, friable when moist, sticky and plastic when wet; many very fine roots; many very fine tubular pores; neutral; clear, wavy boundary. 3 to 7 inches thick.

B1t—15 to 24 inches, grayish-brown (10YR 5/2) clay loam, very dark gray (10YR 3/1) when moist; strong, medium and fine, subangular blocky structure; very hard when dry, firm when moist, sticky and plastic when wet; many very fine roots; many very fine tubular pores; few thin clay films on ped surfaces; mildly alkaline; abrupt, wavy boundary. 4 to 10 inches thick.

B2t—24 to 31 inches, dark-gray (10YR 4/1) clay loam, very dark gray (10YR 3/1) when moist; strong, medium, subangular blocky structure; very hard when dry, firm when moist, sticky and plastic when wet; few very fine and fine roots; many very fine tubular pores; thin patchy clay films on vertical and horizontal ped surfaces; mildly alkaline; abrupt, wavy boundary. 6 to 10 inches thick.

C1ca—31 to 51 inches, grayish-brown (10YR 5/2) silt loam, very dark gray (10YR 3/1) when moist; moderate, fine and medium, subangular blocky structure; hard when dry, friable when moist, slightly sticky and slightly plastic when wet; few very fine roots; many very fine pores; slightly calcareous; few fine lime veins; moderately alkaline; abrupt, smooth boundary. 5 to 25 inches thick.

IIC2ca—51 to 60 inches, light brownish-gray (2.5Y 6/2) fine sandy loam, dark grayish brown (10YR 4/2) when moist; few, fine, faint, brown (10YR 4/3) mottles; massive; very hard when dry, very friable when moist, nonsticky and nonplastic when wet; many very fine and fine tubular pores; slightly calcareous; moderately alkaline.

The Ap horizon is dark grayish brown, dark gray, or grayish brown. The B2t horizon ranges from dark-gray to brown clay loam or silty clay loam that has thin or distinct clay films. The C horizon is clay loam, silt loam, loam, or sandy loam. It is mildly or moderately alkaline. The soil is slightly calcareous at a depth of 30 to 60 inches.

Newell clay loam, 1 to 3 percent slopes (NcB).—This soil is in long, irregularly shaped areas 10 to 150 acres in size. It has the profile described as representative of the series. Included in mapping are small areas of a gravelly clay loam, a Haw soil, a soil that is similar to this Newell soil but does not have clay films and is 15 to 35 percent coarse fragments, and a soil that is similar to this Newell soil but has a black or very dark brown surface layer.

Runoff is slow. The erosion hazard is slight in nonirrigated areas and moderate in irrigated areas. The soil is used for alfalfa, corn, small grain, pasture, range, wildlife, and watershed. Capability units IIe–2 irrigated and IVc–1 nonirrigated; Loamy range site, 12- to 16-inch precipitation zone; windbreak suitability group 1.

Newell stony clay loam, 3 to 12 percent slopes (NED).—This soil is on alluvial fans 10 to 120 acres in size. It has a profile similar to the one described as representative of the series, but stones cover as much as 0.1 percent of the surface area. Included with this soil in mapping are areas of Haw and Gem soils. Runoff is medium, and the erosion hazard is moderate. The soil is used for range, wildlife, and watershed. Capability unit IVe–5, nonirrigated; Loamy range site, 12- to 16-inch precipitation zone; windbreak suitability group 2.

Notus Series

The Notus series consists of somewhat poorly drained soils on low stream terraces and river bottoms. These soils formed in moderately coarse textured and gravelly coarse textured alluvium. Slopes are 0 to 3 percent. Elevation is 2,100 to 2,350 feet. Precipitation is 9 to 12 inches, mean annual air temperature is 50° to 52° F., and the frost-free season is 140 to 160 days.

In a representative profile the soil is mainly light brownish-gray coarse sandy loam to a depth of about 14 inches. Below this, to a depth of 60 inches or more, it is white and yellow very gravelly sand. The soil is mildly alkaline throughout.

Permeability is moderately rapid. The root zone is more than 60 inches deep and holds 3 to 4 inches of water available to plants. A seasonal high water table fluctuates between depths of 2 and 3 feet, depending upon the level of water in the adjacent river. As the riverflow decreases, the water table drops rapidly to a depth as low as 5 feet.

Notus soils are used for irrigated crops and wildlife. They are the best source of sand and gravel for construction purposes in the county.

Representative profile of Notus coarse sandy loam (0 to 2 percent slopes), along the Payette River, 1,800 feet east, 1,100 feet north of the southwest corner of sec. 27, T. 8 N., R. 4 W., in an area used as pasture:

A1—0 to 1 inch, grayish-brown (10YR 5/2) coarse sandy loam, very dark grayish brown (10YR 3/2) when moist; weak, very fine, granular structure; soft when dry, very friable when moist, nonsticky and nonplastic when wet; many very fine roots; many very fine pores; mildly alkaline; abrupt, smooth boundary. 0 to 3 inches thick.

C1—1 inch to 14 inches, light brownish-gray (10YR 6/2) coarse sandy loam, dark grayish brown (10YR 4/2) when moist; common, fine, faint, yellowish-brown (10YR 5/6) iron mottles when moist; weak, very fine, granular structure; soft when dry, very friable when moist, nonsticky and nonplastic when wet; many fine and very fine roots; many very fine and fine pores; mildly alkaline; gradual, smooth boundary. 10 to 19 inches thick.

IIC2—14 to 60 inches, white (10YR 8/1) and yellow (10YR 7/6) dry and moist very gravelly sand; single grained; loose when dry and moist; common grading to few very fine roots; porous; moist; mildly alkaline.

The A horizon is grayish-brown or light brownish-gray coarse sandy loam, sandy loam, loamy sand, or gravelly sandy loam. Depth to loose sand or sand and gravel is 10 to 20 inches. Reaction is neutral to mildly alkaline.

Notus coarse sandy loam (0 to 2 percent slopes) (No).—This soil is in irregularly shaped areas 5 to 80 acres in size. Included in mapping are small areas where the surface layer is sandy loam and gravelly sandy loam and areas of Chance and Moulton soils and Riverwash. Runoff is very slow, and the erosion hazard is slight or none. The soil is used for alfalfa, corn, small grain, pasture, and wildlife. Capability unit IVw–5 irrigated.

Nyssaton Series

The Nyssaton series consists of well-drained soils on intermediate terraces. These soils formed in laminated lacustrine sediment. Slopes are 0 to 30 percent. Elevation is 2,200 to 2,700 feet. The soil is irrigated. Precipitation is 9 to 12 inches, mean annual air temperature is 50° to 52° F., and the frost-free season is 140 to 160 days.

In a representative profile the soil is light-gray silt loam to a depth of about 15 inches. Below this, it is very pale brown and white silt loam to a depth of 60 inches. The soil is strongly calcareous and moderately alkaline throughout.

Permeability is moderately slow. The root zone is more than 60 inches deep and holds 11 to 13 inches of water available to plants.

Nyssaton soils are used for irrigated crops and wildlife.

Representative profile of Nyssaton silt loam, 0 to 1 percent slopes, west of New Plymouth, 1,400 feet south, 1,070 feet east of the southwest corner of sec. 7, T. 7 N., R. 4 W., in a cultivated field:

Ap—0 to 6 inches, light-gray (10YR 7/2) silt loam, brown (10YR 5/3) when moist; moderate, medium, granular structure; hard when dry, very friable when moist, nonsticky and slightly plastic when wet; many very fine and common coarse roots; many very fine irregular pores; strongly calcareous; moderately alkaline; abrupt, smooth boundary. 0 to 16 inches thick.

C1ca—6 to 15 inches, light-gray (10YR 7/2) silt loam, brown (10YR 5/3) when moist; weak, coarse, subangular blocky structure; very hard when dry, very friable when moist, nonsticky and slightly plastic when wet; many very fine and fine roots and few coarse roots; many very fine tubular pores; strongly calcareous; moderately alkaline; abrupt, smooth boundary. 7 to 16 inches thick.

C2ca—15 to 22 inches, very pale brown (10YR 7/3) silt loam, brown (10YR 5/3) when moist; moderate, medium, platy structure; very hard when dry, firm when moist, nonsticky and slightly plastic when wet; many very fine and fine roots in cracks; strongly calcareous; moderately alkaline; abrupt, smooth boundary. 7 to 14 inches thick.

C3ca—22 to 60 inches, white (10YR 8/2) silt loam, brown (10YR 5/3) when moist; strong, thick and very thin, platy structure; very hard when dry, very firm when moist, nonsticky and slightly plastic when wet; few fine roots in cracks; strongly calcareous; moderately alkaline.

The Ap horizon is light brownish gray or light gray. The C horizon is white, light gray, or very pale brown. The depth to the underlying laminated sediments ranges from 20 to 40 inches. Reaction ranges from slightly calcareous to strongly calcareous above the laminated sediments and is moderately calcareous or strongly calcareous in the sediments.

Nyssaton silt loam, 0 to 1 percent slopes (NyA).—This soil is in irregularly shaped areas 10 to 40 acres in size. It has the profile described as representative of the series. Included in mapping are areas of Greenleaf and Owyhee soils. Runoff is very slow, and the erosion hazard is slight or none. The soil is used for alfalfa, corn, mint, sugar beets, small grain, onions, orchards, potatoes, pasture, and wildlife. Capability unit I–1 irrigated; windbreak suitability group 1.

Nyssaton silt loam, 1 to 3 percent slopes (NyB).—This soil is in irregularly shaped areas 10 to 80 acres in size. Included in mapping are areas of Greenleaf and Owyhee soils. Runoff is slow, and the erosion hazard is moderate. The soil is used for alfalfa, corn, mint, sugar beets, small grain, onions, orchards, potatoes, pasture, and wildlife. Capability unit IIe–2 irrigated; windbreak suitability group 1.

Nyssaton silt loam, 3 to 7 percent slopes (NyC).—This soil is in long, irregularly shaped areas 10 to 40 acres in size. Included in mapping are areas of Greenleaf and Owyhee soils. Runoff is medium, and the erosion hazard is high. The soil is used for alfalfa, corn, sugar beets, small grain, orchards, potatoes, pasture, and wildlife. Capability unit IIIe–2 irrigated; windbreak suitability group 2.

Nyssaton silt loam, 7 to 12 percent slopes (NyD).—This soil is in long, irregularly shaped areas 5 to 60 acres in size. Included in mapping are areas of Greenleaf and Owyhee soils. Runoff is medium, and the erosion hazard is very high. The soil is used for alfalfa, corn, small grain, orchards, pasture, and wildlife. Capability unit IVe–1 irrigated; windbreak suitability group 2.

Nyssaton silt loam, 12 to 30 percent slopes (NyE).—This soil is in long, irregularly shaped areas 5 to 60

acres in size. Included in mapping are small areas of Owyhee soils and gravelly sandy loam soils. Runoff is rapid. The erosion hazard is high in nonirrigated areas and very high in irrigated areas. The soil is used for alfalfa, pasture, small grain, and wildlife. Capability units VIe–1 irrigated and VIe–2 nonirrigated.

Owyhee Series

The Owyhee series consists of well-drained soils on intermediate terraces. These soils formed in laminated lacustrine sediment. Slopes are 0 to 30 percent. Elevation is 2,200 to 2,800 feet. Precipitation is 9 to 12 inches, mean annual air temperature is 50° to 52° F., and the frost-free season is 140 to 160 days.

In a representative profile the surface layer is light brownish-gray silt loam about 7 inches thick. The subsoil is pale-brown silt loam about 20 inches thick. The substratum is white silt loam to a depth of about 37 inches. Below this, it is light-gray and white silt to a depth of 60 inches. The soil is moderately alkaline throughout. The subsoil is slightly calcareous, and the substratum is strongly calcareous.

Permeability is moderately slow. The root zone is more than 60 inches deep and holds 11 to 15 inches of water available to plants.

Owyhee soils are used for irrigated crops, wildlife, and homesites.

Representative profile of Owyhee silt loam, 3 to 7 percent slopes, northeast of Payette, 70 feet west, 1,500 feet north of the southeast corner of sec. 26, T. 9 N., R. 5 W., in a cultivated field:

Ap—0 to 7 inches, light brownish-gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) when moist; weak, fine, granular structure; slightly hard when dry, very friable when moist, slightly sticky and nonplastic when wet; many fine and common very fine roots; many fine irregular pores; moderately alkaline; abrupt, smooth boundary. 0 to 14 inches thick.

B21—7 to 14 inches, pale-brown (10YR 6/3) silt loam, brown (10YR 4/3) when moist; weak, medium, prismatic structure parting to weak, medium, subangular blocky; slightly hard when dry, very friable when moist, slightly sticky and slightly plastic when wet; common very fine and fine roots; common very fine and fine tubular pores; few lime-coated nodules of soil material that has a noncalcareous core; moderately alkaline; clear, smooth boundary. 6 to 10 inches thick.

B22—14 to 27 inches, similar to B21 horizon but has moderate, medium, prismatic structure; abrupt, smooth boundary. 10 to 15 inches thick.

C1ca—27 to 37 inches, white (10YR 8/1) silt loam, brown (10YR 5/3) and light gray (10YR 7/2) when moist; massive and has pockets of moderate, fine and medium, subangular blocky structure; slightly hard when dry, firm when moist, slightly sticky and slightly plastic when wet; many fine and very fine roots; common very fine tubular pores; about 20 to 35 percent light-gray (10YR 7/2) nodules of soil material that has discontinuous coatings of lime; strongly calcareous; moderately alkaline; clear, smooth boundary. 6 to 12 inches thick.

C2—37 to 50 inches, light-gray (10YR 7/2) silt, brown (10YR 5/3) and light gray (10YR 7/2) when moist; nearly massive to weak, thin and medium, platy structure; slightly hard when dry, friable when moist, slightly sticky and slightly plastic when wet; few very fine and fine roots; common very fine tubular pores; 3 to 5 percent brown (10YR 5/3) nodules of soil material; strongly calcareous; moderately alkaline; abrupt, smooth boundary. 6 to 14 inches thick.

C3—50 to 60 inches, white (10YR 8/2) silt, pale brown (10YR 6/3) when moist; massive and strong, thin and medium, platy structure; slightly hard when dry, very firm when moist, slightly sticky and slightly plastic when wet; few very fine and fine roots confined in cracks between structural surfaces; plates are brittle; strongly calcareous; moderately alkaline.

The Ap horizon is light brownish gray or grayish brown. The B2 horizon ranges from weak subangular blocky to moderate prismatic structure. The depth to the platy underlying laminated sediments commonly ranges from 20 to 40 inches. The soil is noncalcareous to a depth of 12 to 28 inches. In a few places the laminated sediments are weakly cemented. In places loam, sandy loam, sand, and gravel are below a depth of 40 inches.

Owyhee silt loam, 0 to 1 percent slopes (OwA).—This soil is in irregularly shaped areas 5 to 100 acres in size. Included in mapping are areas of Greenleaf and Nyssaton soils. Runoff is very slow, and there is little or no erosion hazard. The soil is used for alfalfa, corn, mint, orchards, onions, pasture, potatoes, small grain, sugar beets, wildlife, and homesites. Capability unit I–1 irrigated; windbreak suitability group 1.

Owyhee silt loam, 1 to 3 percent slopes (OwB).—This soil is in irregularly shaped areas 10 to 120 acres in size. Included in mapping are areas of Greenleaf and Nyssaton soils. Runoff is slow, and the erosion hazard is moderate. The soil is used for alfalfa, corn, mint, orchards, onions, pasture, potatoes, small grain, sugar beets, wildlife, and homesites. Capability unit IIe–2 irrigated; windbreak suitability group 1.

Owyhee silt loam, 3 to 7 percent slopes (OwC).—This soil is in long, irregularly shaped areas 5 to 80 acres in size. It has the profile described as representative of the series. Included in mapping are areas of Greenleaf and Nyssaton soils. Runoff is medium, and the erosion hazard is high. The soil is used for alfalfa, corn, orchards, pasture, potatoes, small grain, sugar beets, and wildlife. Capability unit IIIe–2 irrigated; windbreak suitability group 2.

Owyhee silt loam, 7 to 12 percent slopes, eroded (OwD2).—This soil is in long, irregularly shaped areas 10 to 160 acres in size. It has a profile similar to the one described as representative of the series, but 6 to 8 inches of the surface layer has been removed by erosion. Included with this soil in mapping are areas of Greenleaf and Nyssaton soils. Runoff is medium, and the erosion hazard is very high. The soil is used for alfalfa, corn, orchards, pasture, small grain, and wildlife. Capability unit IVe–1 irrigated; windbreak suitability group 2.

Owyhee silt loam, 12 to 30 percent slopes, eroded (OwE2).—This soil is in long, irregularly shaped areas 15 to 80 acres in size. It has a profile similar to the one described as representative of the series, but 8 to 10 inches of the surface layer has been removed by erosion. Included with this soil in mapping are areas of Greenleaf and Nyssaton soils. Runoff is rapid. The erosion hazard is high in nonirrigated areas and very high in irrigated areas. The soil is used for alfalfa, small grain, pasture, and wildlife. Capability units VIe–1 irrigated and VIe–2 nonirrigated.

Payette Series

The Payette series consists of well-drained soils on dissected terraces. These soils formed in old moderately coarse textured and coarse textured sediment weathered from acid igneous rock. Slopes are 30 to 65 percent. Elevation is 2,400 to 3,000 feet. The vegetation is annual grasses, bunchgrasses, forbs, and shrubs. Precipitation is 12 to 13 inches, mean annual air temperature is 48° to 50° F., and the frost-free season is 130 to 145 days.

In a representative profile the surface layer is grayish-brown coarse sandy loam about 8 inches thick. The subsoil is grayish-brown and brown coarse sandy loam about 20 inches thick. The substratum is pale-brown coarse sand that extends to a depth of 60 inches or more. The soil is neutral throughout. It is slightly calcareous below a depth of 28 inches.

Permeability is moderately rapid. The root zone is more than 60 inches deep and holds 3 to 6 inches of water available to plants.

Payette soils are used for range, wildlife, and watershed.

Representative profile of Payette coarse sandy loam, 30 to 65 percent slopes, north of Payette, 300 feet south, 1,770 feet east of the northwest corner of sec. 7, T. 9 N., R. 4 W., in an area used as range:

A1—0 to 8 inches, grayish-brown (10YR 5/2) coarse sandy loam, very dark grayish brown (10YR 3/2) when moist; weak, very fine, granular structure; soft when dry, very friable when moist, nonsticky and nonplastic when wet; few fine and many very fine roots; many, very fine, irregular pores; neutral; clear, smooth boundary. 6 to 10 inches thick.

B2t—8 to 16 inches, grayish-brown (10YR 5/2) coarse sandy loam, very dark grayish brown (10YR 3/2) when moist; weak, coarse, subangular blocky structure parting to weak, very fine, granular; soft when dry, very friable when moist, slightly sticky and slightly plastic when wet; few very fine roots; many fine irregular pores; few thin clay films on ped faces; neutral; clear, smooth boundary. 8 to 15 inches thick.

B3—16 to 28 inches, brown (10YR 5/3) coarse sandy loam, dark brown (10YR 3/3) when moist; single grained; loose when dry and moist, nonsticky and nonplastic when wet; few very fine roots; many fine irregular pores; neutral; gradual, smooth boundary. 10 to 20 inches thick.

Cca—28 to 60 inches, pale-brown (10YR 6/3) coarse sand, yellowish brown (10YR 5/4) moist; single grained; loose when dry and moist, nonsticky and nonplastic when set; slightly calcareous; neutral.

The A horizon is grayish brown or dark grayish brown. The B2t horizon is coarse sandy loam, sandy loam, or loam. The Cca horizon is coarse sand or very coarse sand. Reaction is neutral throughout in most places, but in some areas it is mildly alkaline in the Cca horizon.

Payette coarse sandy loam, 30 to 65 percent slopes (PAF).—This soil is on north-facing slopes in long, irregularly shaped areas 10 to 160 acres in size. It has the profile described as representative of the series.

Included with this soil in mapping are areas of Haw, Lolalita, and Van Dusen soils. Also included, on steep north-facing slopes in the southern part of the county, are areas of a soil that is silt loam throughout and has a thin grayish-brown surface layer, a brown subsoil about 20 inches thick, and a brown substratum.

Runoff is very rapid, and the erosion hazard is very high. The soil is used for range, wildlife, and watershed. Capability unit VIIe–1 nonirrigated; Steep Slope range site, 12- to 16- inch precipitation zone.

Payette-Van Dusen association, steep (30 to 65 percent slopes) (PCF).—This mapping unit is about 50 to 70 percent Payette coarse sandy loam and 25 to 45 percent Van Dusen loam. The Payette soil is on north- and south-facing slopes, and the Van Dusen soil is on north-facing slopes. The Van Dusen soil has the profile described as representative of the series. Included with these Payette and Van Dusen soils in mapping are areas that are about 5 percent the Ager deep variant and Haw, Saralegui, and Lolalita soils.

Runoff is very rapid, and the erosion hazard is very high. The soils are used for range, wildlife, and watershed. Capability unit VIIe–1 nonirrigated; Steep Slope range site, 12- to 16- inch precipitation zone.

Power Series

The Power series consists of well-drained soils on high dissected terraces. These soils formed in wind-deposited silt that overlies a hardpan. Slopes are 1 to 12 percent. Elevation is 2,300 to 3,000 feet. The vegetation is annual grasses, forbs, and shrubs in areas not irrigated. Precipitation is 9 to 11 inches, mean annual air temperature is 50° to 52° F., and the frost-free season is 140 to 160 days.

In a representative profile the surface layer is light brownish-gray silt loam about 2 inches thick. The subsurface layer is light-gray silt loam about 12 inches thick. The upper part of the subsoil is pale-brown silty clay loam about 4 inches thick, and the lower part is light yellowish-brown and pale-brown silt loam about 18 inches thick. The substratum is white silt loam about 7 inches thick. A hardpan is at a depth of 43 inches. The surface layer and upper part of the subsoil are moderately alkaline, and the lower part of the subsoil and the substratum are strongly alkaline. The substratum is strongly calcareous.

Permeability is moderately slow over the hardpan. The root zone is 40 to 60 inches deep and holds 9 to 11 inches of water available for plants.

Power soils are used for irrigated crops, range, wildlife, and watershed.

Representative profile of Power silt loam in an area of Power-Elijah silt loams, 3 to 7 percent slopes, north of Payette River near Gem County line, 1,565 feet east, 1,535 feet north of southwest corner sec. 32, T. 8 N., R. 3 W., in an area used as range:

A1—0 to 2 inches, light brownish-gray (10YR 6/2) silt loam, very dark grayish brown (10YR 3/2) when moist; moderate, thick, platy structure parting to weak, very fine, granular; soft when dry, loose when moist, slightly sticky and slightly plastic when wet; many very fine roots; many very fine irregular pores; moderately alkaline; abrupt, smooth boundary. 0 to 3 inches thick.

A21—2 to 7 inches, light-gray (10YR 7/2) silt loam, dark brown (10YR 4/3) when moist; weak, thick, platy structure; soft when dry, friable when moist, slightly sticky and slightly plastic when wet; many very fine roots; many very fine vesicular pores; moderately alkaline; abrupt, smooth boundary. 5 to 6 inches thick.

A22—7 to 14 inches, similar to A21 horizon but has weak, coarse, subangular blocky structure. 6 to 9 inches thick.

B2t—14 to 18 inches, pale-brown (10YR 6/3) silty clay loam, dark brown (10YR 3/3) when moist; strong, medium, subangular blocky structure; very hard when dry, very firm when moist, sticky and plastic when wet; many very fine roots; few very fine tubular pores; medium continuous clay films on all surfaces; moderately alkaline; clear, smooth boundary. 4 to 10 inches thick.

B31t—18 to 24 inches, light yellowish-brown (10YR 6/4) silt loam, dark brown (10YR 3/3) when moist; moderate, medium, subangular blocky structure; hard when dry, firm when moist, sticky and plastic when wet; few very fine roots; many very fine tubular pores; strongly alkaline; clear, smooth boundary. 4 to 6 inches thick.

B32t—24 to 36 inches, pale-brown (10YR 6/3) silt loam, brown (10YR 5/3) when moist; moderate, medium, subangular blocky structure; hard when dry, friable when moist, slightly sticky and slightly plastic when wet; few very fine roots; many very fine and few fine tubular pores; many, medium and large, distinct, white (10YR 8/1) lime veins; strongly calcareous on ped surfaces and none in matrix; strongly alkaline; abrupt, smooth boundary. 8 to 12 inches thick.

C1ca—36 to 43 inches, white (10YR 8/2) silt loam, very pale brown (10YR 7/3) when moist; massive; loose when dry, friable when moist, slightly sticky and slightly plastic when wet; very fine roots; common very fine tubular pores; few faint lime splotches; strongly calcareous; strongly alkaline; abrupt, smooth boundary. 7 to 20 inches thick.

C2casim—43 to 47 inches, indurated hardpan.

IIC3—47 to 60 inches, white (10YR 8/2) and very pale brown (10YR 7/4) quartz sand, white (10YR 8/2) and yellow (10YR 7/6) when moist; single grained; loose when dry and moist, nonsticky and nonplastic when wet; moderately calcareous; moderately alkaline.

The A horizon is light gray to pale brown. The B2t horizon is silt loam or silty clay loam. Depth to carbonates ranges from 15 to 30 inches. The hardpan is below a depth of 40 inches. In places no pan has formed.

Power-Elijah silt loams, 1 to 3 percent slopes (PeB).—This mapping unit is about 50 percent Power silt loam, 20 percent Elijah silt loam, and 20 percent Vickery silt loam. Power and Elijah soils are in depressions between mounds of Vickery soils.

Included with these soils in mapping are areas that are about 10 percent Chilcott, Lankbush, Lanktree, Purdam, and Sebree soils and areas of a soil that is similar to Vickery soils but more than 40 inches deep over a hardpan. Also included are areas where the soils have been deep plowed to a depth of about 35 inches.

Runoff is slow. The erosion hazard is slight in nonirrigated areas and moderate in irrigated areas. This mapping unit is used for alfalfa, corn, orchards, pastures, small grain, sugar beets, potatoes, range, wildlife, and watershed. Capability units IIe–2 irrigated and VIc–1 nonirrigated; Loamy range site, 8- to 12-inch precipitation zone; windbreak suitability group 1.

Power-Elijah silt loams, 3 to 7 percent slopes (PeC).—This mapping unit is about 45 percent Power silt loam, 25 percent Elijah silt loam, and 20 percent Vickery silt loam. Power and Elijah soils are in depressions between mounds of Vickery soils. The profile representative of the Power series is described in this mapping unit.

Included with these soils in mapping are areas that are about 10 percent Chilcott, Lankbush, Lanktree, Purdam, and Sebree soils and areas of a soil that is similar to Vickery soils but more than 40 inches deep over a hardpan. Also included are areas of soils that have been deep plowed to a depth of about 35 inches.

Runoff is medium. The erosion hazard is moderate in nonirrigated areas and high in irrigated areas. This mapping unit is used for alfalfa, corn, orchards, pasture, small grain, sugar beets, potatoes, range, wildlife, and watershed. Capability units IIIe–8 irrigated and VIe–2 nonirrigated; Loamy range site, 8- to 12-inch precipitation zone; windbreak suitability group 2.

Power-Elijah silt loams, 7 to 12 percent slopes (PeD).—This mapping unit is about 50 percent Power silt loam, 20 percent Elijah silt loam, and 20 percent Vickery silt loam. Power and Elijah soils are in depressions between mounds of Vickery soils.

Included with these soils in mapping are areas that are about 10 percent Lankbush, Purdam, and Sebree soils and areas of soils that have been deep plowed to a depth of about 35 inches.

Runoff is medium. The erosion hazard is moderate in nonirrigated areas and very high in irrigated areas. This mapping unit is used for alfalfa, corn, orchards, pasture, small grain, range, wildlife, and watershed. Capability units IVe–1 irrigated and VIe–2 nonirrigated; Loamy range site, 8- to 12-inch precipitation zone; windbreak suitability group 2.

Power-Purdam silt loams, 7 to 12 percent slopes (PoD).—This mapping unit is about 40 percent Power silt loam and 35 percent Purdam silt loam. The Purdam soils are in depressions between areas of Power soils. Included with these soils in mapping are areas that are about 15 percent Elijah, Lankbush, Lolalita, Sebree, and Vickery soils.

Runoff is medium. The erosion hazard is moderate in nonirrigated areas and very high in irrigated areas. This mapping unit is used for alfalfa, corn, orchards, pasture, small grain, range, wildlife, and watershed. Capability units IVe–1 irrigated and VIe–2 nonirrigated; Loamy range site, 8- to 12-inch precipitation zone; windbreak suitability group 2.

Purdam Series

The Purdam series consists of well-drained soils on high dissected terraces. These soils formed in wind-deposited silt that overlies a weakly cemented hardpan. Slopes are 1 to 12 percent. Elevation is 2,300 to 3,000 feet. The vegetation is annual grasses, forbs, and shrubs in areas not irrigated. Precipitation is 9 to 11 inches, mean annual air temperature is 50° to 52° F., and the frost-free season is 140 to 160 days.

In a representative profile the surface layer is pale-brown silt loam about 8 inches thick. The upper part of the subsoil is brown silty clay loam about 6 inches thick. The lower part is very pale brown silt loam about 14 inches thick. The upper part of the substratum is a white, weakly cemented hardpan about 22 inches thick. The lower part is white sand to a depth of 60 inches. The soil is mildly alkaline to a depth of about 14 inches and moderately alkaline and calcareous below.

Permeability is moderately slow over the hardpan. The root zone is 20 to 40 inches deep and holds 4 to 8 inches of water available to plants.

Purdam soils are used for irrigated crops, range, wildlife, and watershed.

Representative profile of Purdam silt loam in an area of Purdam-Power silt loams, 3 to 7 percent slopes, southeast of New Plymouth, 750 feet north, 3,050 feet east of the southeast corner of sec. 20, T. 6 N., R. 3 W., in an area used as range:

A1—0 to 8 inches, pale-brown (10YR 6/3) silt loam, dark brown (10YR 3/3) when moist; weak, thin, platy structure; firm when dry, very friable when moist, slightly sticky and plastic when wet; many very fine roots; many medium vesicular pores; mildly alkaline; abrupt, smooth boundary. 6 to 12 inches thick.

B21t—8 to 14 inches, brown (10YR 5/3) silty clay loam, dark brown (10YR 3/3) when moist; weak, coarse, prismatic structure parting to strong, coarse, subangular blocky; very hard when dry, friable when moist, sticky and plastic when wet; many very fine roots; many very fine tubular pores; thin nearly continuous clay films on horizontal ped surfaces; mildly alkaline; abrupt, wavy boundary. 4 to 12 inches thick.

B22—14 to 20 inches, very pale brown (10YR 7/3) heavy silt loam, brown to dark brown (10YR 4/3) when moist; moderate, medium, subangular blocky structure; very hard when dry, friable when moist, slightly sticky and slightly plastic when wet; few very fine and fine roots; many very fine tubular pores; slightly calcareous; moderately alkaline; clear, smooth boundary. 4 to 14 inches thick.

B3—20 to 28 inches, very pale brown (10YR 7/2) silt loam, dark brown (10YR 3/3) when moist; weak, medium, subangular blocky structure; hard when dry, friable when moist, slightly sticky and slightly plastic when wet; few very fine roots; many very fine tubular pores; slightly calcareous; moderately alkaline; clear, wavy boundary. 4 to 8 inches thick.

C1sica—28 to 50 inches, white (10YR 8/2) weakly cemented hardpan, pale brown (10YR 6/3) and brown (7.5YR 5/3) when moist; very hard when dry, very firm when moist; strongly calcareous; moderately alkaline; abrupt, irregular boundary. 4 to 22 inches thick.

IIC2—50 to 60 inches, white (10YR 8/2) sand; single grained; loose when dry and moist, nonsticky and nonplastic when wet; strongly calcareous; moderately alkaline.

The A horizon is light brownish gray, grayish brown, or pale brown. The B2t horizon is brown or pale-brown silty clay loam or heavy silt loam that has weak to moderate prismatic structure. The depth to the weakly cemented hardpan ranges from 20 to 40 inches.

Purdam-Power silt loams, 1 to 3 percent slopes (PpB).—This mapping unit is about 65 percent Purdam silt loam and 25 percent Power silt loam. The Purdam soils are in depressions between mounds of Power soils. Included with this soil in mapping are areas that are about 10 percent Elijah, Jenness, Sebree, and Vickery soils and areas of a soil that is similar to Purdam soils but less than 20 inches deep over a weak hardpan.

Runoff is slow. The erosion hazard is slight in nonirrigated areas and moderate in irrigated areas. This mapping unit is used for alfalfa, corn, pasture, small grain, sugar beets, potatoes, orchards, range, wildlife, and watershed. Capability units IIIe–6 irrigated and VIc–1 nonirrigated; Loamy range site, 8- to 12-inch precipitation zone; windbreak suitability group 1.

Purdam-Power silt loams, 3 to 7 percent slopes (PpC).—This mapping unit is about 65 percent Purdam silt loam and 25 percent Power silt loam. The Purdam soils are in depressions between mounds of the Power soils. The Purdam soil has the profile described as representative of the Purdam series. Included with these soils in mapping are areas that are about 10 percent Elijah, Jenness, Sebree, and Vickery soils.

Runoff is medium. The erosion hazard is moderate in nonirrigated areas and high in irrigated areas. This mapping unit is used for alfalfa, corn, pasture, small grain, sugar beets, potatoes, orchards, range, wildlife, and watershed. Capability units IIIe–8 irrigated and VIe–2 nonirrigated; Loamy range site, 8- to 12-inch precipitation zone; windbreak suitability group 2.

Reywat Series

The Reywat series consists of well-drained soils in the foothills. These soils formed in basalt residuum. Slopes are 2 to 60 percent. Elevation is 3,000 to 4,650 feet. The vegetation is perennial grasses, annual grasses, forbs, and shrubs. Precipitation is 12 to 14 inches, mean annual air temperature is 45° to 50° F., and the frost-free season is 130 to 145 days.

In a representative profile the surface layer is dark grayish-brown extremely stony loam about 7 inches thick. The subsoil is brown and yellowish-brown extremely stony clay loam about 10 inches thick. The fractured basalt bedrock is at a depth of 17 inches. The soil is neutral throughout.

Permeability is moderately slow over the basalt. The root zone is 10 to 20 inches deep and holds 1 to 3 inches of water available to plants.

Reywat soils are used for range, wildlife, and watershed.

Representative profile of Reywat extremely stony loam in an area of Reywat-Bakeoven complex, 30 to 60 percent slopes, on upper Big Willow Creek, 90 feet north, 575 feet west of the center of sec. 28, T. 9 N., R. 1 W., in an area used as range:

A11—0 to 2 inches, dark grayish-brown (10YR 4/2) extremely stony loam, very dark grayish brown (10YR 3/2) when moist; strong, fine and very fine, granular structure; soft when dry, very friable when moist, slightly sticky and slightly plastic when wet; many very fine roots; many very fine irregular pores; about 40 percent angular gravel and 15 percent stones; neutral; abrupt, smooth boundary. 2 to 8 inches thick.

A12—2 to 7 inches, dark grayish-brown (10YR 4/2) extremely stony loam, very dark grayish brown (10YR 3/2) when moist; weak, medium and fine, subangular blocky structure; slightly hard when dry, firm when moist, slightly sticky and slightly plastic when wet; common very fine roots; few very fine tubular pores; about 40 percent angular gravel and 15 percent stones; neutral; abrupt, smooth boundary. 0 to 5 inches thick.

B2t—7 to 14 inches, brown (10YR 5/3) extremely stony clay loam, dark brown (10YR 3/3) when moist; strong, fine and medium, subangular blocky structure; slightly hard when dry, firm when moist, sticky and plastic when wet; common very fine

roots; few very fine tubular pores; about 40 percent stones; thin continuous clay films on vertical and horizontal ped surfaces; neutral; clear, smooth boundary. 6 to 8 inches thick.

B3—14 to 17 inches, yellowish-brown (10YR 5/4) extremely stony clay loam, dark yellowish brown (10YR 3/4) when moist; strong, medium and fine, subangular blocky structure; hard when dry, firm when moist, sticky and plastic when wet; few very fine roots; few very fine tubular pores; about 50 percent stones; thin nearly continuous clay films on the vertical and horizontal surfaces; neutral; abrupt, smooth boundary. 2 to 3 inches thick.

R—17 inches, fractured basalt bedrock that has soil and roots extending into the cracks.

The A horizon is grayish brown or dark grayish brown. The B2t horizon is brown or yellowish-brown heavy loam, clay loam, or sandy clay loam that is 35 to 75 percent angular gravel, cobbles, or stones. Reaction is neutral to slightly acid in the A horizon and neutral to mildly alkaline in the B2t horizon. The depth to bedrock ranges from 10 to 20 inches.

Reywat-Bakeoven complex, 2 to 30 percent slopes (RBE).—This mapping unit is about 55 percent Reywat extremely stony loam, 25 percent Bakeoven extremely stony loam, and 15 percent Rock outcrop. The Reywat soil is in long narrow strips, and the Bakeoven soil is in depressions or drainageways between the strips. Included with these soils in mapping are areas that are about 5 percent Gem soils.

Runoff is medium or rapid, and the erosion hazard is moderate to high. The mapping unit is used for range, wildlife, and watershed. Capability unit VIIs–1 nonirrigated; Reywat soil in Shallow Stony range site, 12- to 16-inch precipitation zone; Bakeoven soil in Very Shallow range site, 8- to 16-inch precipitation zone.

Reywat-Bakeoven complex, 30 to 60 percent slopes (RBF).—This mapping unit is about 50 percent Reywat extremely stony loam, 25 percent Bakeoven extremely stony loam, and 20 percent Rock outcrop. The Reywat soil is in long narrow strips up and down the slopes, and the Bakeoven soil is in depressions or drainageways between the strips. The Reywat and Bakeoven soils have the profiles described as representative of their respective series. Included with these soils in mapping are areas that are about 5 percent Gem and Gross soils.

Runoff is very rapid, and the erosion hazard is very high. This mapping unit is used for range, wildlife, and watershed. Capability unit VIIs–1 nonirrigated; Reywat soil in Shallow Stony range site, 12- to 16-inch precipitation zone; Bakeoven soil in Very Shallow range site, 8- to 16-inch precipitation zone.

Riverwash

Riverwash (Rh) is mixed water washed sand and gravel. It occurs mainly as gravel bars along the Payette and Snake Rivers. Small islands are in the Payette River.

Riverwash supports very little plant growth, only some weeds and willows. It is suitable only as wildlife habitat. Stream overflow is always changing the shape of these areas. Capability unit VIIIw–2 nonirrigated.

Rock Outcrop

Rock outcrop consists mainly of bare basalt bedrock. It has no value for farming. It is used for wildlife and watershed.

Rock outcrop-Bakeoven complex, 60 to 80 percent slopes (RKG).—This mapping unit is about 70 percent Rock outcrop and 25 percent Bakeoven extremely stony loam. The Bakeoven soil has a profile similar to the one described as representative of the series, but is only 6 inches deep over bedrock. It is in long, narrow, vertical strips. Rock outcrop occurs between the strips. Included in mapping are areas that are about 5 percent Reywat soils.

Runoff is very rapid, and the hazard of erosion is very high. The unit is used for wildlife and watershed. Capability unit VIIIs–1 nonirrigated; Bakeoven soils in Very Shallow range site, 8- to 16-inch precipitation zone.

Ruckles Series

The Ruckles series consists of well-drained soils on foothills. These soils formed in basalt residuum. Slopes are 2 to 65 percent. Elevation is 2,450 to 3,000 feet. The vegetation is bunchgrasses, annual grasses, forbs, and shrubs. Precipitation is 12 to 13 inches, mean annual air temperature is 47° to 50° F., and the frost-free season is 135 to 150 days.

In a representative profile the surface layer is about 6 inches thick. It is grayish-brown stony loam in the upper part and grayish-brown stony clay loam in the lower part. The upper 3 inches of the subsoil is grayish-brown stony clay loam. The lower 8 inches is brown stony clay. Basalt bedrock is at a depth of 17 inches. The upper part of the surface layer is slightly acid, and the lower part of the surface layer and the subsoil are neutral.

Permeability is moderately slow over the basalt. The root zone is 10 to 20 inches deep and holds 2 to 4 inches of water available to plants.

Ruckles soils are used for range, wildlife, and watershed.

Representative profile of Ruckles stony loam, 7 to 20 percent slopes, on upper Little Willow Creek drainageway, 730 feet west, 190 feet south of the center of sec. 12, T. 9 N., R. 3 W., in a noncultivated area:

A1—0 to 3 inches, grayish-brown (10YR 5/2) stony loam, very dark grayish brown (10YR 3/2) when moist; moderate, fine, granular structure; slightly hard when dry, friable when moist, nonsticky and nonplastic when wet; many very fine roots; many very fine irregular pores; about 3 percent stones and 7 percent gravel; slightly acid; abrupt, smooth boundary. 3 to 5 inches thick.

A3—3 to 6 inches, grayish-brown (10YR 5/2) stony clay loam, very dark grayish brown (10YR 3/2) when moist; weak, very thin, platy structure parting to moderate, medium and coarse, granular; slightly hard when dry, friable when moist, slightly sticky and slightly plastic when wet; many very fine roots; many very fine tubular pores; about 1 percent stones and 5 percent gravel; neutral; abrupt, smooth boundary. 2 to 5 inches thick.

B21t—6 to 9 inches, grayish-brown (10YR 5/2) stony clay loam, dark grayish brown (10YR 4/2) when moist; weak, medium, prismatic structure parting

to weak, medium, subangular blocky; slightly hard when dry, firm when moist, sticky and plastic when wet; common very fine roots; many very fine pores; thin nearly continuous clay films on vertical and horizontal ped surfaces; about 1 percent stones and 5 percent gravel; neutral; abrupt, smooth boundary. 1 to 6 inches thick.

B22t—9 to 17 inches, brown (10YR 5/3) stony clay, dark brown (10YR 4/3) when moist; moderate, medium, prismatic structure parting to strong, medium and coarse, angular blocky; very hard when dry, very firm when moist, sticky and plastic when wet; common very fine roots; few very fine tubular pores; medium continuous clay films on the vertical and horizontal ped surfaces and in pores; about 1 percent stones and 5 percent gravel; neutral; abrupt, smooth boundary. 3 to 10 inches thick.

R—17 inches, basalt bedrock.

The A horizon is grayish brown or brown. The depth to basalt bedrock is 10 to 20 inches. The profile is 1 to 10 percent stones and 5 to 15 percent gravel.

The Ruckles soils in Payette County are outside the range defined for the Ruckles series because the content of coarse fragments is less than 35 percent. This difference, however, does not alter their use and behavior.

Ruckles stony loam, 7 to 20 percent slopes (RuE).—This soil is in long, irregularly shaped areas 10 to 40 acres in size. It has the profile described as representative of the series. Included in mapping are areas of Bakeoven and Reywat soils. Runoff is medium, and the erosion hazard is moderate to high. The soil is used for range, wildlife, and watershed. Capability unit VIIs–1 nonirrigated; Shallow Stony range site, 12- to 16-inch precipitation zone.

Ruckles-Bakeoven extremely stony loams, 2 to 30 percent slopes (RVE).—This mapping units is about 55 percent Ruckles extremely stony loam and 35 percent Bakeoven extremely stony loam. The Ruckles soil is on oval mounds or in long strips, and the Bakeoven soil is in depressions between the mounds or strips. The Ruckles soil has a profile similar to the one described as representative of the series, but the surface layer is extremely stony. Included with these soils in mapping are areas that are about 10 percent Ruckles stony loam, Reywat soils, and Rock outcrop.

Runoff is medium or rapid, and the erosion hazard is moderate to high. This mapping unit is used for range, wildlife, and watershed. Capability unit VIIs–1 nonirrigated; Ruckles soil in Shallow Stony range site, 12- to 16-inch precipitation zone; Bakeoven soil in Very Shallow range site, 8- to 16-inch precipitation zone.

Ruckles-Bakeoven extremely stony loams, 30 to 65 percent slopes (RVF).—This mapping unit is about 55 percent Ruckles extremely stony loam and 40 percent Bakeoven extremely stony loam. The Ruckles soils are in long narrow strips, and the Bakeoven soils are in depressions between the strips. The Ruckles soil has a profile similar to the one described as representative of the series, but the surface layer is extremely stony. Included with these soils in mapping are areas that are about 5 percent Ruckles stony loam, Reywat soils, and Rock outcrop.

Runoff is very rapid, and the erosion hazard is very high. This mapping unit is used for range, wildlife, and watershed. Capability unit VIIs–1 nonirrigated; Ruckles soil in Shallow Stony range site, 12- to 16-inch precipitation zone; Bakeoven soil in Very Shallow range site, 8- to 16-inch precipitation zone.

Saralegui Series

The Saralegui series consists of well-drained soils on old dissected terraces. These soils formed in coarse textured and moderately coarse textured alluvium. Slopes are 1 to 60 percent. Elevation is 2,200 to 2,800 feet. The vegetation is annual grasses, forbs, and shrubs. Precipitation is 9 to 12 inches, mean annual air temperature is 48° to 50° F., and the frost-free season is 130 to 145 days.

In a representative profile the surface layer is grayish-brown coarse sandy loam about 4 inches thick. The subsoil is about 38 inches thick. It is grayish-brown and pale-brown sandy loam in the upper part and very pale brown coarse sandy loam in the lower part. The substratum is pale-brown sandy loam to a depth of 80 inches. The soil is moderately alkaline in the surface layer and upper part of the subsoil and strongly alkaline in the lower part of the subsoil and in the substratum.

Permeability is moderately rapid. The root zone is more than 60 inches deep and holds 6 to 8 inches of water available to plants.

Saralegui soils are used for range, wildlife, and watershed.

Representative profile of Saralegui coarse sandy loam in an area of Lolalita-Saralegui association, steep (30 to 60 percent slopes) along Big Willow Creek, 790 feet west, 990 feet south of the northeast corner of sec. 24, T. 8 N., R. 4 W., in an area used as range:

A1—0 to 4 inches, grayish-brown (10YR 5/2) coarse sandy loam, very dark grayish brown (10YR 3/2) when moist; moderate, thin, platy structure parting to weak, medium, granular; slightly hard when dry, friable when moist, nonsticky and nonplastic when wet; many fine roots; many very fine irregular pores; moderately alkaline; abrupt, wavy boundary. 0 to 5 inches thick.

B1—4 to 7 inches, grayish-brown (10YR 5/2) sandy loam, dark grayish brown (10YR 4/2) when moist; weak, medium and coarse, subangular blocky structure; slightly hard when dry, very friable when moist, slightly sticky and nonplastic when wet; many fine roots; many very fine irregular pores; moderately alkaline; clear, smooth boundary. 2 to 6 inches thick.

B21t—7 to 13 inches, grayish-brown (10YR 5/2) sandy loam, dark grayish brown (10YR 4/2) when moist; weak, medium, prismatic structure parting to weak, medium and fine, subangular blocky; hard when dry, very friable when moist, slightly sticky and nonplastic when wet; many fine and very fine roots; many very fine irregular pores; thin patchy clay films on sand grains; moderately alkaline; gradual, smooth boundary. 2 to 10 inches thick.

B22 –13 to 22 inches, pale-brown (10YR 6/3) sandy loam, dark grayish brown (10YR 4/2) when moist; weak, coarse, prismatic structure; hard when dry, friable when moist, sticky and slightly plastic when wet; common very fine and fine roots; many very fine irregular pores; moderately alkaline; gradual, smooth boundary. 5 to 12 inches thick.

B3—22 to 42 inches, very pale brown (10YR 7/3) coarse sandy loam, grayish brown (10YR 5/2) when moist; weak, medium, subangular blocky struc-

ture; slightly hard when dry, friable when moist, nonsticky and nonplastic when wet; many very fine and fine roots; many very fine irregular pores; strongly alkaline; gradual, smooth boundary. 15 to 25 inches thick.

C—42 to 60 inches, pale-brown (10YR 6/3) sandy loam, dark grayish brown (10YR 4/2) when moist; massive; slightly hard when dry, friable when moist, slightly sticky and nonplastic when wet; few very fine and fine roots; many very fine irregular pores; strongly alkaline.

The A1 horizon is light brownish gray or grayish brown. The B2t horizon is grayish-brown or very pale brown coarse sandy loam or sandy loam. The C horizon is coarse sandy loam, sandy loam, or sand below a depth of 40 inches. Reaction ranges from neutral to strongly alkaline. The soil is noncalcareous to weakly calcareous below a depth of 40 inches.

Saralegui coarse sandy loam, 1 to 12 percent slopes (SAD).—This soil is in irregularly shaped areas 10 to 80 acres in size on ridgetops and toe slopes. It has a profile similar to the one described as representative of the series, but the surface layer is 10 to 14 inches thick. Included with this soil in mapping are areas of Lankbush, Haw, Lolalita, and Ager deep variant soils.

Runoff is slow or medium, and the erosion hazard is moderate. The soil is used for range, wildlife, and watershed. Capability unit VIe–2 nonirrigated; Loamy range site, 8- to 12-inch precipitation zone; windbreak suitability group 5.

Saralegui coarse sandy loam, 12 to 30 percent slopes (SAE).—This soil is in irregularly shaped areas 5 to 100 acres in size. Included with it in mapping are areas of Haw, Lankbush, Lolalita, and Ager deep variant soils. Runoff is medium or rapid, and the erosion hazard is high. The soil is used for range, wildlife, and watershed. Capability unit VIe–2 nonirrigated; Loamy range site, 8- to 12-inch precipitation zone.

Saralegui-Haw complex, 12 to 30 percent slopes, eroded (SHE2).—This mapping unit is about 60 percent Saralegui coarse sandy loam and 35 percent Haw loam. The Saralegui soil is on side slopes near the ridgetops and along intermittent drainageways. The Haw soil is on side slopes where the soil is stable and on north-facing slopes. The Saralegui and Haw soils have profiles similar to the ones described as representative of their respective series, but 4 to 8 inches of the surface layer has been removed by erosion.

Included with these soils in mapping are areas that are about 5 percent Lankbush, Lolalita, and Ager deep variant soils. Runoff is medium or rapid, and the erosion hazard is high. This mapping unit is used for range, wildlife, and watershed. Capability unit VIe–2 nonirrigated; Saralegui soil in Loamy range site, 8- to 12-inch precipitation zone; Haw soil in Loamy range site, 12- to 16-inch precipitation zone.

Saralegui complex, 30 to 60 percent slopes (SLF).—This mapping unit is about 65 percent Saralegui coarse sandy loam and 30 percent Ager clay, deep variant. These soils are on the sides of dissected terraces. They formed in stratified sediments. The Saralegui soil formed in coarse textured and moderately coarse textured strata. The Ager deep variant formed in layers of material weathered from siltstone. The Saralegui soils and the Ager deep variant have profiles similar to the ones described as representative of their respective series, but 6 to 8 inches of the surface layer has been removed by erosion.

Included with these soils in mapping are areas that are about 5 percent Haw, Lolalita, and Payette soils. Runoff is very rapid, and the erosion hazard is very high. This mapping unit is used for range, wildlife, and watershed. Capability unit VIIe–1 nonirrigated; Saralegui soil in Steep Granitic range site, 8- to 12-inch precipitation zone; Ager deep variant soil in Dense Clay range site, 12- to 16-inch precipitation zone.

Sebree Series

The Sebree series consists of well-drained, alkali soils on dissected terraces. These soils formed in wind-laid material and in the underlying unconsolidated, moderately coarse textured and coarse textured, acid igneous sediment. Slopes are 0 to 12 percent. Elevation is 2,300 to 2,800 feet. The vegetation is generally nonexistent. Precipitation is 9 to 11 inches, mean annual air temperature is 50° to 52° F., and the frost-free season is 140 to 160 days.

In a representative profile the surface layer is light-gray loam about 1 inch thick. The subsoil is clay loam about 13 inches thick. It is brownish yellow in the upper part and very pale brown in the lower part. The substratum to a depth of about 35 inches is very pale brown silt loam. Below this is a strongly cemented hardpan that is about 4 inches thick. Below the hardpan to a depth of 60 inches is very pale brown sandy loam. The soil is mildly alkaline in the surface layer and upper part of the subsoil and moderately alkaline below. It is strongly calcareous below a depth of 14 inches.

Permeability is very slow over the hardpan. The root zone is 20 to 40 inches deep and holds 6 to 7 inches of water available to plants. Mixing or deep plowing the soil to a depth of about 35 inches increases water intake and aids plant growth.

These soils are used for irrigated crops, range, and wildlife. Although the hardpan and alkali salts restrict plant growth, small areas of these soils are used with surrounding soils for alfalfa, corn, small grain, pasture, range, and wildlife.

The Sebree soils in Payette County are mapped only with Elijah soils.

Representative profile of Sebree silt loam in an area of Elijah-Sebree silt loams, 1 to 3 percent slopes, southeast of New Plymouth, 1,100 feet north, 1,240 feet east of the southwest corner of sec. 7, T. 6 N., R. 3 W., in an area used as range:

A2—0 to 1 inch, light-gray (10YR 6/1) loam, brown (10YR 4/3) when moist; weak, medium, platy structure; slightly hard when dry, firm when moist, nonsticky and nonplastic when wet; many medium vesicular pores; mildly alkaline; abrupt, smooth boundary. 1 to 2 inches thick.

B2t—1 to 9 inches, brownish-yellow (10YR 6/6) clay loam, dark yellowish brown (10YR 3/4) when moist; weak, very fine, prismatic structure in upper 2 inches and moderate, very fine, subangular blocky below; few very fine and fine roots; many very fine tubular pores; thin continuous clay films on vertical and horizontal ped surfaces; mildly alkaline; abrupt, smooth boundary. 4 to 9 inches thick.

B3—9 to 14 inches, very pale brown (10YR 7/4) clay loam,

brown (10YR 4/3) when moist; weak, coarse, subangular blocky structure; very hard when dry, very firm when moist, sticky and plastic when wet; few very fine roots; many very fine and fine tubular pores; many fine veins of gypsum; moderately alkaline; clear, smooth boundary. 4 to 10 inches thick.

C1ca—14 to 35 inches, very pale brown (10YR 7/3) silt loam, pale brown (10YR 6/3) when moist; massive; hard when dry, very firm when moist, nonsticky and slightly plastic when wet; few very fine tubular pores; many 30- by 15-millimeter nodules; strongly calcareous; moderately alkaline; abrupt, wavy boundary. 10 to 21 inches thick.

C2sicam—35 to 39 inches, white (10YR 8/2) hardpan, light gray (10YR 7/2) when moist; 3 pans, 1 inch thick, that have silt loam material similar to C1ca horizon between them; pink (7.5YR 7/4) top surface coating, light brown (7.5YR 6/4) when moist; massive; extremely hard when dry, very firm when moist, nonsticky and nonplastic when wet; strongly calcareous; moderately alkaline. 4 to 25 inches thick.

IIC3ca—39 to 60 inches, very pale brown (10YR 7/3) sandy loam, yellowish brown (10YR 5/4) when moist; massive; hard when dry, friable when moist, nonsticky and nonplastic when wet; strongly calcareous; moderately alkaline.

The A2 horizon is light gray or white. In cultivated areas, the Ap horizon is grayish brown or light brownish gray. The Bt horizon is silty clay loam or clay loam that contains more than 15 percent exchangeable sodium. The depth to calcareous material ranges from 7 to 20 inches. The depth to the hardpan ranges from 20 to 40 inches.

Terrace Escarpments

Terrace escarpments (TE) consists of sloping, steep and very steep, somewhat even terrace fronts. The soil material is coarse textured, medium textured, or fine textured and in places is cobbly, gravelly, and stony. Texture and depth vary widely.

Runoff is rapid to very rapid, and the erosion hazard is very high. These areas are not suitable for cultivation or grazing, but in places provide some wildlife habitat. Capability unit VIIIs–1 nonirrigated.

Tindahay Series

The Tindahay series consists of somewhat excessively drained soils on fans and terraces. These soils formed in moderately coarse textured and coarse textured alluvium or eolian deposits. Slopes are 3 to 30 percent. Elevation is 2,200 to 3,000 feet. The vegetation is annual grasses, forbs, and shrubs. Precipitation is 9 to 12 inches, mean annual air temperature is 50° to 52° F., and the frost-free season is 140 to 160 days.

In a representative profile the surface layer is grayish-brown loamy coarse sand about 8 inches thick. The upper part of the substratum is grayish-brown coarse sandy loam about 10 inches thick. The next 38 inches is grayish-brown and brown loamy coarse sand. The lower part of the substratum is pale-brown coarse sandy loam to a depth of 60 inches. The soil is moderately alkaline throughout. It is calcareous below a depth of 56 inches.

Permeability is moderately rapid. The root zone is more than 60 inches deep and holds 5 to 6 inches of water available to plants.

Tindahay soils are used for irrigated crops, range, and wildlife.

Representative profile of Tindahay loamy coarse sand, 12 to 30 percent slopes, north of Payette, 1,340 feet west, 560 feet north of the southeast corner of sec. 1, T. 9 N., R. 5 W., in a noncultivated area:

A1—0 to 8 inches, grayish-brown (10YR 5/2) loamy coarse sand, very dark grayish brown (10YR 3/2) when moist; weak, fine, granular structure and weak, thick, platy; loose when dry, very friable when moist, nonsticky and nonplastic when wet; many fine and very fine roots; many fine irregular pores; 5 to 15 percent fine gravel; moderately alkaline; abrupt, smooth boundary. 5 to 10 inches thick.

C1—8 to 18 inches, grayish-brown (10YR 5/2) coarse sandy loam, very dark grayish brown (10YR 3/2) when moist; massive; slightly hard when dry, very friable when moist, nonsticky and nonplastic when wet; few fine roots; many fine irregular pores; moderately alkaline; clear, smooth boundary. 4 to 10 inches thick.

C2—18 to 27 inches, grayish-brown (10YR 5/2) loamy coarse sand, very dark grayish brown (10YR 3/2) when moist; massive; slightly hard when dry, very friable when moist, nonsticky and nonplastic when wet; few fine roots; many fine irregular pores; moderately alkaline; clear, smooth boundary. 3 to 10 inches thick.

C3—27 to 56 inches, brown (10YR 5/3) loamy coarse sand, dark grayish brown (10YR 4/2) when moist; massive; slightly hard when dry, very friable when moist, nonsticky and nonplastic when wet; moderately alkaline; clear, wavy boundary. 20 to 30 inches thick.

C4—56 to 60 inches, pale-brown (10YR 6/3) coarse sandy loam, dark brown (10YR 4/3) when moist; single grained; soft when dry, very friable when moist, slightly sticky and nonplastic when wet; many very fine irregular pores; slightly calcareous; moderately alkaline.

The A1 horizon is grayish brown, pale brown, or light brownish gray. The C horizon is grayish-brown, pale-brown, or brown coarse sandy loam or sandy loam over loamy coarse sand or loamy sand. Reaction is moderately alkaline or mildly alkaline. Below a depth of 20 inches or more, the soils range from noncalcareous to moderately calcareous.

Tindahay loamy coarse sand, 12 to 30 percent slopes (ThE).—This soil is on long, irregularly shaped valley sides and in fan-shaped areas 10 to 140 acres in size. This soil has the profile described as representative of the series. Included in mapping are areas of Cashmere and Lolalita soils. Runoff is medium. The erosion hazard is high in nonirrigated areas and very high in irrigated areas. The soil is used for alfalfa, orchards, pasture, small grain, range, and wildlife. Capability units VIe–1 irrigated and VIe–2 nonirrigated; Loamy range site, 8- to 12-inch precipitation zone.

Tindahay coarse sandy loam, 3 to 7 percent slopes (TIC).—This soil is in long, irregularly shaped and fan-shaped areas 5 to 170 acres in size. It has a profile similar to the one described as representative of the series, but the surface layer is coarse sandy loam. Included with this soil in mapping are areas of Emerson, Jenness, and Lolalita soils.

Runoff is medium. The erosion hazard is moderate in nonirrigated areas and high in irrigated areas. The soil is used for alfalfa, corn, orchards, pasture, pota-

toes, small grain, range, and wildlife. Capability units IIIe–3 irrigated and VIe–2 nonirrigated; Loamy range site, 8- to 12-inch precipitation zone; windbreak suitability group 5.

Tindahay coarse sandy loam, 7 to 12 percent slopes (TlD).—This soil is on irregularly shaped alluvial fans and valley sides in areas 20 to 200 acres in size. It has a profile similar to the one described as representative of the series, but the surface layer is coarse sandy loam. Included with this soil in mapping are areas of Lolalita soils.

Runoff is medium. The erosion hazard is moderate in nonirrigated areas and very high in irrigated areas. The soil is used for alfalfa, pasture, orchards, small grain, range, and wildlife. Capability units IVe–2 irrigated and VIe–2 nonirrigated; Loamy range site, 8- to 12-inch precipitation zone; windbreak suitability group 5.

Tindahay-Cashmere complex, 7 to 12 percent slopes (TmD).—This mapping unit is about 75 percent Tindahay loamy coarse sand and 20 percent Cashmere coarse sandy loam. The Tindahay soil is on the upper parts of the alluvial fans, and the Cashmere soil is on the lower parts. Included with these soils in mapping are areas that are about 5 percent Lolalita soils.

Runoff is medium. The erosion hazard is moderate in nonirrigated areas and very high in irrigated areas. This mapping unit is used for alfalfa, orchards, pasture, small grain, range, and wildlife. Capability units IVe–2 irrigated and VIe–2 nonirrigated; Loamy range site, 8- to 12-inch precipitation zone; windbreak suitability group 5.

Truesdale Series

The Truesdale series consists of well-drained soils on intermediate and high terraces. These soils formed in alluvium or lacustrine sediment. Slopes are 3 to 12 percent. Elevation is 2,200 to 2,800 feet. Precipitation is 9 to 11 inches, mean annual air temperature is 50° to 52° F., and the frost-free season is 145 to 160 days.

In a representative profile the surface layer, about 7 inches thick, and the subsoil, about 9 inches thick, are pale-brown fine sandy loam. The substratum to a depth of about 26 inches is light-gray fine sandy loam. Below this, to a depth of 60 inches, the substratum is a series of white hardpan layers about three-fourths of an inch thick stratified with an inch of loamy fine sand. The soil is moderately alkaline throughout. It is slightly calcareous below a depth of 7 inches and becomes strongly calcareous below a depth of 16 inches. Permeability is moderately rapid over the hardpan. The root zone is 20 to 40 inches deep and holds 4 to 6 inches of water available to plants.

Truesdale soils are used for irrigated crops and wildlife.

Representative profile of Truesdale fine sandy loam, 3 to 7 percent slopes, south of Fruitland near the Canyon County line, 190 feet north, 2,590 feet west of the southeast corner of sec. 22, T. 6 N., R. 5 W., in an uncultivated area:

A1—0 to 7 inches, pale-brown (10YR 6/3) fine sandy loam, dark grayish brown (10YR 4/2) when moist; weak, thick, platy structure parting to weak, very fine, granular; soft when dry, very friable when moist, nonsticky and nonplastic when wet; many very fine roots; many very fine irregular pores; moderately alkaline; clear, smooth boundary. 0 to 7 inches thick.

B—7 to 16 inches, pale-brown (10YR 6/3) fine sandy loam, dark brown (10YR 4/3) when moist; weak, medium, subangular blocky structure; slightly hard when dry, friable when moist, nonsticky and nonplastic when wet; many very fine roots; common very fine tubular pores; slightly calcareous; moderately alkaline; clear, smooth boundary. 9 to 20 inches thick.

C1ca—16 to 26 inches, light-gray (10YR 7/2) fine sandy loam, brown (10YR 5/3) when moist; massive; slightly hard when dry, friable when moist, nonsticky and nonplastic when wet; common very fine roots; common very fine tubular pores; strongly calcareous; moderately alkaline; abrupt, wavy boundary. 6 to 10 inches thick.

C2sicam—26 to 60 inches, white (10YR 8/1) strongly cemented hardpans, each about ¾ inch thick, intermittent with 1-inch layers of loamy fine sand, light gray (10YR 7/2) when moist; massive; extremely hard when dry, extremely firm when moist, nonsticky and nonplastic when wet; strongly calcareous; moderately alkaline.

The A horizon is light brownish gray or pale brown. The B horizon has very weak, very fine, granular structure or weak, medium or coarse, subangular blocky. Between a depth of 10 inches and the hardpan, the soil material is fine sandy loam, sandy loam, or coarse sandy loam. Reaction ranges from neutral to moderately alkaline. The Cca horizon is moderately calcareous or strongly calcareous. Depth to the Cca horizon is 12 to 20 inches. The depth to the hardpan is 20 to 40 inches. The hardpan is in layers and is discontinuous.

Truesdale fine sandy loam, 3 to 7 percent slopes (TrC).—This soil is in long, irregularly shaped areas 10 to 100 acres in size. It has the profile described as representative of the series. Included in mapping are areas of Clems, Tindahay, and Turbyfill soils. Runoff is medium, and the erosion hazard is high. The soil is used for alfalfa, corn, pasture, potatoes, small grain, sugar beets, and wildlife. Capability unit IIIe–3 irrigated; windbreak suitability group 2.

Truesdale fine sandy loam, 7 to 12 percent slopes (TrD).—This soil is in long, irregularly shaped areas 20 to 60 acres in size. Included in mapping are areas of Clems, Tindahay, and Turbyfill soils. Runoff is medium, and the erosion hazard is very high. The soils are used for alfalfa, corn, pasture, small grain, and wildlife. Capability unit IVe–2 irrigated; windbreak suitability group 2.

Turbyfill Series

The Turbyfill series consists of well-drained soils on intermediate and high terraces. These soils formed in alluvium or lacustrine sediment. Slopes are 1 to 12 percent. Elevation is 2,200 to 2,600 feet. Precipitation is 9 to 11 inches, mean annual air temperature is 48° to 52° F., and the frost-free season is 145 to 160 days.

In a representative profile the soil is light brownish-gray and pale-brown fine sandy loam to a depth of about 42 inches. Below this to a depth of 60 inches it is light-gray loamy fine sand. It is moderately alkaline throughout. It is slightly calcareous to a depth of 42 inches and strongly calcareous below.

Permeability is moderately rapid. The root zone is more than 60 inches deep and holds 6 to 8 inches of water available to plants.

Turbyfill soils are used for irrigated crops and wildlife.

Representative profile of Turbyfill fine sandy loam, 1 to 3 percent slopes, south of Fruitland near Canyon County line, 1,110 feet west, 925 feet north of the center of sec. 5, T. 6 N., R. 5 W., in a cultivated field:

Ap—0 to 4 inches, light brownish-gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) when moist; weak, very fine, granular structure; soft when dry, very friable when moist, nonsticky and nonplastic when wet; many very fine, fine, and medium roots; many very fine irregular pores; slightly calcareous; moderately alkaline; abrupt, smooth boundary. 0 to 14 inches thick.

C1—4 to 14 inches, light brownish-gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) when moist; massive; slightly hard when dry, very friable when moist, nonsticky and nonplastic when wet; few very fine, fine, coarse, and very coarse roots; many very fine irregular pores; slightly calcareous; moderately alkaline; clear, smooth boundary. 8 to 20 inches thick.

C2—14 to 25 inches, same as C1 horizon but pale brown (10YR 6/3) when dry; few very fine and fine roots; gradual, smooth boundary. 6 to 11 inches thick.

C3—25 to 42 inches, pale-brown (10YR 6/3) fine sandy loam, dark grayish brown (10YR 4/2) when moist; massive; slightly hard when dry, friable when moist, nonsticky and nonplastic when wet; many very fine irregular pores; slightly calcareous; moderately alkaline; gradual, smooth boundary. 12 to 18 inches thick.

IIC4ca—42 to 60 inches, light-gray (10YR 7/1) loamy fine sand, grayish brown (10YR 5/2) when moist; massive; slightly hard when dry, firm when moist, nonsticky and nonplastic when wet; many very fine irregular pores; strongly calcareous; moderately alkaline.

The Ap horizon is light brownish gray or pale brown. The C horizon between depths of 10 and 40 inches is fine sandy loam or sandy loam. The A horizon ranges from noncalcareous to moderately calcareous, and the C horizon ranges from slightly calcareous to strongly calcareous.

Turbyfill fine sandy loam, 1 to 3 percent slopes (TuB).—This soil is in irregularly shaped areas 40 to 160 acres in size. It has the profile described as representative of the series. Included with this soil in mapping are areas of Clems and Truesdale soils and a soil that is similar to this Turbyfill soil but is light brownish-gray loamy fine sand and is noncalcareous above a depth of 20 to 30 inches.

Runoff is slow, and the erosion hazard is moderate. The soil is used for alfalfa, corn, orchards, potatoes, pasture, sugar beets, small grain, and wildlife. Capability unit IIe–3 irrigated; windbreak suitability group 1.

Turbyfill fine sandy loam, 3 to 7 percent slopes (TuC).—This soil is in irregularly shaped areas 10 to 100 acres in size. Included in mapping are areas of Clems and Truesdale soils and a soil that is similar to this Turbyfill soil but is light brownish-gray loamy fine sand and is calcareous above a depth of 20 to 30 inches.

Runoff is medium, and the erosion hazard is high. The soil is used for alfalfa, corn, orchards, potatoes, sugar beets, small grain, pasture, and wildlife. Capability unit IIIe–3 irrigated; windbreak suitability group 2.

Turbyfill fine sandy loam, 7 to 12 percent slopes (TuD).—This soil is in long, irregularly shaped areas 5 to 150 acres in size. It has a profile similar to the one described as representative of the series, but is steeper. Included with this soil in mapping are small areas of Clems soils; areas of Turbyfill fine sandy loam, 12 to 30 percent slopes; and areas of a soil that is similar to this Turbyfill soil but is light brownish-gray loamy fine sand and is noncalcareous above a depth of 20 to 30 inches.

Runoff is medium, and the erosion hazard is very high. The soil is used for alfalfa, corn, orchards, pasture, small grain, and wildlife. Capability unit IVe–2 irrigated; windbreak suitability group 2.

Van Dusen Series

The Van Dusen series consists of well-drained soils on north-facing slopes of dissected terraces. These soils formed in medium-textured to coarse-textured sediment. Slopes are 30 to 65 percent. Elevation is 2,400 to 3,000 feet. The vegetation is bunchgrasses, annual grasses, forbs, and shrubs. Precipitation is 14 to 16 inches, mean annual air temperature is 46° to 50° F., and the frost-free season is 140 to 145 days.

In a representative profile the surface layer is gray loam about 14 inches thick. The subsoil is about 24 inches thick. The upper 4 inches is gray silt loam, and the lower 20 inches is grayish-brown clay loam. The upper 8 inches of the substratum is light brownish-gray loam. The lower 14 inches is light-gray silt loam. The soil is mildly alkaline in the surface layer and neutral and mildly alkaline in the subsoil and substratum.

Permeability is moderate. The root zone is more than 60 inches deep and holds 10 to 12 inches of water available to plants.

Van Dusen soils are used for range and wildlife and serve as catchment areas in watershed.

The Van Dusen soils in Payette County are mapped only with Payette and Haw soils.

Representative profile of Van Dusen loam in an area of Payette-Van Dusen association, steep (30 to 65 percent slopes) along Big Willow Creek, 400 feet south, 1,190 feet west of northeast corner of sec. 1, T. 8 N., R. 3 W., in an area used as range:

A11—0 to 8 inches, gray (10YR 5/1) loam, very dark gray (10YR 3/1) when moist; weak, very fine, granular structure; soft when dry, friable when moist, nonsticky and nonplastic when wet; many very fine and fine and few medium roots; many very fine and fine pores; mildly alkaline; abrupt, smooth boundary. 6 to 10 inches thick.

A12—8 to 14 inches, gray (10YR 5/1) loam, very dark gray (10YR 3/1) when moist; weak, medium and coarse, subangular blocky structure; slightly hard when dry, friable when moist, nonsticky and nonplastic when wet; common medium roots; common fine tubular pores; mildly alkaline; clear, smooth boundary. 4 to 8 inches thick.

B1t—14 to 18 inches, gray (10YR 5/1) silt loam, very dark gray (10YR 3/1) when moist; moderate, medium, subangular blocky structure; hard when dry, fria-

ble when moist, slightly sticky and slightly plastic when wet; common medium roots; many very fine pores; neutral; abrupt, smooth boundary. 4 to 10 inches thick.

B2t—18 to 30 inches, grayish-brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) when moist; strong, medium and coarse, subangular blocky structure; very dark gray (10YR 3/1), thin, nearly continuous clay films; hard when dry, very firm when moist, sticky and plastic when wet; few medium roots; common very fine pores; neutral; clear, smooth boundary. 4 to 12 inches thick.

B3t—30 to 38 inches, grayish-brown (10YR 5/2) light clay loam, very dark grayish brown (10YR 3/2) when moist; strong, medium and coarse, subangular blocky structure; very dark grayish-brown (10YR 3/2) coatings on peds; hard when dry, very firm when moist, slightly sticky and slightly plastic when wet; few fine roots; common very fine pores; mildly alkaline; clear, smooth boundary. 4 to 8 inches thick.

C1—38 to 46 inches, light brownish-gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) when moist; common, fine, faint mottles; massive; slightly hard when dry, firm when moist, nonsticky and nonplastic when wet; few fine roots; noncalcareous; mildly alkaline; clear, smooth boundary. 8 to 16 inches thick.

C2ca—46 to 60 inches, light-gray (2.5Y 7/2) silt loam, light olive brown (2.5Y 5/3) when moist; common, fine, faint mottles; massive; soft when dry, friable when moist, nonsticky and nonplastic when wet; slightly calcareous; neutral.

The A horizon is gray or dark gray. The B2t horizon is gray, grayish-brown, or brown clay loam or sandy clay loam. The C horizon below a depth of 40 inches is loam, silt loam, coarse sandy loam, or coarse sand.

Van Dusen-Haw loams, 30 to 65 percent slopes (VDF).—This mapping unit is about 55 percent Van Dusen loam and 40 percent Haw loam. The Van Dusen soil is on the north-facing, steeper slopes. The Haw soil is on the east- or west-facing, less steep slopes. Included with these soils in mapping are areas that are about 5 percent Payette and Lolalita soils.

Runoff is very rapid, and the erosion hazard is very high. This mapping unit is used for range, wildlife, and watershed. Capability unit VIIe–1 nonirrigated; Steep Slope range site, 12- to 16-inch precipitation zone.

Vickery Series

The Vickery series consists of well-drained soils on dissected high terraces. These soils formed in a layer of wind-laid silty material that overlies a hardpan. Slopes are 1 to 12 percent. Elevation is 2,300 to 2,800 feet. The vegetation is annual grasses, forbs, and shrubs in areas not irrigated. Precipitation is 9 to 11 inches, mean annual air temperature is 50° to 52° F., and the frost-free season is 145 to 160 days.

In a representative profile the surface layer is light brownish-gray and pale-brown silt loam about 10 inches thick. The subsoil is pale-brown silt loam about 9 inches thick. The substratum to a depth of about 28 inches is light-gray silt loam. Below this is a calcium carbonate-silica cemented hardpan. The soil is neutral in the surface layer and mildly alkaline in the subsoil and substratum. The substratum is moderately calcareous.

Permeability is moderate over the hardpan. The root zone is 20 to 40 inches deep and holds 4 to 8 inches of water available to plants.

These soils are used for irrigated crops and wildlife.

The Vickery soils in Payette County are mapped only with Chilcott, Elijah, Power, and Sebree soils.

Representative profile of Vickery silt loam in an area of Elijah-Chilcott silt loams, 3 to 7 percent slopes, southeast of New Plymouth, 1,200 feet east, 1,420 feet north of the southwest corner of sec. 1, T. 6 N., R. 4 W., in an area used as range:

A1—0 to 4 inches, light brownish-gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) when moist; weak, thick, platy structure parting to weak, very fine, granular; slightly hard when dry, friable when moist, slightly sticky and slightly plastic when wet; many very fine roots; many very fine tubular pores; neutral; abrupt, wavy boundary. 3 to 6 inches thick.

A3—4 to 10 inches, pale-brown (10YR 6/3) silt loam, dark brown (10YR 4/3) when moist; weak, medium and coarse, subangular blocky structure parting to weak, very fine, granular; slightly hard when dry, friable when moist, slightly sticky and slightly plastic when wet; common very fine roots; many very fine tubular pores; neutral; clear, wavy boundary. 2 to 6 inches thick.

B2—10 to 19 inches, pale-brown (10YR 6/3) silt loam, dark brown (10YR 4/3) when moist; weak, coarse, prismatic structure parting to weak, coarse, subangular blocky; slightly hard when dry, friable when moist, slightly sticky and slightly plastic when wet; common very fine and many very fine roots; many very fine tubular pores; mildly alkaline; clear, wavy boundary. 8 to 20 inches thick.

C1ca—19 to 28 inches, light-gray (10YR 7/2) silt loam, brown (10YR 5/3) when moist; weak, medium and coarse, subangular blocky structure; slightly hard when dry, friable when moist, slightly sticky and slightly plastic when wet; few very fine roots; many very fine tubular pores; few durinodes; moderately calcareous; mildly alkaline; abrupt, wavy boundary. 8 to 12 inches thick.

C2sicam—28 to 33 inches, white (10YR 8/2) lime-silica hardpan, very pale brown (10YR 7/3) when moist; massive; extremely hard when dry, moist, and wet; very strongly calcareous.

IIC3—33 to 60 inches, white (10YR 8/2) and very pale brown (10YR 7/4) quartz sand, white (10YR 8/2) and yellow (10YR 7/6) when moist; single grained; loose when dry and moist, nonsticky and nonplastic when wet; moderately calcareous; moderately alkaline.

The A horizon is light gray, pale brown, or light brownish gray. The B2 horizon is light brownish-gray or pale-brown silt loam or loam. The A and B horizons are noncalcareous. They range from neutral to moderately alkaline. The depth to the hardpan ranges from 20 to 40 inches.

Use and Management of the Soils

This section explains the system of capability grouping used by the Soil Conservation Service. It suggests the management of cultivated soils by capability unit and gives estimated yields of the principal crops. This part of the survey also contains information on range management and suitability of the soils for windbreaks and general suggestions for improving wildlife habitat. It reports estimates and provides interpretations of soil properties that affect highway construction and other engineering structures. It also

contains information on use of the soils for recreational facilities.

Use of the Soils for Crops and Pasture

Certain management applies to all the irrigated soils in Payette County. All soils respond to the application of phosphate and nitrogen fertilizer. Legumes benefit from inoculation with nitrogen fixation bacteria. Soils used for sugar beets and apples need additions of the minor element zinc if they have been cultivated for many years.

Legumes and grasses under irrigation for hay and pasture are an important part of the economy. Alfalfa, alsike clover, red clover, and Ladino clover are the main legumes grown in the county. Orchardgrass, Kentucky bluegrass, smooth bromegrass, alta fescue, and tall wheatgrass are the main grasses.

Cover crops, mulching, and rough plowing help control soil blowing. High winds occur mostly during spring in Payette County.

Soils that were used for orchards when arsenate insect sprays were popular have arsenic residues in the surface layer. The arsenic is toxic to plants that require large amounts of phosphorus. This condition can be corrected by plowing about 35 inches deep to disperse the concentration of arsenic throughout the profile. Sandy loams, coarse sandy loams, and loamy coarse sands do not accumulate arsenic residues.

Capability grouping

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The soils are grouped according to their limitations when 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 horticultural crops or other crops that require special management.

Those familiar with the capability classification can infer from it much about the behavior of soils when used for other purposes, but this classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for range, for forest trees, or for engineering.

In the capability system, the kinds of soils are grouped at three levels: the capability class, the subclass, and the unit. These are discussed in the following paragraphs.

CAPABILITY CLASSES, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use, 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 require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants, require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants, require very careful management, or both.

Class V soils are subject to little or no erosion but have other limitations, impractical to remove, that limit their use largely to pasture or range, woodland, or wildlife.

Class VI soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife.

Class VII soils have very severe limitations that make them unsuited to cultivation and restrict their use largely to pasture or range, woodland, or wildlife.

Class VIII soils and landforms have limitations that preclude their use for commercial crop production and restrict their use to recreation, wildlife, or water supply or to esthetic purposes.

CAPABILITY SUBCLASSES are soil groups within one class; they are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion; *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 to too dry.

Class I contains no subclasses, because the soils of this class have few limitations. Class V can contain, at the most, only the subclasses indicated by *w*, *s*, and *c*, because the soils in class V are subject to little or no erosion, although they have other limitations that restrict their use largely to pasture, range, woodland, wildlife, or recreation.

CAPABILITY UNITS are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe–3 or IIIe–6. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation; the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraph; and the Arabic numeral specifically identifies the capability unit within each subclass.

Management by capability units [2]

On the following pages each capability unit in Payette County is described, and suggestions are given

[2] ROBERT L. KANE, district conservationist, Soil Conservation Service, helped prepare this section.

for the use and management of the arable soils. The units are not numbered consecutively, because not all the units are represented in this county. The capability classification of each soil is given at the end of the individual soil description and in the "Guide to Mapping Units."

The capability classification of the Payette County soils that are suitable for irrigation under existing irrigation systems is based on the assumption that irrigation water is available. No attempt has been made to evaluate the economic feasibility of providing water.

CAPABILITY UNIT I-1, IRRIGATED

This unit consists of well-drained loams and silt loams. Slopes are 0 to 1 percent. The root zone is more than 60 inches deep and holds 7.5 to 15 inches of water available to plants. Permeability is moderate or moderately slow, and runoff is very slow. The erosion hazard is slight or none. Precipitation is 9 to 12 inches, and the frost-free season is 140 to 160 days.

These soils are used for legumes, grasses, small grain, row crops (fig. 9), orchards, pasture, homesites, and wildlife. Potatoes are grown in most areas. The quality can be improved by deep plowing soils that have a moderately fine textured subsoil.

A suitable cropping system is 2 to 5 years of legumes and grass followed by 4 to 6 years of row crops. Row crops can be grown year after year if the soil is kept fertile and friable. Maintaining the level of organic matter is essential in keeping the soil friable. Crop residue and pasture and hay crops increase the supply of organic matter, and minimum tillage reduces the loss.

Borders, corrugations, furrows, and sprinklers are used for irrigation. Corrugations are used for most crops, but furrows are used for corn and potatoes. Enough irrigation water should be applied to wet the soil evenly as far down as the roots of the crop extend. Excessive irrigation is to be avoided.

CAPABILITY UNIT IIe-2, IRRIGATED

This unit consists of well-drained loams, silt loams, and clay loams. Slopes are 0 to 3 percent. The root zone in most areas is more than 60 inches deep and holds 7.5 to 15 inches of water available to plants. In a few places it is restricted by a hardpan at a depth of 20 to 40 inches. Permeability is slow to moderate, and runoff is slow. The erosion hazard is moderate to slight. Precipitation is 9 to 14 inches, and the frost-free period is 130 to 160 days.

These soils are used for legumes, grasses, row crops,

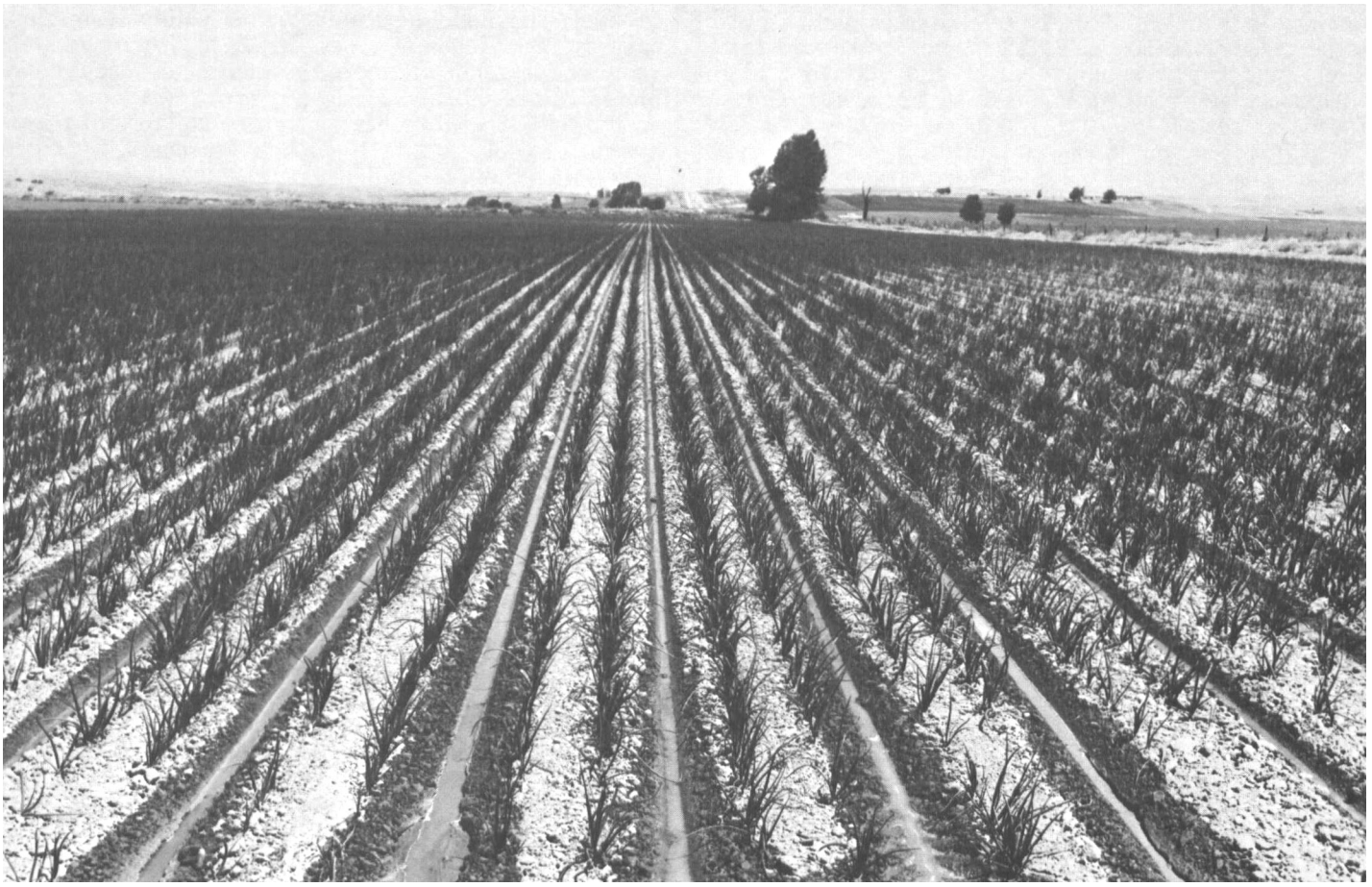

Figure 9.—**Onions on Owyhee silt loam, 0 to 1 percent slopes.**

small grain, orchards, homesites, and wildlife. Potatoes are grown, but make poor growth on the clay loams. Deep plowing to a depth of about 35 inches in soils that have a moderately fine textured subsoil improves the quality of the potatoes.

A suitable cropping system is 2 to 5 years of hay followed by 2 to 4 years of row crops or 1 to 3 years of grain. Yields are usually high. The level of organic matter can be maintained by growing crops that improve the soil and produce a large amount of residue that can be returned to the soil after harvest. Minimum tillage reduces the loss of organic matter.

Corrugations, furrows, borders, and sprinklers are used for irrigation. Borders are suitable for hay, pasture, and small grain. Careful application is essential to avoid excessive runoff and leaching of plant nutrients. Leveling is commonly needed. The depth to which the soil is irrigated should not exceed the depth of the crop roots. Soils that have a clay loam surface layer can be tilled within only a narrow range of moisture content to avoid puddling. Careful application of irrigation water is particularly needed on such soils to reduce the hazard of ponding and soil baking.

CAPABILITY UNIT IIe-3, IRRIGATED

This unit consists of well-drained fine sandy loams and sandy loams. Slopes are 0 to 3 percent. The root zone is more than 60 inches deep. In most places it holds 5 to 8 inches of water available to plants, but in some places 8 to 10 inches. Permeability is moderately rapid, and runoff is slow. The erosion hazard is slight to moderate. Precipitation is 9 to 12 inches, and the frost-free season is 140 to 160 days.

Fruit trees, potatoes, and alfalfa grow well, but these soils are used mainly for forage crops, row crops, pasture, small grain, homesites, and wildlife.

A suitable cropping system is 2 to 5 years of legumes and grass followed by 1 to 3 years of row crops or small grain. Because the soils are moderately coarse textured, maintaining an adequate amount of organic matter is difficult. Including green manure crops and high residue crops in the rotation is essential.

Corrugations, furrows, borders, and sprinklers can be used for irrigation. A low velocity head is needed for control of erosion. Because permeability is moderately rapid, short irrigation runs are needed for uniform application of water. Sprinklers are needed on the steeper soils. Borders should be limited to the more nearly level soils. Careful irrigation is essential on shallow-rooted crops to avoid leaching the plant nutrients below the root zone. Moderately deep cuts can be made in leveling. After the soils that have a high calcium content have been leveled, phosphate in the new surface layer may not be available to plants. This can be corrected by applying additional phosphate.

CAPABILITY UNIT IIIe-2, IRRIGATED

This unit consists of well-drained loams and silt loams. Slopes are 3 to 7 percent. The root zone is more than 60 inches deep and holds 8 to 15 inches of water available to plants. Permeability is slow to moderate, and runoff is medium. The erosion hazard is high. Precipitation is 9 to 13 inches, and the frost-free season is 130 to 160 days.

These soils are used for row crops, forage crops, small grain, pasture, orchards, homesites, and wildlife.

A suitable cropping system is 3 to 5 years of legumes and grass followed by 2 years of row crops or small grain and a new seeding of legumes and grass. The level of organic matter can be maintained by limiting the number of row crops and returning crop residue to the soil.

Corrugations, furrows, and sprinklers are used for irrigation. Sprinklers are well suited to the steeper soils where erosion is a hazard. In corrugation and furrow irrigation, a low-velocity head is needed for control of erosion. A high percentage of hay and pasture or other close-growing crops in the rotation also is needed. Irrigation pipelines and drop structures are frequently needed to control water in the irrigation delivery systems. Excessive runoff can be avoided by regulating the amount of irrigation water applied to the field. The depth to which the soil is irrigated should not exceed the depth of the crop roots. Moderately deep cuts can be made in leveling. After the soils that have a high calcium content have been leveled, phosphate in the new surface layer may not be available to plants. This can be corrected by applying additional phosphate.

CAPABILITY UNIT IIIe-3, IRRIGATED

This unit consists of well-drained and somewhat excessively drained fine sandy loams, sandy loams, and coarse sandy loams. Slopes are 3 to 7 percent. The root zone is generally more than 60 inches deep, but in places is 20 to 40 inches deep over a hardpan. It generally holds 5 to 8 inches of water available to plants, but in some places 8 to 10 inches. Permeability is generally moderately rapid or rapid, but in some sandy loams it is moderately slow. Runoff is medium. The erosion hazard is high. Precipitation is 9 to 12 inches, and the frost-free season is 140 to 160 days.

These soils are used for small grain, forage crops, row crops, pasture, orchards, and wildlife. Corn is the main row crop. The soils are well suited to orchards.

A suitable cropping system is 3 to 4 years of legumes and grass followed by 1 to 2 years of small grain or corn and a new seeding of legumes and grass. The level of organic matter can be maintained by growing crops that produce a large amount of residue and returning residue to the soil after harvest.

Corrugations, furrows, and sprinklers are used for irrigation. Controlling erosion is more difficult on these soils than on less sloping soils. Sprinkler irrigation is especially suited to the steeper soil in this group. In corrugation and furrow irrigation, a low-velocity head is needed to control erosion. Pipelines, drop structures, and ditch linings should be used to control the flow of irrigation water. Short irrigation runs are needed for uniform application of water. Moderately deep cuts can be made in leveling. After the soils that have a high calcium content have been leveled, phosphate in the new surface layer may not be available to plants. This can be corrected by applying additional phosphate.

CAPABILITY UNIT IIIe-6, IRRIGATED

This unit consists of well-drained, alkali-affected silt

loams that are underlain by a hardpan. Slopes are 1 to 3 percent. The root zone is generally 20 to 40 inches deep, but in some places it is deeper. It holds 4 to 10 inches of water available to plants. Permeability in most places is moderately slow, but in some places very slow. Runoff is slow, and the erosion hazard is moderate. Precipitation is 9 to 11 inches, and the frost-free season is 140 to 160 days.

These soils are used for row crops, legumes, grasses, small grain, homesites, and wildlife. Corn is the main row crop.

A suitable cropping system is 2 to 5 years of hay or 6 to 8 years of pasture followed by 2 years of corn or small grain and a new seeding of hay or pasture. Crops grown on these soils are adversely affected by alkali salts. The growth of deep-rooted crops is limited by the hardpan. These soils can be improved by plowing to a depth of about 35 inches. Intensive leveling provides similar benefits. The mixing action of deep plowing and leveling improves water intake, helps leach salts from the soil, and increases crop yields. The level of organic matter can be maintained by using crop rotations similar to those outlined above and by returning crop residue to the soil.

Corrugations, furrows, and sprinklers can be used for irrigation. Leveling is commonly needed. In corrugation and furrow irrigation, a low-velocity head is needed to control erosion. A large number of hay, pasture, and close-growing crops in the rotation is beneficial.

CAPABILITY UNIT IIIe-8, IRRIGATED

This unit consists of well-drained, alkali-affected silt loams that are underlain by a hardpan. Slopes are 3 to 7 percent. The root zone is generally 20 to 40 inches deep, but in some places it is deeper. In most places it holds 4 to 10 inches of water available to plants, but in some places 8 to 15 inches. Permeability is slow to moderate, and runoff is medium. The erosion hazard is high. Precipitation is 9 to 11 inches, and the frost-free season is 140 to 160 days.

These soils are used for row crops, legumes, grasses, small grain, homesites, and wildlife. Corn is the main row crop.

A suitable cropping system is 3 to 6 years of hay or 6 to 8 years of pasture followed by 1 year of corn and 1 or 2 years of grain. Crops grown on these soils are adversely affected by alkali salts. The growth of deep-rooted crops is limited by the hardpan. These soils can be improved by plowing to a depth of about 35 inches. Intensive leveling provides similar benefits. The mixing action of deep plowing and leveling improves water intake, helps disperse and leach salts from the soil, and increases crop yields. The level of organic matter can be maintained by using a suitable cropping system and returning crop residue to the soil.

Corrugations, furrows, and sprinklers can be used for irrigation. Sprinklers are better suited because erosion is a hazard. In corrugation and furrow irrigation, a low-velocity head is needed to contol erosion. Hay, pasture, and other close-growing perennial crops in the rotation are beneficial. Land smoothing is more practical than leveling in large fields that require deep cuts.

CAPABILITY UNIT IIIw-1, IRRIGATED

This unit consists of poorly drained and somewhat poorly drained loams and fine sandy loams. Slopes are 0 to 2 percent. The root zone is more than 60 inches deep and holds 5 to 11 inches of water available to plants. A seasonal high water table fluctuates between depths of 2 and 4 feet. Permeability is moderate and moderately rapid, and runoff is slow. The erosion hazard is none to slight. Precipitation is 9 to 12 inches, and the frost-free season is 140 to 160 days.

These soils are used for row crops, legumes, grasses, small grain, and wildlife. Shallow-rooted crops grow well because the water table is high. Alfalfa can be grown, but is generally short lived.

A suitable cropping system is 3 to 4 years of hay or 8 to 10 years of pasture followed by 2 to 4 years of corn and 1 to 3 years of small grain. Yields are usually high, except for crops adversely affected by the water table. In some places excellent corn crops are grown by using only one application of irrigation water. The level of organic matter can be maintained by returning crop residue to the soil. If silage corn is included in the cropping system, grass is needed with the alfalfa to maintain the organic-matter content. Open ditches and underground pipes lower the water table to the level of the river, slough, or drainage outlet.

Corrugations, furrows, borders, and sprinklers are used for irrigation. Careful application is essential to avoid excessive runoff and raising the water table. A large volume of water is needed. On the fine sandy loams, the water generally is turned off or moved to another area shortly after it reaches the lower end of the field. Leveling improves irrigation management and does not reduce the depth of the root zone. Only a small amount is needed. Small isolated gravel spots exposed in leveling can be excavated to a desirable depth and backfilled with suitable soil material.

CAPABILITY UNIT IIIw-6, IRRIGATED

This unit consists of somewhat poorly drained and poorly drained fine sandy loams, loams, silt loams, and silty clay loams. All but the loams are slightly or moderately affected by salts and alkali. Alkali spots make up as much as 5 percent of some areas; they have slow or very slow permeability. Slopes are 0 to 2 percent on all the soils in this unit. The root zone is more than 60 inches deep and holds 5 to 14 inches of water available to plants. A seasonal high water table fluctuates between depths of 1 foot and 5 feet. Permeability is slow to moderately rapid, and runoff is slow. The erosion hazard is slight or none. Precipitation is 9 to 12 inches, and the frost-free season is 140 to 160 days.

These soils are used for row crops, legumes, grasses, small grain, and wildlife. Crops selected should be tolerant of water, salts, and alkali. If the soils are drained and leached of salts, they are suited to corn, sugar beets, small grain, alfalfa, clover, and grasses. Potatoes can be grown, but generally are not of good quality. In undrained areas the soils are suited to alta fescue, sugar beets, and barley. The wetter, more strongly saline-alkali areas, are suited only to tall wheatgrass.

A suitable cropping system in areas where the water table is at a depth of 3 to 5 feet is 3 to 4 years of hay or 6 to 8 years of pasture followed by 1 year of grain, 1 year of sugar beets, 2 years of corn or grain, and a new seeding of hay or pasture. Alfalfa is short lived in areas where the water table is at a depth of less than 3 feet. The level of organic matter can be maintained by returning crop residue to the soil. Open ditches and underground pipes generally lower the water table to the level of the stream or drainage ditch. Saline-alkali salts can be leached by draining the soils. Gypsum is necessary in places to achieve good reclamation.

Corrugations, furrows, borders, and sprinklers are used for irrigation. Careful application is essential to avoid excessive runoff and raising the water table. Borders are suitable for leaching salts from these soils. Moderate leveling improves irrigation management. Small, isolated gravel spots exposed in leveling can be excavated to a desirable depth and backfilled with suitable soil material.

CAPABILITY UNIT IVe-1, IRRIGATED

This unit consists of well-drained loams and silt loams. Slopes are 7 to 12 percent. The root zone is 20 to more than 60 inches deep and holds 3 to 15 inches of water available to plants. In some places it is restricted by a hardpan at a depth of 20 to 40 inches. Permeability is moderately slow and moderate, and runoff is medium. The erosion hazard is very high. Precipitation is 9 to 13 inches, and frost-free period is 130 to 160 days.

These soils are used for legumes, grasses, small grain, and orchards.

A suitable cropping system is 4 to 6 years of hay or 6 to 8 years of pasture followed by 1 to 2 years of grain and a new seeding of hay or pasture. The level of organic matter can be maintained by using a suitable cropping system and returning crop residue to the soil.

Corrugations, furrows, and sprinklers can be used for irrigation. Sprinklers are best suited because erosion is a hazard. In corrugation and furrow irrigation, a low-velocity head is needed. Hay and pasture in the rotation also are beneficial. Irrigation pipelines and drop structures generally are needed to avoid excessive runoff. The depth to which the soil is irrigated should not exceed the depth of the crop roots. Land smoothing is more practical than leveling in areas where deep cuts are required, because deep cuts can expose the underlying sand or hardpan. After the soils that have a high calcium content have been leveled, phosphate in the new surface layer may not be available to plants. This can be corrected by applying additional phosphate.

CAPABILITY UNIT IVe-2, IRRIGATED

This unit consists of well-drained and somewhat excessively drained fine sandy loams, sandy loams, coarse sandy loams, and loamy coarse sands. Slopes are 7 to 12 percent. The root zone is 20 to more than 60 inches deep and holds 4 to 11 inches of water available to plants. Permeability is moderately rapid, and runoff is medium. The erosion hazard is very high. Precipitation is 9 to 12 inches, and the frost-free season is 140 to 160 days.

These soils are used for orchards, vineyards, legumes, grasses, and small grain.

A suitable cropping system is 4 to 8 years of hay or 8 to 10 years of pasture followed by 1 to 2 years of grain and a new seeding of hay or pasture. Also suitable if needed to reestablish the hay or pasture is permanent cover of hay or pasture rotated with 1 to 2 years of grain. The level of organic matter can be maintained by using a cropping system similar to the one outlined above and by returning crop residue to the soil. Grass seeded with alfalfa provides good erosion control and improves the soil-building quality of the crop. If orchards or vineyards are planted on these soils, cover crops are needed to help control erosion.

Corrugations and sprinklers are used for irrigation. Sprinklers are better suited because erosion is a hazard. In corrugation irrigation, a low-velocity head is needed. Irrigation pipelines, concrete ditch linings, and water control structures are needed to avoid excessive runoff. The length of run should be such that the time needed for water to cross the field is about one-fourth of the time for the irrigation set. This results in more uniform application and helps avoid excessive leaching of plant nutrients. Moderately deep cuts can be made in leveling. After the soils that have a high calcium content have been leveled, phosphate in the new surface layer may not be available to plants. This can be corrected by applying additional phosphate.

CAPABILITY UNIT IVe-5, NONIRRIGATED

This unit consists of well-drained silt loams, loams, clays, and stony clay loams. Slopes are 3 to 12 percent. The root zone is more than 60 inches deep and holds 8 to 13 inches of water available to plants. Permeability is slow or moderate, and runoff is medium. The erosion hazard is moderate. Precipitation is 10 to 14 inches, and the frost-free season is 120 to 155 days.

These soils are used for small grain and forage crops, but precipitation makes grain production marginal.

A suitable cropping system is 4 to 6 years of wheat-fallow followed by 5 to 8 years of alfalfa and grass. Cross-slope cultivation and return of crop residue are needed to control erosion. Soils that have a surface layer of clay should not be cultivated when they are too wet or dry. Livestock should not be allowed on these soils when they are wet.

CAPABILITY UNIT IVw-3, IRRIGATED

This unit consists of somewhat poorly drained fine sandy loams or silt loams. Slopes are 0 to 2 percent. The root zone is more than 60 inches deep and holds 8 to 14 inches of water available to plants. A seasonal high water table fluctuates between depths of 3 and 5 feet. Permeability is moderately slow and slow, and runoff is slow. The erosion hazard is slight or none. The soils are moderately to very strongly alkaline. From 5 to 35 percent of the acreage is affected by a slight to moderate content of saline salts and a moder-

ate to high amount of exchangeable sodium. Precipitation is 9 to 10 inches, and the frost-free season is 140 to 160 days.

These soils are used for row crops, legumes, grasses, small grain, and wildlife. Crops selected should be tolerant of water, salts, and alkali. If the soils are drained and leached of salts, they are suited to corn, sugar beets, small grain, alfalfa, clover, and grasses. In undrained areas the soils are suited to alta fescue, tall wheatgrass, sugar beets, or barley.

A suitable cropping system in areas where the water table is at a depth of 3 to 4 feet is 2 to 4 years of alfalfa-grass hay or 6 to 8 years of pasture followed by 1 year of grain, 1 year of sugar beets, 2 years of corn or grain and a new seeding of hay. Alfalfa is short lived where the water table is at a depth of less than 3 feet. Corn and other crops that have a low tolerance for saline-alkali salts vary greatly in growth and yields. The salt content may be sufficient that reduced yields are evident in salt-tolerant plants. The level of organic matter can be maintained by returning crop residue to the soil. Open ditches and underground pipes lower the water table to the level of the stream or drainage ditch.

Saline-alkali salts can be leached only after drainage is provided. Gypsum is needed in places to achieve good reclamation.

Corrugations, furrows, borders, and sprinklers are used for irrigation. The depth to which the soil is irrigated should not exceed the depth of the crop roots. Borders are suitable for leaching saline-alkali salts. Moderate cuts can be made in leveling. Small, isolated gravel spots exposed in leveling can be excavated to a desirable depth and backfilled to grade with suitable soil material.

CAPABILITY UNIT IVw-5, IRRIGATED

Only Notus coarse sandy loam is in this unit. This soil is underlain by very gravelly sand and is somewhat poorly drained. Slopes are 0 to 3 percent. The root zone is more than 60 inches deep and holds 2 to 5 inches of water available to plants. The water table fluctuates between depths of 2 and 3 feet. Permeability is moderately rapid, and runoff is very slow. The erosion hazard is slight to none. Precipitation is 9 to 12 inches, and the frost-free season is 140 to 160 days.

This soil is suited to legumes, grasses, and small grain.

A suitable cropping system is 3 to 5 years of hay followed by 1 to 2 years of grain. Permanent pasture also is well suited to these soils and should be rotated with grain. Pasture is reseeded with grain when reestablishment is necessary. The level of organic matter is difficult to maintain in these soils because they are droughty. Crop residue and grass planted with alfalfa hay increase the supply of organic matter. Grass is shallow rooted and requires frequent, careful irrigations. Overirrigation adversely affects the growth of alfalfa.

Corrugations, furrows, borders, and sprinklers are used for irrigation. Ample water is available. Border irrigation, which requires a large volume of water for a short period, is commonly used. Plant nutrients are leached readily from these soils and, therefore, fertilizer should be applied frequently and in small amounts. Land smoothing improves irrigation water management, but intensive leveling should be avoided or, if necessary, done carefully. Intensive leveling may expose gravel.

CAPABILITY UNIT IVe-1, NONIRRIGATED

This unit consists of well-drained loams, clay loams, and silt loams. Slopes are 0 to 3 percent. The root zone is more than 60 inches deep and holds 13 inches of water available to plants. Permeability is moderate to slow, and runoff is slow to very slow. The erosion hazard is slight or none. Precipitation is 10 to 14 inches, and the frost-free season is 130 to 160 days. The clay loam in this unit should not be cultivated when it is too wet or too dry.

These soils are used for early maturing, deep-rooted, drought-tolerant crops. Wheat can be grown under a grain-fallow system, but production is low. Alfalfa, crested wheatgrass, and pubescent wheatgrass are suitable. They can be grown in alternative rows for hay or pasture. Careful tillage conserves moisture. Crop residue and a crop rotation that is dominantly alfalfa or grass help control erosion.

CAPABILITY UNIT Vw, NONIRRIGATED

Only Chance fine sandy loam is in this unit. This soil is poorly drained and is underlain by gravel and sand. Slopes are 0 to 2 percent. The root zone is more than 60 inches deep and holds 5 to 6 inches of water available to plants. A seasonal high water table fluctuates between depths of 1 foot and 2 feet. Permeability is moderately rapid, and runoff is very slow or ponded. The erosion hazard is slight or none. Precipitation is 9 to 12 inches, and the frost-free season is 140 to 160 days.

The soil in this unit is too wet to be used for crops, and it is generally in areas that are not practical to drain. Most areas are used for native pasture. Reed canarygrass, alsike clover, and meadow foxtail can be seeded in areas that are dry enough to permit the use of equipment.

CAPABILITY UNIT VIe-1, IRRIGATED

This unit consists of well-drained or somewhat excessively drained fine sandy loams, sandy loams, loams, coarse sands, and silt loams. Slopes are 12 to 30 percent. The root zone is mainly more than 60 inches deep and holds 4 to 15 inches of water available to plants. In some places it is restricted by a hardpan at a depth of 20 to 40 inches. Permeability is moderately slow or moderately rapid, and runoff is medium or rapid. The erosion hazard is very high. Precipitation is 9 to 13 inches, and the frost-free season is 130 to 160 days.

These soils are used for orchards, legumes, grasses, and small grain. They are not suited to cultivated crops. Small grain grown occasionally to reestablish hay or pasture helps maintain the level of organic matter. If alfalfa is grown for hay, a grass should be included in the rotation to help control erosion, increase the supply of organic matter, and control weeds

and cheatgrass. If orchards are planted on these soils, a cover crop of grass is needed to help control erosion.

Sprinklers should be used in irrigating. Pipelines and water control structures are needed. Some smoothing and shaping of fields is possible.

CAPABILITY UNIT VIe-2, NONIRRIGATED

This unit consists of well-drained and somewhat excessively drained loamy coarse sands to clays. Slopes range from 1 to 30 percent. The root zone is 20 to more than 60 inches deep and holds 3 to 15 inches of water available to plants. Permeability is slow to moderately rapid, and runoff is slow to medium. The erosion hazard is moderate to high. Precipitation is 9 to 13 inches, and 120 to 160 days are frost free.

These soils are too dry for crops. They are used for range, wildlife, and watershed. In most areas the vegetation is annual grasses, forbs, and big sagebrush. Some areas have been seeded to crested wheatgrass.

CAPABILITY UNIT VIe-1, NONIRRIGATED

This unit consists of well-drained sandy loams, loams, and silt loams. Slopes are 0 to 3 percent. The root zone is 20 to more than 60 inches deep. In most places it holds 4 to 10 inches of water available to plants, but in some places 8 to 15 inches. Permeability is moderately rapid to slow, and runoff is very slow or slow. The erosion hazard is slight or none. Precipitation is 9 to 12 inches, and the frost-free season is 140 to 160 days.

These soils are too dry for farming and are used for range, wildlife, and watershed. The vegetation is mainly annual grasses, forbs, and big sagebrush. Large areas of these soils are suited to cultivation and irrigation water development. Water development consists primarily of drilling wells.

CAPABILITY UNIT VIIe-1, NONIRRIGATED

This unit consists of well-drained coarse sandy loams, loams, and clays. Slopes are 30 to 65 percent. The root zone is 20 to more than 60 inches deep and holds 2 to 12 inches of water available to plants. Permeability is slow, moderately slow, moderate, or moderately rapid. Runoff is very rapid. The erosion hazard is very high. Precipitation is 9 to 18 inches, and the frost-free season is 110 to 160 days.

These soils are used for range, wildlife, and watershed. Range management, including seeding and brush clearing, is impractical because the soils are so steep. Management to prevent loss of plant cover is important in controlling erosion. The vegetation in many areas is mostly annual grasses, forbs, and shrubs.

CAPABILITY UNIT VIIs-1, NONIRRIGATED

This unit consists of well-drained very stony and extremely stony loams and clay loams. Slopes are 2 to 60 percent. The root zone is 8 to 40 inches deep and holds one-half inch to 8 inches of water available to plants. Permeability is slow or moderately slow, and runoff is medium or rapid. The erosion hazard is moderate to very high. Precipitation is 12 to 18 inches, and the frost-free season is 115 to 150 days.

These soils are used for range, watershed, and wildlife. Stones, slope, and soil depth generally make seeding, brush clearing, and other range management impractical.

CAPABILITY UNIT VIIIs-1

This unit consists of extremely rocky, extremely stony, very shallow or shallow loams or clay loams; Rock outcrop; and deep sandy soils. Slopes are 60 to 80 percent. The erosion hazard is very high. These areas are not suitable for cultivation or grazing. They are used only for wildlife and watershed.

CAPABILITY UNIT VIIIw-2

Only Riverwash is in this unit. It is a mixture of water-laid sand and gravel. It supports only sparse vegetation, chiefly weeds and willows. It is suited only to wildlife. At times it is covered with water.

Estimated yields

Table 2 lists average yields per acre that can be expected under a moderately high level of management on selected irrigated soils in the county. Only the principal crops are listed. Less important crops suited to the area, such as hops, grapes, berries, truck garden vegetables, vegetable seed, melons, pears, cherries, and apricots, are not listed. The estimates are based on data compiled by the Soil Conservation Service and on information obtained from county farmers.

TABLE 2.—*Estimated average yields per acre of*

[These yields can be obtained under a moderately high level of management. Absence of a yield

Soil	Alfalfa		Sweet corn	Field corn		Potatoes
	Hay	Seed		Grain	Silage	
	Tons	*Bu*	*Tons*	*Bu*	*Tons*	*Cwt*
Baldock silt loam	4.5		6.0	80	23	
Baldock silt loam, saline-alkali	4.0		5.0	70	16	
Baldock silt loam, strongly saline-alkali			4.5	65	12	
Baldock silty clay loam	4.5		6.5	80	23	
Bowman loam	4.0		6.0	75	18	
Cashmere sandy loam, 0 to 3 percent slopes	5.0	14	8.0	90	24	380
Cashmere sandy loam, 3 to 7 percent slopes	4.0	7	4.5	80	16	335
Clems fine sandy loam, 0 to 3 percent slopes	5.5	14	7.0	85	23	380

See footnotes at end of table.

In table 2—

1. Yields are conservative estimates.
2. The estimates are of average yields that may be expected over a period of years. The yield in any given year may be higher or lower than the average, depending on such conditions as supply of irrigation water and the length of the growing season.
3. Variations in yields occur among areas of the same soil.
4. Past management of a soil affects its response to new management practices.
5. New crop varieties and improved farming practices are likely to affect future yields.
6. The availability of farm labor is also reflected in crop yields.

Moderately high level management consists of using improved varieties, applying commercial fertilizer at recommended rates based on soil tests, following a systematic cropping system, preparing an adequate seedbed, developing an irrigation system to supply the water requirements of the crop, installing drainage to remove excess irrigation or ground water, and controlling harmful insects and weeds.

Apple varieties grown for commercial purposes are mainly red Delicious and Rome Beauties. Jonathan and golden Delicious are grown mainly for pollination, but their fruit is marketed along with the other apples.

Yields are influenced mostly by temperatures early in spring. The red Delicious apples are more susceptible to frost than the Jonathan and Rome Beauties because they bud earlier. When low temperatures continue too late in the season, the yield is usually reduced considerably. For this reason, good air drainage is important in apple production. In most orchards where adequate air drainage is lacking, artificial heating systems are used for frost protection.

The use of cover crops is important in managing apple orchards. Such crops are usually permanent plantings of perennial grasses.

Many prune varieties are suited to Payette County soils, but the most common among the early varieties are the Demarius, Milton, and Richard. The Italian prune is the most common late variety.

Yields are more consistent for prunes than for apples from year to year because the loss from frost damage is smaller.

Cover crops are not generally planted in prune orchards. Volunteer growth appears about the middle of summer.

Management of the Soils for Range [3]

Approximately 175,000 acres of Payette County is range. About 65,000 acres of this is Federally owned and is under the direction of the Bureau of Land Management, Department of the Interior. This acreage is used for grazing livestock, for wildlife, and for recreation, and it is a valuable watershed. Range contributes significantly to the economy of Payette County and could add a great deal more if it were managed to its potential.

Before about 1900, the range supported a dense stand of bunchgrass and a scattering of forbs, bitterbrush, and sagebrush. It was suited to spring and fall grazing and was grazed heavily by both sheep and cattle. Range fires were common. Continued grazing, fires, and poor management killed the perennial grasses and forbs and allowed annuals to invade. Some of these invading plants are medusahead ryegrass, cheatgrass, and annual forbs. Where poor grazing management and occasional burning continued, big sagebrush and rubber rabbitbrush increased. Vegetation changes such as these have reduced forage production in the county to less than half the original potential. Fluctuations in weather cause highly variable yields of annual plants. Where the range is in annuals, the fire hazard is high and there is generally little protection against soil erosion. Dense stands of medusahead ryegrass provide good soil protection but make poor-quality forage.

The greatest benefit can be obtained only if the range is developed properly and maintained in excellent or good condition. The principles of management in the paragraphs that follow apply to all sites.

The range must be properly grazed. Range plants live and grow on the food manufactured in their leaves. To remain in healthy condition, a plant must have rest periods or be grazed within its capability to

[3] LEWIS L. PENCE, range conservationist, Soil Conservation Service, helped prepare this section.

principal crops on selected irrigated soils

estimate indicates the crop is not suited to the soil or is not commonly grown on the soil]

Barley	Oats	Wheat	Apples	Prunes	Mint oil	Sugar beets	Onions	Pasture
Bu	*Bu*	*Bu*	*Tons*	*Tons*	*Lb*	*Tons*	*Cwt*	*AUM* [1]
60	65	55				24		18
45	50	40				23		15
						20		13
60	65	55				22		18
55	60	50				18		18
100	110	90	12	14		22		18
80	90	70	12	14		15		13
100	110	90	13	11		26		18

TABLE 2.—*Estimated average yields per acre of*

Soil	Alfalfa		Sweet corn	Field corn		Potatoes
	Hay	Seed		Grain	Silage	
	Tons	*Bu*	*Tons*	*Bu*	*Tons*	*Cwt*
Clems fine sandy loam, 3 to 7 percent slopes	4.5	8	4.5	80	18	345
Clems fine sandy loam, 7 to 12 percent slopes	4.0	7				
Clems fine sandy loam, 12 to 30 percent slopes	2.5					
Elijah-Chilcott silt loams, 3 to 7 percent slopes	4.5	8	4.5	75	17	245
Elijah-Sebree silt loams, 1 to 3 percent slopes	5.0	10	6.0	80	18	290
Elijah-Vickery silt loams, 7 to 12 percent slopes	3.5	6	4.0	65	13	
Elijah-Vickery silt loams, 7 to 12 percent slopes, eroded	3.5	6	4.0	65	13	
Emerson sandy loam	5.0	12	6.5	80	22	360
Falk fine sandy loam	4.5		6.0	80	23	250
Greenleaf silt loam, 0 to 1 percent slopes	7.0	15	9.0	100	27	380
Greenleaf silt loam, 1 to 3 percent slopes	7.0	15	8.5	95	26	375
Greenleaf silt loam, 3 to 7 percent slopes	6.5	10	7.0	90	22	345
Greenleaf silt loam, 3 to 7 percent slopes, eroded	6.5	10	6.5	90	20	340
Greenleaf silt loam, 7 to 12 percent slopes, eroded	4.0	7	5.0	75	16	
Greenleaf silt loam, 12 to 30 percent slopes, eroded	2.5					
Greenleaf silt loam, saline-alkali, 1 to 3 percent slopes	6.5	14	8.0	90	25	370
Greenleaf silt loam, wet variant	5.0		7.0	90	25	
Greenleaf silt loam, wet variant, saline-alkali	4.0		5.0	70	16	
Harpt loam, 0 to 1 percent slopes	6.5	14	7.5	95	26	380
Harpt loam, 1 to 3 percent slopes	6.5	14	7.0	90	25	370
Harpt loam, 3 to 7 percent slopes	6.0	11	7.0	90	20	345
Harpt loam, 7 to 12 percent slopes	4.0	7	5.0	75	16	
Harpt loam, wet variant	4.0		7.0	105	26	
Haw loam, 0 to 1 percent slopes	7.0	15	9.0	100	27	390
Haw loam, 1 to 3 percent slopes	7.0	15	8.5	95	26	380
Haw loam, 3 to 7 percent slopes	6.5	10	7.0	90	22	345
Haw loam, 7 to 12 percent slopes	4.0	7				
Haw loam, 12 to 30 percent slopes	2.5					
Jenness loam, 0 to 1 percent slopes	6.5	14	7.5	95	26	380
Jenness loam, 1 to 3 percent slopes	6.5	14	7.0	90	25	370
Lankbush sandy loam, 3 to 7 percent slopes	4.5	9	5.0	85	18	335
Lankbush sandy loam, 12 to 30 percent slopes, eroded	2.5					
Lankbush-Purdam complex, 12 to 30 percent slopes	2.5					
Lanktree-Haw complex, 0 to 3 percent slopes	6.5	14	8.0	90	25	
Lanktree-Haw complex, 3 to 7 percent slopes	6.0	9	6.5	90	20	
Letha fine sandy loam				65	12	
Letha fine sandy loam, slightly saline-alkali				75	19	
Lolalita sandy loam, 1 to 3 percent slopes	6.0	12	6.0	85	22	380
Lolalita sandy loam, 3 to 7 percent slopes	4.0	7	4.5	80	16	335
Lolalita sandy loam, 7 to 12 percent slopes	3.5	6				
Moulton fine sandy loam	5.0		6.0	90	27	
Moulton fine sandy loam, slightly saline-alkali	4.5		6.0	80	22	
Newell clay loam, 1 to 3 percent slopes	6.0	16	8.0	95	26	
Notus coarse sandy loam	2.5		3.0	50	10	
Nyssaton silt loam, 0 to 1 percent slopes	7.0	16	9.0	105	28	380
Nyssaton silt loam, 1 to 3 percent slopes	7.0	16	8.5	100	27	375
Nyssaton silt loam, 3 to 7 percent slopes	6.5	10	6.5	90	20	335
Nyssaton silt loam, 7 to 12 percent slopes	4.0	7	4.5	75	16	
Nyssaton silt loam, 12 to 30 percent slopes	2.5					
Owyhee silt loam, 0 to 1 percent slopes	7.0	16	9.0	105	28	380
Owyhee silt loam, 1 to 3 percent slopes	7.0	16	8.5	100	27	375
Owyhee silt loam, 3 to 7 percent slopes	6.5	10	6.5	90	20	335
Owyhee silt loam, 7 to 12 percent slopes, eroded	4.0	7	4.5	75	16	
Owyhee silt loam, 12 to 30 percent slopes, eroded	2.5					
Power-Elijah silt loams, 1 to 3 percent slopes	6.0	12	7.0	95	24	350
Power-Elijah silt loams, 3 to 7 percent slopes	5.0	9	6.0	85	18	270
Power-Elijah silt loams, 7 to 12 percent slopes	4.0	7	5.0	75	16	
Power-Purdam silt loams, 7 to 12 percent slopes	4.0	7	5.0	75	16	
Purdam-Power silt loams, 1 to 3 percent slopes	6.0	11	5.5	95	24	355
Purdam-Power silt loams, 3 to 7 percent slopes	4.5	9	6.0	90	18	315
Tindahay loamy coarse sand, 12 to 30 percent slopes	2.5					
Tindahay coarse sandy loam, 3 to 7 percent slopes	4.0	8	4.5	80	16	330
Tindahay coarse sandy loam, 7 to 12 percent slopes	3.5	6				
Tindahay-Cashmere complex, 7 to 12 percent slopes	3.5	6				
Truesdale fine sandy loam, 3 to 7 percent slopes	3.5	6	4.0	55	15	200
Truesdale fine sandy loam, 7 to 12 percent slopes	3.5	6	4.0	50	15	
Turbyfill fine sandy loam, 1 to 3 percent slopes	6.0	14	6.5	90	24	400
Turbyfill fine sandy loam, 3 to 7 percent slopes	4.5	8	4.5	85	18	345
Turbyfill fine sandy loam, 7 to 12 percent slopes	4.0	7	4.0	60	14	

[1] AUM, animal unit months, are the number of months 1 acre will provide grazing for one animal unit without injury to the pasture. One animal unit is defined as one cow, steer, or horse; five pigs; or seven sheep or goats.

principal crops on selected irrigated soils—Continued

Barley	Oats	Wheat	Apples	Prunes	Mint oil	Sugar beets	Onions	Pasture
Bu	*Bu*	*Bu*	*Tons*	*Tons*	*Lb*	*Tons*	*Cwt*	*AUM* [1]
85	95	75	13	11		18		15
50	55	45	12	8				8
								8
60	65	55	8	8		15		13
75	85	65	8	8		20		16
50	55	45	6	5				12
50	55	45	7	8				12
95	105	85				21		15
75	85	65				22		14
120	130	110	12	16	100	32	550	20
120	130	110	12	14	95	30	540	20
110	120	100	11	14		24		16
110	120	100	10	11		23		16
60	65	55	8	11				15
55	60	50						10
120	130	110	12	14		32	530	20
65	70	60				24		18
45	50	40				23		15
120	130	110	11	14		30		20
130	130	110	10	11		28		20
110	120	100	11	14		23		16
60	65	55	8	11				15
85	95	75				24		18
120	130	110	12	14	100	32	550	18
120	130	110	12	14	95	30	540	18
110	120	100	11	14		24		16
60	65	55						15
55	60	50						10
120	130	110			95	30		20
120	130	110			90	28		20
80	90	70	13	11		19		14
50	55	45						9
50	55	45						9
115	125	105						16
110	120	100				23		16
						20		13
65	70	60				22		17
95	105	85	13	11		25		18
80	90	70	14	11		15		13
45	50	40	11	8				8
75	85	65				22		15
65	70	60				19		17
120	130	110						20
35	40	30						8
120	130	110	12	16	100	32	550	20
120	130	110	12	14	95	30	540	20
110	120	100	11	11		24		16
60	65	55	8	11				15
55	60	50						9
120	130	110	12	16	100	32	550	20
120	130	110	12	14	95	30	540	20
110	120	100	11	11		24		16
60	65	55	8	11				15
55	60	50						9
100	110	90	10	11		28		18
65	70	60	10	11		18		14
65	70	60	10	11				14
65	70	60	10	11				14
85	95	75	10	11		26		18
65	70	60	8	8		21		14
50	55	45	10	11				8
80	90	70	14	11				13
45	50	40	11	8				8
45	50	40	11	8				8
50	55	45				16		10
45	50	40						8
95	105	85	13	11		26		19
85	95	75	13	11		18		15
55	60	50	12	8				11

withstand grazing. Proper grazing means grazing the key range site and key forage species in a manner that permits the plant to produce adequate food for growth and maintenance.

A grazing system is needed for the particular site. This system must allow the plants to obtain the needed rest or to receive the proper degree of use. A grazing system for the particular area or range under management must be flexible enough to accommodate changes in the plant population. It must provide enough ground cover to protect the soil from erosion.

The forage on a range site should be grazed as uniformly as possible. To accomplish this, maximum distribution of livestock is necessary. Practices that help to obtain good livestock distribution are properly locating fences; salting away from heavily used water, meadows, and livestock trails; watering stock throughout the range unit; and making use of a rider or herder.

The range should be seeded as needed. A considerable amount of range, especially the Loamy range sites in the 8- to 16-inch precipitation zones, is likely to require reseeding. Much of this range is in poor condition, and seeding is the most practical method to gain full production. These areas have dense stands of annual species that dry out early in spring. In preparing seedbeds, care must be taken to eliminate the annual plant competition. Seeding late in fall or early in spring is suggested because moisture is adequate during those periods. Newly established seedlings should not be grazed during the first full year and the growing season of the next.

Annual plants require careful management. Much of the area in Payette County has been overgrazed for many years and burned many times. Continued heavy grazing and burning have resulted in a range cover of medusahead ryegrass and cheatgrass. Reestablishing grasses so that the range is in good or better condition is unrealistic. Much of the area can be seeded, but other areas cannot be seeded economically by the average operator. In such places a system of annual grazing management is needed that allows sufficient seed production for the next year's crop and keeps enough litter on the ground to protect the soil from erosion.

Range sites and condition classes

Range sites are kinds of range that differ in their ability to produce potential vegetation. Soils in a range site produce about the same kind and amounts of potential vegetation. Potential, or climax, vegetation is the product of its total environment and is the most stable plant community; it reproduces itself and does not change so long as the environment remains unchanged. The potential vegetation consists of plants that grew in the region when it was first settled. It is not necessarily the goal in range management, but it provides the basis for evaluating range condition, alternative uses, and good management.

Under poor grazing management, desirable forage species tend to decrease and undesirable species increase. Some plants decrease if grazed by one kind of livestock and increase if grazed by another. In much of Payette County desirable forage plants have been replaced by shrubby plants and invader annuals, such as medusahead wildrye and cheatgrass brome.

Range condition refers to the composition of the existing native plants on a site in relation to what the site is capable of producing. Four range condition classes indicate the degree of departure from the potential, or climax, vegetation. The classes represent the present ecological condition of the native vegetation for that site.

A range is in *excellent* condition if 76 to 100 percent of the vegetation is of the same kind as that in the climax stand. It is in *good* condition if the percentage is 51 to 75; in *fair* condition if the percentage is 26 to 50; and in *poor* condition if the percentage is less than 25.

A primary objective of good range management is to improve or maintain range in excellent or good condition. If this is done, water is conserved, the quality and quantity of forage is improved, and the soils are protected from erosion. Recognizing important changes in the kind and amounts of vegetation on a range site is difficult. Changes take place gradually and can be misinterpreted or overlooked. Growth encouraged by above-average rainfall may be interpreted as an upward trend in range condition, when actually the long-term trend is downward. On the other hand, range that has been closely grazed for short periods may have a deteriorating appearance that temporarily conceals its quality and ability to recover. Range trend cannot be measured by single criteria. All range trend indicators must be considered to properly evaluate range trend.

Descriptions of range sites

Soils of Payette County are grouped into 10 range sites. They occur in four precipitation zones: 8 to 12 inches, 8 to 16 inches, 12 to 16 inches, and 16 to 22 inches.

The 8- to 12-inch precipitation zone is in the southern part of the county. Elevation ranges from 2,200 to 3,000 feet, and the frost-free season is 140 to 160 days. Plant growth begins near the middle of March and continues until the soil moisture is depleted late in June. Range sites in this category are usually used for spring and fall grazing.

The 12- to 16-inch precipitation zone is in the northern part of the county. Elevation ranges from 2,150 to 4,650 feet, and the frost-free season is 120 to 160 days. Plant growth begins about the middle of April and continues until the soil moisture is depleted near the middle of July.

The 16- to 22-inch precipitation zone is on north-facing slopes in the northern part of the county. Elevation ranges from 3,000 to 4,650 feet, and the frost-free period is 110 to 130 days. Plant growth begins in the last part of April and continues until soil moisture is depleted about the middle of July.

These precipitation zones receive 75 percent of the moisture in winter. Summers are hot and dry.

On the following pages the range sites of Payette County are described and the potential plants and principal invaders on the sites are named. Also given is an estimate of the potential annual production of

air-dry herbage. The range site for each soil in the county is shown in the "Guide to Mapping Units" at the back of this survey.

LOAMY RANGE SITE
8- TO 12-INCH PRECIPITATION ZONE

This site consists of well-drained and somewhat excessively drained clay loams, silt loams, loams, sandy loams, coarse sandy loams, and loamy coarse sands. Coarse fragments occur in places, but not in amounts that significantly affect the kind or amount of vegetation. Slopes are 0 to 30 percent. Permeability is very slow to moderately rapid, and available water capacity is 4 to 15 inches.

The potential plant community on a site in excellent condition is 60 to 70 percent grasses, 10 to 15 percent forbs, and 20 to 25 percent shrubs. Primary plants, dominantly bluebunch wheatgrass, make up 40 to 60 percent of the vegetation. Other primary plants are tapertip hawksbeard, Nevada bluegrass, prairie junegrass, and bitterbrush. Secondary plants, such as Sandberg bluegrass, squirreltail, arrowleaf balsamroot, lupine, penstemon, big sagebrush, and threetip sagebrush, make up the rest of the potential, or climax, vegetation.

Deterioration of the site is marked by an increase in big sagebrush, Sandberg bluegrass, and rubber rabbitbrush. If deterioration continues and the site is not burned over, it is taken over by plants of low value, such as cheatgrass, medusahead ryegrass, and annual forbs and an overstory of big sagebrush. Burning kills the big sagebrush and causes an increase in yellow rabbitbrush.

Most soils in this range site are suitable for seeding. Suitable grasses are Nordan crested wheatgrass (fig. 10), Siberian wheatgrass, and Whitmar wheatgrass. Seedings made on a weed-free, firm seedbed late in fall or early in spring are most successful. Grazing should be deferred for the first year and the growing season of the second year or until the grass is established.

Approximately 80 percent of the native plants on this site furnish at least some forage for cattle and sheep. The potential total yield, dry weight, is ordinarily 1,100 pounds per acre, but ranges from 500 to 1,000 pounds, depending upon the amount of precipitation.

Species composition of the potential plant community of a typical site is 40 percent bluebunch wheatgrass, 18 percent big sagebrush, 12 percent Thurber needlegrass, 5 percent bottlebrush squirreltail, 5 percent Sandberg bluegrass, and 3 percent or less each of Great Basin wildrye, arrowleaf balsamroot, lupine,

Figure 10.—**Nordan crested wheatgrass seeded late in fall on Loamy range site, 8- to 12-inch precipitation zone. The soil is Lankbush-Purdam complex, 12 to 30 percent slopes, south of New Plymouth.**

yellowbrush, rubber rabbitbrush, antelope bitterbrush, and Nevada bluegrass.

LOAMY RANGE SITE
12- TO 16-INCH PRECIPITATION ZONE

This site consists of well-drained loams, silt loams, clay loams, stony clay loams, and very stony loams. Coarse fragments occur in places, but not in amounts that significantly affect the kind or amount of vegetation. Slopes are 0 to 30 percent. Permeability is slow and moderately slow, and available water capacity is 8 to 13 inches.

The potential plant community on a site in excellent condition is 60 to 70 percent bunchgrasses, 15 to 20 percent forbs, and 15 to 20 percent shrubs. Primary plants, dominantly bluebunch wheatgrass and Idaho fescue, make up 40 to 60 percent of the vegetation. Other primary plants are Nevada bluegrass, prairie junegrass, tapertip hawksbeard, and bitterbrush. Secondary plants, such as Sandberg bluegrass, squirreltail, lupine, arrowleaf balsamroot, western yarrow, big sagebrush, and rubber rabbitbrush, make up the rest of the potential, or climax, vegetation.

Deterioration of the site is marked by an increase in secondary plants. If deterioration continues and the site is not burned, it is taken over by plants of low value, such as cheatgrass, medusahead ryegrass, and annual forbs and an overstory of big sagebrush (fig. 11).

If this site is in poor condition or has undesirable vegetation, all but the very stony soils can be seeded to adapted forage species. Approved sprays and possibly fire can be used where control of big sagebrush is needed.

Approximately 80 percent of the native plants on this site furnish at least some forage for cattle and sheep. The potential total yield, dry weight, is ordinarily 1,300 pounds per acre, but ranges from 800 to 1,900 pounds, depending upon the amount of precipitation.

Species composition of the potential plant community of a typical site is 35 percent bluebunch wheatgrass; 25 percent Idaho fescue; 10 percent big sagebrush; 5 percent each of Nevada bluegrass, arrowleaf balsamroot, and lupine; and 3 percent or less each of Great Basin wildrye, needlegrass, western yarrow, biscuitroot, antelope bitterbrush, and yellowbrush.

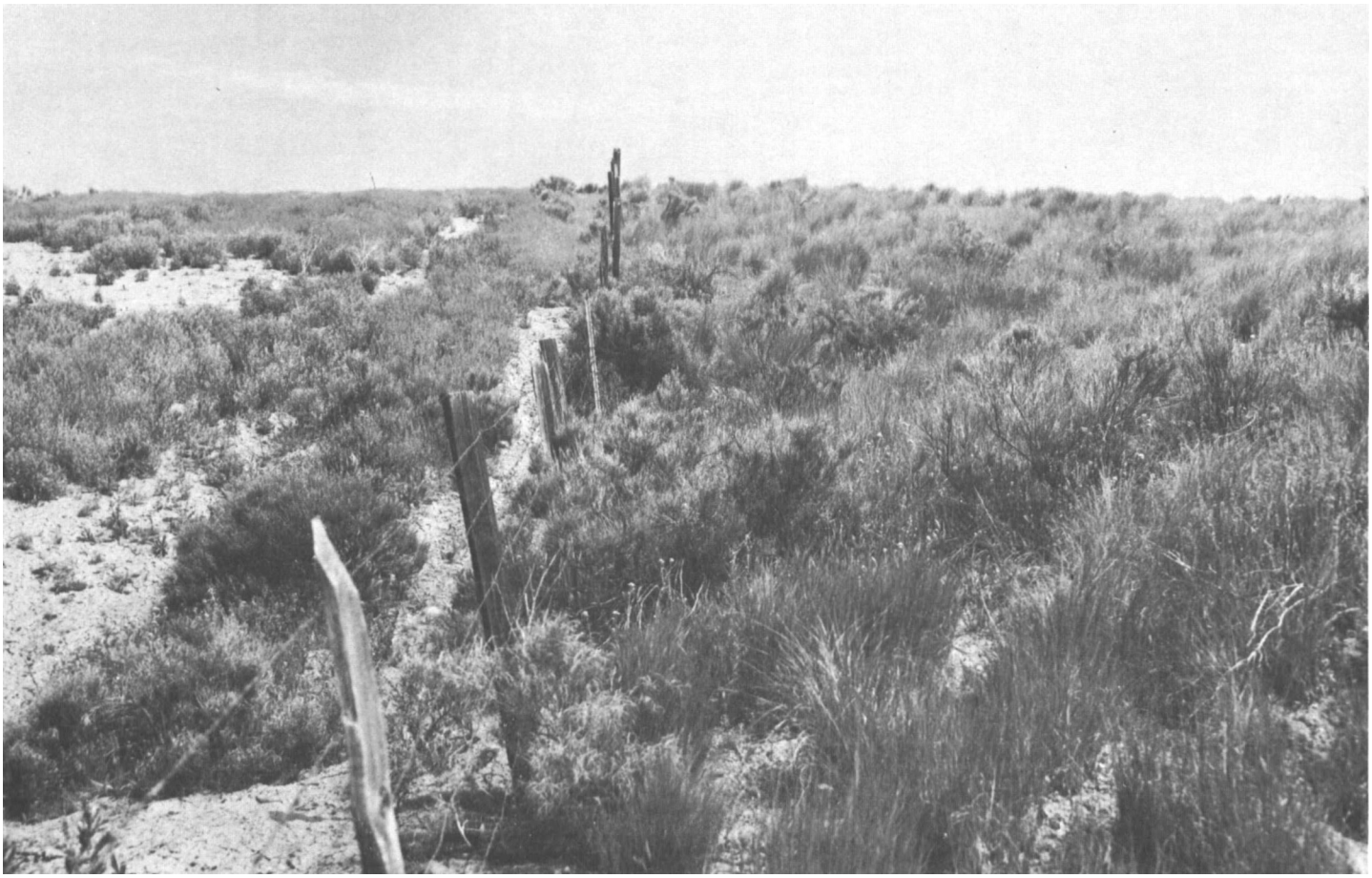

Figure 11.—**Poor condition range under dense cover of big sagebrush on left. Well-managed range under good stand of bluebunch wheatgrass and sparse big sagebrush on right. Loamy range site, 12- to 16-inch precipitation zone, on the Haw soils in Saralegui-Haw complex, 12 to 30 percent slopes, eroded, along Big Willow Creek.**

STEEP GRANITIC RANGE SITE
8- TO 12-INCH PRECIPITATION ZONE

This site consists of well-drained coarse sandy loams. Slopes are 30 to 65 percent. Permeability is moderately rapid, and available water capacity is 6 to 8 inches. This site is dominantly on steep, south- to west-facing slopes, but a small part at lower elevations is on north-facing slopes.

The potential plant community on a site in excellent condition is 65 to 70 percent perennial bunchgrass, 5 to 10 percent forbs, and 20 to 30 percent shrubs. Primary plants, dominantly bluebunch wheatgrass, Thurber needlegrass, and Indian ricegrass, make up 50 to 60 percent of the vegetation. Other primary plants are tapertip hawksbeard and bitterbrush. Secondary plants, such as needle-and-thread, squirreltail, Sandberg bluegrass, red three-awn, buckwheat, arrowleaf balsamroot, phlox, and big sagebrush, make up the rest of the potential, or climax, vegetation.

Deterioration of the site is marked by an increase in red three-awn, buckwheat, and big sagebrush. If deterioration continues and the site is not burned over, it is taken over by plants of low value, such as red three-awn, medusahead ryegrass, cheatgrass, and annual forbs and an overstory of big sagebrush. Mechanical treatment is not economically feasible because the soils are too steep. Proper grazing management and brush control are most important in improving the range vegetation.

Approximately 60 percent of the native plants on this site furnish at least some forage for cattle and sheep. The potential total yield, dry weight, is ordinarily 400 pounds per acre, but ranges from 250 to 700 pounds, depending upon the amount of precipitation.

Species composition of the potential plant community of a typical range site is 25 percent bluebunch wheatgrass, 20 percent Indian ricegrass, 15 percent big sagebrush, 10 percent Thurber needlegrass, 10 percent Sandberg bluegrass, 5 percent yellowbrush, and 3 percent or less each of bottlebrush squirreltail, tapertip hawksbeard, arrowleaf balsamroot, eriogonum, longleaf phlox, and antelope bitterbrush.

STEEP SLOPE RANGE SITE
12- TO 16-INCH PRECIPITATION ZONE

This site consists of well-drained loams and coarse sandy loams that are more than 60 inches deep. Stones and gravel occur in places, but not in amounts that significantly affect the kind or amount of vegetation. Slopes are 30 to 65 percent. Permeability is moderately slow to moderately rapid, and available water capacity is 3 to 12 inches.

The potential plant community on a site in excellent condition is 70 to 80 percent grasses, 5 to 10 percent perennial forbs, and 10 to 15 percent shrubs. Primary plants, dominantly bluebunch wheatgrass and Idaho fescue, make up 60 to 70 percent of the vegetation. Other primary plants are Nevada bluegrass, prairie junegrass, and bitterbrush. Secondary plants, such as Sandberg bluegrass, squirreltail, needlegrass, arrowleaf balsamroot, lupine, big sagebrush, and snowberry, make up the rest of the potential, or climax, vegetation.

Deterioration of the site is marked by an increase in big sagebrush, Sandberg bluegrass, larkspur, and needlegrass. If deterioration continues and the site is not burned, it is taken over by plants of low value, such as cheatgrass, medusahead wildrye, and annual forbs and an overstory of big sagebrush. Mechanical treatment is not economically feasible because the site is generally too steep. Proper grazing management and brush control are most important in improving the range vegetation.

Approximately 70 percent of the native plants on this site furnish at least some forage for cattle and sheep. The potential total yield, dry weight, is ordinarily 1,500 pounds per acre, but ranges from 900 to 2,000 pounds, depending upon the amount of precipitation.

Species composition of the potential plant community of a typical site is 35 percent Idaho fescue, 30 percent bluebunch wheatgrass, 7 percent big sagebrush, 5 percent needlegrass, and 3 percent or less each of prairie junegrass, Nevada bluegrass, Sandberg bluegrass, Great Basin wildrye, arrowleaf balsamroot, lupine, larkspur, geranium, western snowberry, and antelope bitterbrush.

STEEP SLOPE RANGE SITE
16- TO 22-INCH PRECIPITATION ZONE, LESS THAN 47° F.

This site consists of well-drained stony loams that are 20 to 40 inches deep over bedrock. It occurs on north-facing slopes in the northern part of the county. Slopes are more than 30 percent. Permeability is moderately slow, and available water capacity is 2 to 8 inches.

The potential plant community on a site in excellent condition is 60 to 70 percent perennial grasses, 20 to 30 percent perennial forbs, and 15 to 20 percent shrubs. Primary plants, dominantly bluebunch wheatgrass and Idaho fescue, make up 45 to 55 percent of the vegetation. Other primary plants are prairie junegrass, bluegrass, mountain brome, tapertip hawksbeard, and bitterbrush. Secondary plants, such as Sandberg bluegrass, squirreltail, Kentucky bluegrass, lupine, western yarrow, big sagebrush, yellowbrush, and snowberry make up the rest of the potential, or climax, vegetation.

Deterioration of the site is marked by an increase in big sagebrush and Kentucky bluegrass. If deterioration continues and the site is not burned over, it is taken over by plants of low value, such as cheatgrass, medusahead ryegrass, and annual forbs and an overstory of big sagebrush. Mechanical treatment is not economically feasible because the site is generally too steep. Proper grazing management is needed to improve the range vegetation. If the percentage of sagebrush is high and the perennial grass understory is sufficient to reestablish the potential plant community, brush control and proper grazing management are effective.

Approximately 60 percent of the native plants on this site furnish at least some forage for cattle and sheep. The potential total yield, dry weight, is ordinarily 2,000 pounds per acre, but ranges from 1,400 to 2,900 pounds, depending upon the amount of precipitation.

Species composition of the potential plant community of a typical site is 30 percent bluebunch wheatgrass, 15 percent Idaho fescue, 10 percent arrowleaf balsamroot, 8 percent bluegrass, 7 percent big sagebrush, 5 percent lupine, 5 percent antelope bitterbrush, and 3 percent or less each of needlegrass, prairie junegrass, oniongrass, mountain brome, western yarrow, tapertip hawksbeard, and yellowbrush.

STEEP STONY SLOPE RANGE SITE
12- TO 16-INCH PRECIPITATION ZONE

This site consists of well-drained extremely stony clay loams that are 20 to 40 inches deep over bedrock. Stones and gravel occur in amounts that affect the kind and amount of vegetation. Slopes are 30 to 65 percent. Permeability is slow, and available water capacity is 2 to 5 inches.

The potential plant community on a site in excellent condition is 55 to 65 percent grasses, 15 to 20 percent perennial forbs, and 20 to 30 percent shrubs. Primary plants, dominantly bluebunch wheatgrass and Idaho fescue, make up 45 to 55 percent of the vegetation. Other primary plants are Nevada bluegrass, prairie junegrass, and bitterbrush. Secondary plants, such as Sandberg bluegrass, squirreltail, needlegrass, lupine, buckwheat, western yarrow, and big sagebrush, make up the rest of the potential, or climax, vegetation.

Deterioration of the site is marked by an increase in big sagebrush, Sandberg bluegrass, buckwheat, and needlegrass. If deterioration continues and the site is not burned, it is taken over by plants of low value, such as cheatgrass, medusahead ryegrass, and annual forbs and an overstory of big sagebrush. This site is too stony for reseeding. Proper grazing management and brush control are most important in improving the range condition.

Approximately 70 percent of the native plants on this site furnish at least some forage for cattle and sheep. The potential total yield, dry weight, is ordinarily 1,100 pounds per acre, but ranges from 700 to 1,500 pounds, depending upon the amount of precipitation.

Species composition of the potential plant community of a typical range site is 45 percent bluebunch wheatgrass, 10 percent big sagebrush, 8 percent Idaho fescue, 5 percent arrowleaf balsamroot, 4 percent Sandberg bluegrass, 4 percent lupine, and 3 percent or less each of Nevada bluegrass, prairie junegrass, Great Basin wildrye, needlegrass, western yarrow, eriogonum, and antelope bitterbrush.

DENSE CLAY RANGE SITE
12- TO 16-INCH PRECIPITATION ZONE

This site consists of clay soils that churn or are self-mixing and are more than 60 inches deep. Stones and gravel occur in places, but not in amounts that significantly affect the kind or amount of vegetation. Slopes range from 12 to 60 percent, but are generally less than 35 percent. Permeability is slow, and available water capacity is 10 to 12 inches.

The potential plant community on a site in excellent condition is 45 to 55 percent grasses, 34 to 45 percent forbs, and 5 to 10 percent shrubs. Primary plants, dominantly bluebunch wheatgrass, make up 30 to 35 percent of the vegetation. Other primary plants are Nevada bluegrass, tapertip hawksbeard, and California oatgrass. Secondary plants, such as Sandberg bluegrass, needlegrass, arrowleaf balsamroot, biscuitroot, lupine, western yarrow, and big sagebrush, make up most of the rest of the potential, or climax, vegetation.

Deterioration of the site is marked by an increase in biscuitroot and Sandberg bluegrass. If deterioration continues and the site is not burned, it is taken over by plants of low value, such as biscuitroot, cheatgrass, medusahead ryegrass, and annual forbs. This site is difficult to seed because the soil crusts and a good seedbed is difficult to prepare.

Approximately 60 percent of the native plants on this site furnish at least some forage for cattle and sheep. The potential total yield, dry weight, is ordinarily 1,600 pounds per acre, but ranges from 900 to 1,800 pounds, depending upon the amount of precipitation.

Species composition of the potential plant community of a typical site is 20 percent bluebunch wheatgrass, 20 percent biscuitroot; 10 percent Sandberg bluegrass; 5 percent Idaho fescue, Nevada bluegrass, arrowleaf balsamroot, and big sagebrush; 4 percent each of lupine and western yarrow; and 3 percent each of California oatgrass, needlegrass, and tapertip hawksbeard.

STONY RANGE SITE
12- TO 16-INCH PRECIPITATION ZONE

This site consists of well-drained extremely stony clay loams that are 20 to 40 inches deep over bedrock. Stones occur on the surface and throughout the profile in amounts that affect the kind and amount of vegetation. Slopes are 2 to 30 percent. Permeability is slow, and available water capacity is 2 to 5 inches.

The potential plant community on a site in excellent condition is 60 to 70 percent bunchgrasses, 20 percent forbs, and 20 percent shrubs. Primary plants, dominantly bluebunch wheatgrass and Idaho fescue, make up 40 to 50 percent of the vegetation. Other primary plants are prairie junegrass, Nevada bluegrass, tapertip hawksbeard, lomatium, and bitterbrush. Secondary plants, such as Sandberg bluegrass, squirreltail, lupine, buckwheat, western yarrow, arrowleaf balsamroot, big sagebrush, and rabbitbrush, make up the rest of the potential, or climax, vegetation.

Deterioration of the site is marked by an increase in big sagebrush and Sandberg bluegrass. If deterioration continues and the site is not burned, it is taken over by plants of low value, such as cheatgrass, medusahead ryegrass, and annual forbs and an overstory of big sagebrush. This site is generally unsuitable for reseeding, because the soils are extremely stony. Proper grazing management is needed to improve the range vegetation. If the percentage of big sagebrush is high and the perennial grass understory is sufficient to reestablish the potential plant community, brush control and proper grazing management are effective.

Approximately 60 percent of the native plants on this site furnish at least some forage for cattle and sheep. The potential total yield, dry weight, is ordinarily 1,500 pounds per acre, but ranges from 800 to

1,800 pounds, depending upon the amount of precipitation.

Species composition of the potential plant community of a typical site is 30 percent Idaho fescue, 20 percent bluebunch wheatgrass, 15 percent big sagebrush, 5 percent lupine, 5 percent arrowleaf balsamroot, and 3 percent or less each of prairie junegrass, Nevada bluegrass, Sandberg bluegrass, bottlebrush squirreltail, western yarrow, bitterbrush, lomatium, and tapertip hawksbeard.

SHALLOW STONY RANGE SITE
12- TO 16-INCH PRECIPITATION ZONE

This site consists of well-drained extremely stony loams and stony loams that are 10 to 20 inches deep over bedrock. Slopes are 2 to 65 percent. Excessive amounts of coarse fragments in the profile cause droughtiness. Permeability is moderately slow, and available water capacity is 1 to 5 inches.

The potential plant community on a site in excellent condition is 60 percent grass, 20 to 25 percent forbs, and 20 percent shrubs. Primary plants, dominantly bluebunch wheatgrass and Idaho fescue, make up 35 to 45 percent of the vegetation. Other primary plants are Nevada bluegrass, prairie junegrass, tapertip hawksbeard, and bitterbrush. Secondary plants, such as Sandberg bluegrass, squirreltail, buckwheat, arrowleaf balsamroot, pussytoes, big sagebrush, and low sagebrush, make up the rest of the potential, or climax, vegetation.

Deterioration of the site is marked by an increase in secondary plants. If deterioration continues and the site is not burned over, it is taken over by plants of low value, such as cheatgrass, medusahead ryegrass, and annual forbs and an overstory of big sagebrush. Because the potential productivity of this site is relatively low and the soils are extremely stony, range improvement other than good management is generally not feasible.

Approximately 70 percent of the native plants on this site furnish at least some forage for cattle and sheep. The potential total yield, dry weight, is ordinarily 600 pounds per acre, but ranges from 400 to 1,000 pounds, depending upon the amount of precipitation.

Species composition of the potential plant community of a typical site is 25 percent each of Idaho fescue and low sagebrush; 10 percent each of bluebunch wheatgrass and Sandberg bluegrass; 5 percent each of bottlebrush squirreltail, lupine, and bitterbrush; and 3 percent or less each of Nevada bluegrass, longleaf phlox, pussytoes, eriogonum, and yellowbrush.

VERY SHALLOW RANGE SITE
8- TO 16-INCH PRECIPITATION ZONE

This site consists of well-drained extremely stony loams that are less than 10 inches deep over bedrock. It is generally on foothills. Rock outcrop is common. Slopes are 2 to 65 percent. Permeability is moderately slow, and available water capacity is less than 1 inch. The soils dry out early in spring, and the site is characterized by sparse vegetation.

The potential plant community on a site in excellent condition is 35 to 45 percent perennial grasses, 10 to 15 percent perennial forbs, and 40 to 50 percent shrubs. Primary plants, dominantly Nevada bluegrass, make up 30 to 40 percent of the vegetation. Other primary plants are bluebunch wheatgrass, Thurber needlegrass, lomatium, wild onion, tapertip hawksbeard, and small cutleaf balsamroot. Secondary plants, such as Sandberg bluegrass, squirreltail, penstemon, shrubby buckwheat, big sagebrush, and threetip sagebrush, make up the rest of the potential, or climax, vegetation.

Deterioration of the site is marked by an increase in shrubby buckwheat, threetip sagebrush, Sandberg bluegrass, penstemon, and annual forbs. If deterioration continues and the site is not burned over, it is taken over by plants of low value, such as annual forbs, cheatgrass, and medusahead ryegrass and an overstory of shrubby buckwheat and threetip sagebrush. Because the potential productivity of this site is low and the soil is shallow and stony, range improvement other than good management is generally not feasible.

Approximately 65 percent of the native plants on this site furnish at least some forage for cattle and sheep. The potential total yield, dry weight, is ordinarily 400 pounds per acre, but ranges from 250 to 600 pounds, depending upon the amount of precipitation.

Species composition of the potential plant community of a typical site is 25 percent bluebunch wheatgrass, 10 percent Thurber needlegrass, 10 percent big sagebrush, 6 percent cutleaf balsamroot, 5 percent Sandberg bluegrass, 5 percent threetip sagebrush, and 4 percent or less each of tapertip hawksbeard, squirreltail, shrubby buckwheat, longleaf phlox, penstemon, threetip sagebrush, and yellowbrush.

Windbreaks [4]

Trees grow in only a few areas in Payette County. Native cottonwoods and willows originally grew on streambanks and on the flood plains of larger streams. Sagebrush and grasses grew on the foothills and terraces, and mainly saltgrass and greasewood on strongly saline-alkali soils. Sedges, rushes, and aquatic grasses grew on poorly drained soils.

Approximately 30 percent of Payette County is now in irrigated farms. The foothills and terraces are used for range and crops, and most of the low-lying soils along flood plains and streams are cultivated.

The irrigated soils in Payette County generally are well suited to trees and shrubs planted for windbreaks. The windbreaks are of two general types: field windbreaks and farmstead windbreaks. A field windbreak consists of trees and shrubs planted in a strip or belt within or around a field. A farmstead windbreak is generally a narrow belt of trees or shrubs planted next to a farmstead or feedlot.

Many soils in the county are not suitable for trees and shrubs. Soils that are suitable, however, have been assigned to five windbreak groups. To find the group to which a soil has been assigned, refer to the "Guide to Mapping Units" at the back of this survey.

Each group consists of soils that have about the

[4] MELVIN R. CARLSON, woodland conservationist, Soil Conservation Service, helped prepare this section.

same suitability for trees and shrubs and that require about the same management. In the following paragraphs the windbreak groups are described, species of trees and shrubs suitable for planting on the soils of the group are listed, and the major hazards and limitations for windbreak plantings are mentioned.

WINDBREAK SUITABILITY GROUP 1

This group consists of moderately deep to very deep, well-drained clay loams, silt loams, loams, fine sandy loams, and sandy loams. These are level or very gently sloping soils on intermediate and high terraces adjacent to major rivers. They have very slow to moderately rapid permeability and moderate or high available water capacity. Reaction is generally neutral to moderately alkaline, but in some places is strongly alkaline. Runoff is slow or very slow. The hazard of erosion ranges from none to moderate.

Once established, trees grow very well on these soils. Limitations for windbreaks are few. Rocky Mountain junipers should not be planted near apple orchards, because they are host to the cedar-apple rust disease.

Deciduous trees suited to these soils are Russian-olive, golden willow, black locust, green ash, and hybrid poplar. Suitable evergreens are Douglas-fir, Austrian pine, Scotch pine, Norway spruce, ponderosa pine, blue spruce, and Rocky Mountain juniper. Suitable shrubs are caragana, Nanking cherry, lilac, southernwood, mulberry, cotoneaster, clearwater rose, Tatarian honeysuckle, common privet, and mugho pine.

WINDBREAK SUITABILITY GROUP 2

This group consists of moderately deep to very deep, well-drained clay loams, silt loams, fine sandy loams, and sandy loams. Two of the soils in this group are stony. All are gently sloping or moderately sloping soils on the sides of drainageways and near terrace edges. They have slow to moderately rapid permeability and moderate or high available water capacity. Reaction is neutral to moderately alkaline. Runoff is medium. The erosion hazard is high or very high.

Careful irrigation is needed to prevent erosion on these soils, especially while the windbreak is being established. Small streams and short runs, contour furrows, or sprinklers provide adequate control of irrigation water. Once established, trees grow very well on these soils.

Deciduous trees suited to these soils are Russian-olive, golden willow, black locust, green ash, and hybrid poplar. Suitable evergreens are Douglas-fir, Austrian pine, Scotch pine, Norway spruce, ponderosa pine, and blue spruce. Suitable shrubs are caragana, Nanking cherry, lilac, southernwood, mulberry, cotoneaster, clearwater rose, Tatarian honeysuckle, common privet, and mugho pine.

WINDBREAK SUITABILITY GROUP 3

This group consists of very deep, poorly drained or somewhat poorly drained silty clay loams, silt loams, and loams. These are level or very gently sloping soils on low terraces and alluvial bottoms near rivers and drainageways. They generally have moderate or moderately slow permeability. In places saline-alkali spots occur that have slow or very slow permeability. All the soils have moderate or high available water capacity. Reaction generally is mildly alkaline to strongly alkaline. Runoff is slow. The erosion hazard is slight or none.

A high water table and salt toxicity limit the species of trees and shrubs that can grow on these soils. Drainage generally is needed in establishing desirable trees and shrubs.

Deciduous trees suited to these soils are hybrid poplar, golden willow, and Russian-olive. Suitable evergreens are lodgepole pine and Norway spruce. Suitable shrubs are clearwater rose and cotoneaster.

WINDBREAK SUITABILITY GROUP 4

This group consists of very deep, poorly drained or somewhat poorly drained loams or fine sandy loams. These are level or very gently sloping soils on low terraces or alluvial river bottoms. They generally have slow to moderately rapid permeability. In some places saline-alkali spots occur that have slow or very slow permeability. All the soils have moderate or high available water capacity. Reaction is neutral or mildly alkaline. Runoff is slow. The erosion hazard is slight or none.

A fluctuating water table and the content of saline and alkali salts restrict the species of trees and shrubs that can grow on these soils. Drainage generally is needed in establishing desirable trees and shrubs. Rocky Mountain junipers should not be planted near apple orchards, because they are hosts to the cedar-apple rust disease.

Deciduous trees suited to these soils are green ash and black locust. Suitable evergreens are Norway spruce and Rocky Mountain juniper. Suitable shrubs are cotoneaster, lilac, and Tatarian honeysuckle.

WINDBREAK SUITABILITY GROUP 5

This group consists of very deep, well-drained or somewhat excessively drained loamy coarse sands, coarse sandy loams, and sandy loams. These are nearly level to moderately sloping soils on terraces and alluvial fans. They have moderately rapid permeability and moderate available water capacity. Runoff is slow or medium. The erosion hazard ranges from slight to very high. Soil blowing is a hazard, especially on bare soils in spring.

Careful irrigation is needed in establishing trees and shrubs, because the soil has a moderate available water capacity and rapid water intake. Sites for windbreak plantings should be prepared by adding barnyard manure or by growing a green-manure crop to reduce the hazards of blowing and water erosion and to increase the supply of organic matter and the available water capacity. Rocky Mountain junipers should not be planted near apple orchards, because they are hosts to the cedar-apple rust disease.

Deciduous trees suited to these soils are black locust, hybrid poplar, green ash, and Russian-olive. Suitable evergreens are Rocky Mountain juniper, Scotch pine, ponderosa pine, and Austrian pine. Suitable shrubs are caragana, southernwood, Nanking cherry, and lilac.

Wildlife [5]

Upland game and fish are the most significant wildlife in Payette County. Because the county is densely populated and much of the soil is intensively cultivated, big game habitat does not exist. A very small herd of deer lives on bottom land along the Payette River and in sparsely wooded areas near the Snake River. In winter some deer migrate from outside the county to uplands in the northeastern part of Payette County.

Most soils in Payette County are suited to habitat for game birds, such as chukar, mourning dove, ducks, geese, gray partridge, ring-necked pheasant, and California quail. Many nongame birds also are present. Wild ducks, geese, shore birds, and muskrat live on bottom land along the Payette and Snake Rivers and in drainageways throughout the county. Canada geese nest on river islands. Many farms have sites suitable for fish ponds.

Most wildlife species cannot be directly related to an individual soil or group of soils. Wildlife generally live where food, cover, and water are available in a favorable combination. The development of these elements of habitat depends on the suitability of the soils and the willingness of the owner to manage his land for wildlife.

Information about the major kinds of wildlife in Payette County is given in the paragraphs that follow.

California quail.—This native game bird is also known as valley quail. It roosts in shrubs and low trees and uses shrubby thickets for daytime cover. Soils throughout the county provide habitat suitable for California quail. Choice food is mainly seeds, tender green forage, and berries. Some of the foods known to be preferred are barley, barnyardgrass, corn, geranium, millet, oats, pigweed, raspberry, Indian ricegrass, sorghum, sunflower, and wheat. Other foods are alfalfa, bluegrass, bristlegrass, cheatgrass, clover, dandelion, wildrose, Russian-olive, and timothy.

Canada geese.—A large number of Canada geese nest on islands in the Payette and Snake Rivers on the Moulton-Letha-Notus and Baldock-Greenleaf variant soil associations.[6] Soils in all parts of the county except the Bakeoven-Reywat-Gross and Haw-Saralegui soil associations provide grain and green forage plants for geese. Geese prefer the tender green forage of alfalfa, barley, Kentucky bluegrass, clover, dandelion, sago potamogeton, rye, timothy, and wheat. Preferred seeds are alfalfa, barley, barnyardgrass, corn, millet, rye, sorghum, and wheat. Some other foods are brome, bulrush, cattail, cheatgrass, tall fescue, Idaho fescue, grasswort, oats, pigweed, potamogeton, and smartweed.

Chukar.—This game bird was introduced from southern Asia. The Bakeoven-Reywat-Gross and Haw-Saralegui soil associations provide habitat suitable for large numbers of chukar. Chukars find cover in rocky, steep, grassy areas. Their preferred foods are barley, Sandberg bluegrass, bristlebrush, cheatgrass, clover, corn, currant, Idaho fescue, oats, wild onion, pigweed, Indian ricegrass, serviceberry, sorghum, smooth sumac, sunflower, wheat, and bluebunch wheatgrass. Other foods are alfalfa, aster, balsamroot, barnyardgrass, Kentucky bluegrass, chokecherry, millet, potatoes, rose, sagebrush, and teasel. Chukars also eat many kinds of insects.

Ducks.—The main kinds of ducks are mallard, pintail, and widgeon. They generally feed on field grain, seeds, and green forage. They nest in marshes near ponds and streams. Suitable habitat occurs on all soil associations except the Bakeoven-Reywat-Gross and Haw-Saralegui soil associations. The best habitat is along the Payette River and near sloughs, streams, and drainageways. Suitable areas for shallow-water impoundments and feeding occur along the Payette and Snake Rivers on the Moulton-Letha-Notus and Baldock-Greenleaf variant soil associations.

All but the Bakeoven-Reywat-Gross and Haw-Saralegui soil associations can provide grain for ducks. Preferred foods are barley, buckwheat, bulrush, corn, millet, sago potamogeton, smartweed, sorghum, and wheat. Ducks generally favor seeds of aquatic plants.

Gray partridge.—The gray partridge, or Hungarian partridge, was introduced from Europe in 1930. Grainfields and range provide habitat for this game bird. The partridge nests mainly in alfalfa, along grassy fencerows, and in patches of weeds. Preferred foods are barley, barnyardgrass, yellow bristlegrass, Japanese millet, sorghum, teasel, and wheat. Other foods are alfalfa, cheatgrass, corn, dandelion, foxtail millet, proso millet, oats, pigweed, Indian ricegrass, wildrose, rye, spring beauty, and sunflower. Gray partridge also eat insects.

Mourning dove.—Habitat suitable for mourning dove can be maintained or developed in all soils of Payette County. Doves favor black locust and orchard trees for nesting, but do nest in other kinds of trees and on the ground in well-drained areas. This migratory game bird eats only seeds and must have drinking water daily. Landowners who wish to attract and hold doves during the hunting season grow barnyardgrass, bristlegrass, corn, fiddleneck, Japanese millet, proso millet, pigweed, lodgepole pine, ponderosa pine, ragweed, rape, Indian ricegrass, sorghum, sunflower, and wheat.

Ring-necked pheasant.—This game bird, a native of China, was introduced in the 1930's. Soils in all but the Bakeoven-Reywat-Gross and Haw-Saralegui soil associations provide suitable pheasant habitat. Cattails, shrubs, and trees that grow along ditches and fencerows and near streams adjacent to cultivated areas provide excellent habitat. During the hunting season many birds migrate from the cultivated areas into the range. Pheasants eat seeds, grasshoppers, and other insects. Cereal grains, such as barley, corn, proso millet, sorghum, and wheat, make up more than 80 percent of the pheasant's diet. Seeds of knotweed, pigweed, ricegrass, Russian thistle, and sunflower are also eaten. Such fruits as hawthorn, rose, Russian-olive, and snowberry are not preferred, but may sustain

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[5] CLYDE A. SCOTT, biologist, Soil Conservation Service, helped prepare this section.

[6] For location of the soil associations, refer to the General Soil Map.

birds through periods of deep snow, when other foods are scarce.

Songbirds.—All soils of Payette County provide habitat for nongame birds, such as robins, swallows, flycatchers, hawks, and herons. Small birds eat seeds, insects, worms, and fruit. Some large birds feed mainly on fish, frogs, rodents, and snakes.

Fish.—The principal game fish in the ponds and streams of Payette County are bass, bullhead catfish, channel catfish, crappie, and trout. Ponds, lakes, and permanent streams are suitable for fish. All but the Bakeoven-Reywat-Gross association have sites suitable for ponds.

Engineering Uses of the Soils [7]

This section is useful to those who need information about soils used as structural material or as foundation upon which structures are built. Among those who can benefit from this section are planning commissions, town and city managers, land developers, engineers, contractors, and farmers.

Among properties of soils highly important in engineering are permeability, strength, compaction characteristics, soil drainage, shrink-swell potential, grain-size distribution, plasticity, and soil reaction. Also important are depth to the water table, depth to bedrock, and slope. These properties, in various degrees and combinations, affect construction and maintenance of roads, airports, pipelines, foundations for small buildings, irrigation systems, ponds and small dams, and systems for disposal of sewage and refuse.

Information in this section of the soil survey can help those who—

1. Select potential residential, industrial, commercial, and recreational areas.
2. Evaluate alternate routes for roads, highways, pipelines, and underground cables.
3. Seek sources of gravel, sand, or clay.
4. Plan farm drainage systems (fig. 12), irrigation systems, ponds, terraces, and other structures for controlling water and conserving soil.
5. Correlate performance of structures already built with properties of the kinds of soil on which they are built, for the purpose of predicting performance of structures on the same or similar kinds of soil in other locations.
6. Predict the trafficability of soils for cross-

[7] DONALD P. STEWART, civil engineer, Soil Conservation Service, helped prepare this section.

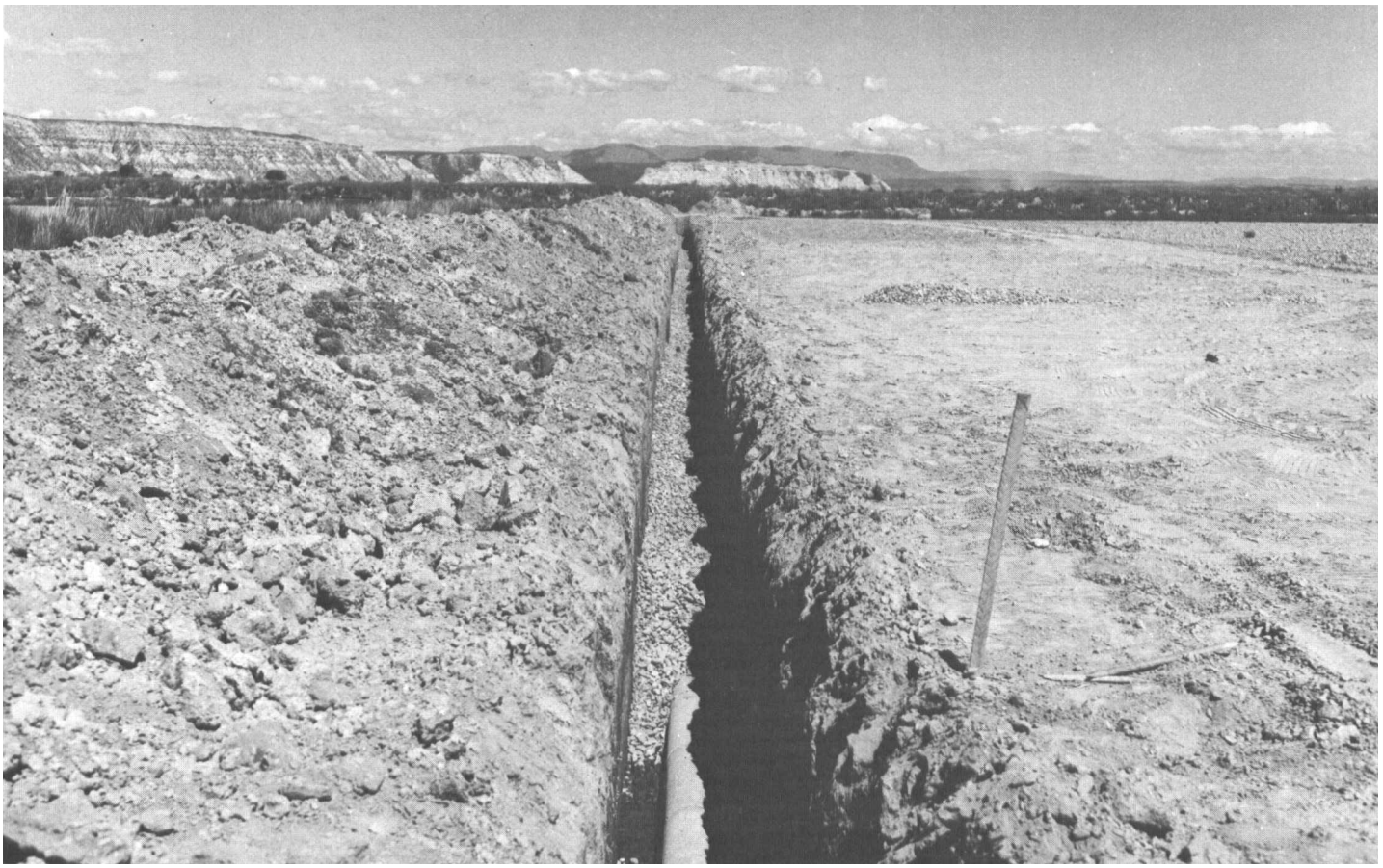

***Figure 12.*—Drainage tile installed in Letha fine sandy loam to lower water table and reclaim the soil by leaching out the salts. About 2 miles north of New Plymouth.**

country movement of vehicles and construction equipment.

7. Develop preliminary estimates pertinent to construction in a particular area.

Most of the information in this section is presented in tables 3 and 4, which show, respectively, estimates of soil properties significant in engineering and interpretations for various engineering uses.

This information, along with the soil map and other parts of this publication, can be used to make interpretations in addition to those given in tables 3 and 4, and it also can be used to make other useful maps.

This information, however, does not eliminate need for further investigations at sites selected for engineering works, especially works that involve heavy loads or that require excavations to depths greater than those shown in the tables, generally depths greater than 6 feet. Also, inspection of sites, especially the small ones, is needed because many delineated areas of a given soil mapping unit may contain small areas of other kinds of soil that have strongly contrasting properties and different suitabilities or limitations for soil engineering.

Some of the terms used in this soil survey have special meaning in soil science that may be unfamiliar to engineers. The Glossary defines many of the terms commonly used in soil science.

Engineering soil classification systems

The two systems most commonly used in classifying samples of soils for engineering are the Unified system used by the Soil Conservation Service, Department of Defense, and other agencies and the AASHO system adopted by the American Association of State Highway Officials (*13, 1*).

The Unified classification system is used to classify soils according to those properties that affect use as a construction material, such as in a dam, or as a foundation material for a structure such as a building. In this system soils are classified according to particle-size distribution, plasticity, liquid limit, and organic matter. Soils are grouped in 15 classes. There are eight classes of coarse-grained soils. The dominantly gravelly soils are identified as GW, GP, GM, and GC; and the dominantly sandy soils are SW, SP, SM, and SC. There are six classes of fine-grained soils. Those that have low liquid limits are identified as ML, CL, and OL; and those that have high liquid limits are identified as MH, CH, and OH. There is one class of highly organic soils, identified as Pt. Soils on the borderline between two classes are designated by symbols for both classes; for example, CL-ML. The estimated Unified classifications of Payette County soils are shown in table 3.

The AASHO system is used to classify soils according to those properties that affect use in highway construction and maintenance. In this system, a soil is placed in one of seven basic groups that range from A–1 to A–7 on the basis of grain-size distribution, liquid limit, and plasticity index. In group A–1 are gravelly soils, which have high bearing strength and are the best soils for subgrade (foundation). At the other extreme, in group A–7, are clay soils, which have low strength when wet and are the poorest soils for subgrade. Where laboratory data are available to justify a further breakdown, the A–1, A–2, and A–7 groups are divided as follows: A–1–a, A–1–b; A–2–4, A–2–5, A–2–6, A–2–7; and A–7–5 and A–7–6. As additional refinement, the engineering value of a soil material can be indicated by a group index number. Group indexes range from 0 for the best material to 20 or more for the poorest. The estimated classification, without group index numbers, is shown in table 3 for all soils mapped in the county.

USDA texture is determined by the relative proportions of sand, silt, and clay in soil material that is less than 2.0 millimeters in diameter. "Sand," "silt," "clay," and some of the other terms used in the USDA textural classification are defined in the Glossary.

Soil properties significant in engineering

Estimates of soil properties significant in engineering are shown in table 3. They are made for typical soil profiles, by layers sufficiently different to have different significance for soil engineering. The estimates are based on field observations made in the course of mapping, on test data for these and similar soils, and on experience with the same kinds of soil in other counties. Following are explanations of some of the columns in table 3.

Depth to bedrock is distance from the surface of the soil to the upper surface of the rock layer.

Depth to seasonal high water table is the distance from the surface of the soil to the highest level ground water reaches in the soil in most years.

Soil texture is described in table 3 in the standard terms used by the Department of Agriculture. These terms take into account the relative 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 the soil contains gravel or other particles coarser than sand, an appropriate modifier is added, as for example, "gravelly loamy sand."

Liquid limit and plasticity index indicate the effect of water on the strength and consistence of soil material. As the moisture content of a clayey soil is increased from a dry state, the material changes from a semisolid to a plastic state. If the moisture content is further increased, the material changes from a plastic to a liquid state. The plastic limit is the moisture content at which the soil material changes from the semisolid to plastic state; and the liquid limit, from the plastic to the liquid state. The plasticity index is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which a soil material is plastic. Liquid limit and plasticity index are estimated in table 3.

Permeability is that quality of a soil that enables it to transmit water or air. It is estimated on the basis of those soil characteristics observed in the field, particularly structure and texture. The estimates in table 3 do not take into account lateral seepage or such transient soil features as plowpans and surface crusts.

Available water capacity is the ability of a soil to

TABLE 3.—*Estimates of soil properties*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils in referring to other series that appear in the first column of this table.

Soil series and map symbols	Depth to—		Depth from surface	Classification			Coarse fraction more than 3 inches in diameter
	Bedrock	Seasonal high water table		USDA texture	Unified	AASHO	
	Feet	*Feet*	*Inches*				*Percent*
Ager deep variant: AGD, AGE.	>5	(1)	0–25	Clay and silty clay	CH	A–7	0
			25–60	Clay loam	CL	A–7	0
Bakeoven	<1	(1)	0–8	Extremely stony loam.	SC or CL	A–6	25–50
Mapped only with Gem, Gross, Reywat, and Ruckles soils and Rock outcrop.			8	Basalt.			
Baldock:							
Ba, Bc, Bd	>5	3–5	0–60	Silt loam	ML	A–4	0
Bk	>5	3–5	0–23	Silty clay loam	CL	A–6	0
			23–48	Silt loam	ML	A–4	0
			48–60	Fine sandy loam	SM or ML	A–4	0
Bowman: Bo	>5	1–3	0–25	Loam	ML	A–4	0
			25–32	Fine sandy loam	SM or ML	A–4	0
			32–60	Coarse sand and gravel.	SP or SW	A–1	0
Cashmere: CaB, CaC	>5	(1)	0–46	Sandy loam	SM	A–2 or A–4	0
			46–60	Loamy sand	SM	A–2	0
Chance: Ch	>5	1–2	0–30	Fine sandy loam	SM or ML	A–4	0
			30–48	Sand	SW–SM or SM	A–2	0
			48–60	Gravel and sand	GP or GW	A–1	0
Chilcott	1.5–3.5	(1)	0–7	Silt loam	ML	A–4	0
Mapped only with Elijah soils.			7–23	Clay, clay loam	CL	A–6	0
			23–27	Sandy loam	SM	A–2 or A–4	0
			27–50	Silica-cemented hardpan.			
			50–60	Sand	SW–SM or SM	A–2 or A–3	0
Clems: CIB, CIC, CID, CIE	>5	(1)	0–52	Fine sandy loam	SM	A–2 or A–4	0
			52–60	Silt loam	ML	A–4	0
*Elijah: EcC, EeB, EID, EID2	1.5–3.5	(1)	0–12	Silt loam	ML	A–4	0
For Chilcott and Sebree parts of EcC and EeB, see Chilcott and Sebree series; for Vickery part of EID and EID2, see Vickery series.			12–25	Silty clay loam	CL	A–7	0
			25–33	Loam	ML	A–4	0
			33–36	Silica-cemented hardpan.			
			36–60	Sand	SW–SM or SM	A–2 or A–3	0
Emerson: Em	>5	(1)	0–26	Sandy loam	SM	A–2 or A–4	0
			26–36	Loamy coarse sand	SM	A–2	0
			36–60	Coarse sand	SM or SP–SM	A–2 or A–3	0
Falk: Fa	>5	3–4	0–35	Fine sandy loam	SM or ML	A–4	0
			35–60	Sand and gravel	SW or SP	A–1	0
*Gem: GBE, GBF	1.5–3.5	(1)	0–23	Extremely stony clay loam and gravelly clay.	GC or CL	A–6	15–25
For Bakeoven part, see Bakeoven series.			23	Basalt.			
Greenleaf: GeA, GeB, GeC, GeC2, GeD2, GeE2, GfB.	>5	(1)	0–60	Silt loam, silty clay loam, and silt.	CL	A–6	0
Greenleaf wet variant: Gm, Gn.	>5	3–5	0–60	Silt loam and silty clay loam.	CL	A–6	0

See footnotes at end of table.

significant in engineering

such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions for
The symbol > means more than; the symbol < means less than]

Percentage of material less than 3 inches in diameter passing sieve—				Liquid limit	Plasticity index	Permeability	Available water capacity	Reaction	Salinity	Shrink-swell potential	Risk of corrosion to uncoated steel
No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)								
				Percent		*Inches per hour*	*In/in of soil*	*pH*	*Mmhos/cm at 25°C.*		
100	95–100	90–100	85–95	50–60	25–35	0.06–0.2	0.15–0.17	7.4–8.4	<2.0	High	High.
100	95–100	90–100	65–80	40–50	25–30	0.2–0.6	0.19–0.21	7.9–9.0	<2.0	Moderate	High.
70–95	65–85	50–75	40–65	30–40	15–20	0.2–0.6	0.12–0.14	6.6–7.3	<2.0	Low	High.
100	100	95–100	70–85	30–35	5–10	0.2–0.6	0.19–0.21	7.9–9.1	2.0–8.0	Low	High.
100	100	95–100	85–95	30–40	15–20	0.2–0.6	0.19–0.21	8.5–9.0	<2.0	Moderate	High.
100	100	90–100	70–85	30–35	5–10	0.2–0.6	0.19–0.21	7.9–8.4	<2.0	Low	High.
100	100	70–85	40–70	[2] NP	[2] NP	2.0–6.0	0.13–0.15	7.9–8.4	<2.0	Low	High.
100	100	85–95	60–75	25–35	4–10	0.6–2.0	0.16–0.18	7.9–9.0	<2.0	Low	High.
100	100	70–85	40–55	20–30	NP–4	2.0–6.0	0.13–0.15	7.9–8.4	<2.0	Low	High.
65–75	30–40	15–20	0–5	NP	NP	6.0–20.0	0.04–0.06	7.4–7.8	<2.0	Low	High.
100	100	60–70	30–40	NP	NP	2.0–6.0	0.11–0.13	6.6–7.8	<2.0	Low	Low.
100	100	50–75	15–30	NP	NP	2.0–6.0	0.06–0.08	7.4–7.8	<2.0	Low	Low.
100	100	70–85	40–55	20–30	NP–5	2.0–6.0	0.13–0.15	7.4–8.4	<2.0	Low	High.
100	100	50–70	5–15	NP	NP	6.0–20.0	0.05–0.07	7.4–7.8	<2.0	Low	High.
30–50	10–30	5–20	0–5	NP	NP	>20	0.03–0.05	----------	<2.0	Low	High.
--------	100	90–100	70–90	30–40	5–10	0.6–2.6	0.19–0.21	7.4–7.8	<2.0	Low	Moderate.
--------	100	90–100	70–90	30–40	15–20	0.06–0.20	0.16–0.18	7.9–8.4	<2.0	Moderate	High.
--------	100	60–70	30–40	NP	NP	2.0–6.0	0.11–0.13	7.9–8.4	<2.0	Low	Low.
--------	100	50–70	5–15	NP	NP	2.0–6.0	0.05–0.07	7.9–8.4	<2.0	Very low	Low.
--------	100	75–85	30–40	20–30	NP–5	2.0–6.0	0.13–0.15	6.6–7.3	<2.0	Low	Low.
100	95–100	85–100	65–90	30–40	5–10	0.2–0.6	0.19–0.21	7.9–8.4	<2.0	Low	Moderate.
--------	100	90–100	70–90	30–40	5–10	0.6–2.0	0.19–0.21	7.9–8.4	<2.0	Low	Moderate.
--------	100	95–100	85–95	40–50	15–25	0.2–0.6	0.19–0.21	7.9–8.4	<2.0	Moderate	Moderate.
--------	100	85–95	60–75	25–35	4–10	0.2–0.6	0.16–0.18	7.9–8.4	<2.0	Low	Moderate.
--------	100	50–70	5–15	NP	NP	2.0–6.0	0.05–0.07	7.9–8.4	<2.0	Very low	Low.
--------	100	60–70	30–40	NP	NP	2.0–6.0	0.11–0.13	6.6–7.3	<2.0	Low	Low.
--------	100	50–75	15–30	NP	NP	6.0–20.0	0.06–0.08	6.6–7.3	<2.0	Low	Low.
80–100	70–100	50–70	5–15	NP	NP	6.0–20.0	0.05–0.07	6.6–7.3	<2.0	Low	Low.
--------	100	70–85	40–55	20–30	NP–4	2.0–6.0	0.13–0.15	6.6–7.3	<2.0	Low	Moderate.
50–65	35–50	15–35	0–5	NP	NP	>20.0	0.05–0.06	6.6–7.3	<2.0	Low	Moderate.
70–80	60–70	50–70	45–65	30–40	10–20	0.06–0.2	0.16–0.18	6.6–7.8	<2.0	Moderate	Moderate.
--------	--------	100	85–100	30–40	10–20	0.2–0.6	0.19–0.21	7.4–9.0	<2.0	Low	High.
--------	100	75–90	70–85	20–30	10–20	0.2–0.6	0.20–0.25	7.4–8.4	<2.0	Moderate	High.

TABLE 3.—*Estimates of soil properties*

Soil series and map symbols	Depth to—		Depth from surface	Classification			Coarse fraction more than 3 inches in diameter
	Bedrock	Seasonal high water table		USDA texture	Unified	AASHO	
	Feet	*Feet*	*Inches*				*Percent*
*Gross: GOF, GRF For Bakeoven part of GRF, see Bakeoven series.	1.5–3.5	(1)	0–38 38	Stony loam and stony clay loam. Basalt.	ML	A–4	10–25
Harpt: HaA, HaB, HaE, HaD	>5	(1)	0–60	Loam	ML	A–4	0
Harpt wet variant: He	>5	3–4	0–47 47–60	Loam Fine sandy loam	ML SM or ML	A–4 A–4	0 0
Haw: HIA, HIB, HIC, HID, HIE, HIE2, HMF, HVD.	>5	(1)	0–28 28–60	Loam and clay loam Sandy loam	CL SM	A–6 or A–7 A–4 or A–2	0 (3)
Jenness: JeA, JeB	>5	(1)	0–36 36–60	Loam Coarse sandy loam and sand.	ML SM	A–4 A–2 or A–4	0 0
*Lankbush: LaC, LaE2, LbE, LOE2. For Purdam part of LbE, see Purdham series.	>5	(1)	0–12 12–30 30–60	Sandy loam Sandy clay loam Sandy loam and sand	SM SC SM	A–2 A–6 A–2	0 0 0
*Lanktree: LcB, LcC For Haw part, see Haw series.	>5	(1)	0–60	Silty clay loam, silt loam, and coarse sandy loam.	ML	A–6 or A–7	0
Letha: Le, Lf	>5	3–4	0–47 47–60	Fine sandy loam and loam. Loamy sand	CL–ML or ML SM	A–4 A–2	0 0
*Lolalita: LIB, LIC, LID, LIE, LMG, LOE2, LSF. For Rough broken land part of LMG, see Rough broken land; for Lankbush part of LOE2, see Lankbush series; for Haw and Saralegui parts of LSF, see Haw and Saralegui series.	>5	(1)	0–60	Sandy loam	SM	A–2 or A–4	0
Moulton: Mo, Mu	>5	2–4	0–30 30–60	Fine sandy loam Sand and gravel	SM or ML GW or GP	A–4 A–1	0 0
Newell: NcB, NED	>5	(1)	0–31 31–51 51–60	Clay loam Silt loam Fine sandy loam	CL or CH CL SM or ML	A–7 A–6 A–4	0 0 0
Notus: No	>5	2–3	0–14 14–60	Coarse sandy loam Very gravelly sand	SM GW or GP	A–2 A–1	0 0
Nyssaton: NyA, NyB, NyC, NyD, NyE.	>5	(1)	0–60	Silt loam	ML	A–4	0
Owyhee: OwA, OwB, OwC, OwD2, OwE2.	>5	(1)	0–60	Silt loam and silt	ML	A–4	0
*Payette: PAF, PCF For Van Dusen part of PCF, see Van Dusen series.	>5	(1)	0–60	Coarse sandy loam and coarse sand.	SM	A–2 or A–4	0
*Power: PeB, PeC, PeD, PoD For Elijah and Vickery parts of PeB, PeC, and PeD, see Elijah and Vickery series; for Purdam part of PoD, see Purdam series.	3.5–5	(1)	0–43 43–47 47–60	Silt loam and silty clay loam. Silicated-cemented hardpan. Sand	CL SW–SM or SM	A–6 A–2 or A–3	0 0

See footnotes at end of table.

significant in engineering—Continued

Percentage of material less than 3 inches in diameter passing sieve—				Liquid limit	Plasticity index	Permeability	Available water capacity	Reaction	Salinity	Shrink-swell potential	Risk of corrosion to uncoated steel
No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)								
				Percent		*Inches per hour*	*In/in of soil*	*pH*	*Mmhos/cm at 25°C.*		
--------	100	80–95	60–75	30–40	5–10	0.2–0.6	0.10–0.20	6.6–7.3	<2.0	Low------	Moderate.
--------	100	85–95	60–75	25–35	4–10	0.6–2.0	0.16–0.18	6.6–7.8	<2.0	Low------	Low.
--------	100	85–95	60–75	25–35	4–10	0.6–2.0	0.16–0.18	6.6–7.3	<2.0	Low------	High.
--------	100	70–85	40–55	25–35	4–10	2.0–6.0	0.13–0.15	6.6–7.3	<2.0	Low------	High.
100	95–100	80–90	65–75	35–45	15–20	0.2–0.6	0.17–0.19	6.6–7.3	<2.0	Moderate.	Moderate.
100	95–100	55–70	30–40	25–35	4–10	2.0–6.0	0.11–0.13	7.9–8.4	<2.0	Low------	Low.
--------	100	85–95	60–75	25–35	4–10	0.6–2.0	0.16–0.18	6.6–7.8	<2.0	Low------	Low.
--------	100	50–70	15–40	NP	NP	2.0–6.0	0.08–0.15	7.4–7.8	<2.0	Low------	Low.
--------	100	60–70	30–35	NP	NP	0.6–2.0	0.11–0.13	6.6–7.3	<2.0	Low------	Low.
--------	100	80–90	35–50	30–40	15–20	0.2–0.6	0.14–0.16	6.6–7.3	<2.0	Low------	Low.
--------	100	30–70	15–35	NP	NP	2.0–6.0	0.05–0.13	6.6–7.8	<2.0	Low------	Low.
--------	100	90–95	85–90	35–45	10–15	0.06–0.2	0.19–0.21	7.9–8.4	<2.0	Moderate.	High.
--------	100	90–100	50–65	15–25	NP–5	0.06–0.2	0.15–0.20	7.4–9.1	<2.0	Moderate.	High.
--------	100	65–75	20–30	NP	NP	2.0–6.0	0.08–0.10	7.9–9.1	2.0–4.0	Moderate.	High.
--------	100	60–70	30–40	10–20	NP	2.0–6.0	0.11–0.13	7.4–8.4	<2.0	Low------	Low.
--------	100	70–85	40–55	20–30	NP–4	2.0–6.0	0.13–0.15	6.6–7.3	<2.0	Low------	Moderate.
20–30	5–15	5–10	0–5	NP	NP	6.0–20.0	0.04–0.06	6.6–7.3	<2.0	Low------	Moderate.
--------	100	90–100	70–80	40–60	20–35	0.2–0.6	0.19–0.21	6.6–7.8	<2.0	Moderate to high.	High.
--------	100	90–100	70–85	30–40	10–20	0.2–0.6	0.19–0.21	7.4–8.4	<2.0	Moderate.	Moderate.
--------	100	70–85	40–55	20–30	NP–4	2.0–6.0	0.13–0.15	7.4–8.4	<2.0	Very low to low.	Low.
--------	100	60–70	30–35	NP	NP	2.0–6.0	0.11–0.13	7.4–7.8	<2.0	Very low.	Moderate.
30–50	10–30	5–20	0–5	NP	NP	>20.0	0.03–0.05	7.4–7.8	<2.0	Very low.	Moderate.
--------	100	90–100	75–90	30–40	5–10	0.2–0.6	0.19–0.21	7.9–8.4	<2.0	Low------	High.
--------	100	90–100	80–90	25–35	4–10	0.2–0.6	0.19–0.21	7.9–8.4	<2.0	Low------	High.
--------	100	50–70	15–40	NP	NP	2.0–6.0	0.06–0.10	6.6–7.3	<2.0	Low------	Low.
--------	100	90–100	80–95	30–40	10–20	0.2–0.6	0.20–0.25	7.9–9.0	<2.0	Moderate.	High.
--------	100	50–70	5–15	NP	NP	2.0–6.0	0.05–0.07	7.9–8.4	<2.0	Very low.	Low.

TABLE 3.—*Estimates of soil properties*

Soil series and map symbols	Depth to—		Depth from surface	Classification			Coarse fraction more than 3 inches in diameter
	Bedrock	Seasonal high water table		USDA texture	Unified	AASHO	
	Feet	*Feet*	*Inches*				*Percent*
*Purdam: PpB, PpC For Power part, see Power series.	1.5–3.5	(1)	0–28	Silt loam and silty clay loam.	ML	A–7	0
			28–50	Silica-cemented hardpan.			
			50–60	Sand	SW–SM or SM	A–2 or A–3	0
*Reywat: RBE, RBF For Bakeoven part, see Bakeoven series.	1–1.5	(1)	0–17	Extremely stony loam and clay loam.	SC or CL	A–6	35–45
			17	Basalt.			
Riverwash: Rh. Properties too variable to estimate.							
*Rock outcrop: RKG. Properties too variable to estimate. For Bakeoven part, see Bakeoven series.							
Rough broken land. Properties too variable to estimate. Mapped only with Lolalita soils.							
*Ruckles: RuE, RVE, RVF For Bakeoven part of RVE and RVF, see Bakeoven series.	1–1.5	(1)	0–17	Stony loam, clay loam, and clay.	CL	A–6 or A–7	0–5
			17	Basalt.			
*Saralegui: SAD, SAE, SHE2, SLF. For Haw part of SHE2 and SLF, see Haw series; for Ager part of SLF, see Ager deep variant.	>5	(1)	0–60	Sandy loam and coarse sandy loam.	SM	A–4 or A–2	0
Sebree Mapped only with Elijah soils.	1.5–3.5	(1)	0–35	Loam, clay loam, and silt loam.	ML	A–4	0
			35–39	Silica-cemented hardpan.			
			39–60	Sandy loam	SM	A–2	0
Terrace escarpments: TE. Properties too variable to estimate.							
*Tindahay: ThE, TIC, TID, TmD For Cashmere part of TmD, see Cashmere series.	>5	(1)	0–60	Loamy coarse sand and coarse sandy loam.	SM	A–2	0
Truesdale: TrC, TrD	1.5–3.5	(1)	0–26	Fine sandy loam	SM or ML	A–4	0
			26	Silica-cemented hardpan.			
Turbyfill: TuB, TuC, TuD	>5	(1)	0–60	Fine sandy loam and loamy fine sand.	SM or ML	A–4	0
*Van Dusen: VDF For Haw part, see Haw series.	>5	(1)	0–14	Loam	ML	A–4	0
			14–38	Silt loam and clay loam.	CL	A–6	0
			38–60	Loam and silt loam	ML	A–4	0
Vickery Mapped only with Chilcott, Sebree, Elijah, and Power soils.	1.5–3.5	(1)	0–28	Silt loam	ML	A–4	0
			28–33	Silica-cemented hardpan.			
			33–60	Sand	SW–SM or SM	A–2 or A–3	0

[1] No water table within depth of observation. Unless limited by bedrock or a hardpan, the depth is ordinarily 5 feet.
[2] NP = nonplastic.
[3] HVD mapping unit has 0 to 5 percent coarse fraction.

significant in engineering—Continued

Percentage of material less than 3 inches in diameter passing sieve—				Liquid limit	Plasticity index	Permeability	Available water capacity	Reaction	Salinity	Shrink-swell potential	Risk of corrosion to uncoated steel
No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)								
				Percent		*Inches per hour*	*In/in of soil*	*pH*	*Mmhos/cm at 25°C.*		
--------	100	90–100	85–95	40–50	10–20	0.2–0.6	0.19–0.21	7.4–8.4	<2.0	Low------	High.
--------	100	50–70	5–15	NP	NP	2.0–6.0	0.05–0.07	7.9–8.4	<2.0	Very low-	Low.
75–85	65–75	55–70	35–60	25–35	10–15	0.2–0.6	0.12–0.14	6.6–7.3	<2.0	Moderate-	High.
90–100	85–95	70–95	50–90	35–45	20–25	0.2–0.6	0.16–0.18	6.1–7.3	<2.0	Moderate-	High.
95–100	90–100	65–75	30–40	15–25	NP–4	2.0–6.0	0.11–0.13	7.9–9.0	<2.0	Low------	Moderate.
--------	100	85–100	75–90	30–40	5–10	<0.6	0.19–0.21	7.4–8.4	<2.0	Low-----	High.
--------	100	60–70	25–35	NP	NP	2.0–6.0	0.11–0.13	7.9–8.4	<2.0	Low------	Moderate.
95–100	90–100	50–60	20–30	15–25	NP–4	2.0–6.0	0.08–0.10	7.9–8.4	<2.0	Low------	Moderate.
--------	100	70–85	40–55	20–30	NP–4	2.0–6.0	0.13–0.15	7.9–8.4	<2.0	Low------	Moderate.
--------	100	70–95	40–60	20–30	NP–4	2.0–6.0	0.11–0.13	7.9–8.4	<2.0	Low------	Low.
--------	100	85–95	60–75	25–35	4–10	0.6–2.0	0.16–0.18	7.4–7.8	<2.0	Low------	Moderate.
--------	100	90–100	70–85	30–40	10–20	0.6–2.0	0.19–0.21	6.6–7.8	<2.0	Moderate-	Moderate.
--------	100	85–100	60–85	30–40	5–10	0.6–2.0	0.18–0.20	6.6–7.8	<2.0	Low------	Moderate.
--------	100	90–100	70–85	30–40	5–10	0.6–2.0	0.19–0.21	6.6–7.8	<2.0	Low-----	Moderate.
--------	100	50–70	5–15	NP	NP	2.0–6.0	0.05–0.07	7.9–8.4	<2.0	Very low-	Low.

TABLE 4.—*Engineering*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils in such to other series that appear

Soil series and map symbols	Degree and kind of limitation for—					
	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings without basements	Sanitary landfills	Local roads and streets
Ager deep variant: AGD, AGE.	Severe: slow permeability.	Severe: slope	Severe: clay and silty clay texture.	Severe: high shrink-swell potential.	Severe: clay and silty clay texture.	Severe: high shrink-swell potential.
Bakeoven Mapped only with Gem, Gross, Reywat, and Ruckles soils, and Rock outcrop.	Severe: very shallow over bedrock.	Severe: very shallow over bedrock.	Severe: very shallow over bedrock.	Severe: very shallow over bedrock.	Severe: very shallow over bedrock.	Severe: very shallow over bedrock.
Baldock: Ba, Bc, Bd, Bk	Severe: high water table; moderately slow permeability.[1]	Moderate: high water table.	Moderate: high water table.	Moderate: somewhat poorly drained.	Severe: high water table.	Moderate: moderate shrink-swell potential.
Bowman: Bo	Severe: high water table.[1]	Severe: high water table.	Severe: high water table.	Severe: poorly drained; high water table.	Severe: high water table.	Severe: poorly drained.
Cashmere: CaB, CaC	Slight [1]	Severe: moderately rapid permeability.	Slight	Slight	Severe: moderately rapid permeability.	Moderate: low strength.
Chance: Ch	Severe: high water table.[1]	Severe: high water table.	Severe: high water table.	Severe: poorly drained; high water table.	Severe: poorly drained.	Severe: poorly drained.
Chilcott Mapped only with Elijah soils.	Severe: hardpan at a depth of 20 to 40 inches.	Severe: hardpan at a depth of 20 to 40 inches; moderately rapid permeability below hardpan.	Moderate: hardpan at a depth of 20 to 40 inches.	Moderate: moderate shrink-swell potential in subsoil.	Moderate: clay loam texture.	Moderate: moderate shrink-swell potential; low shear strength.
Clems: ClB, ClC, ClD, ClE	Slight if slope is less than 8 percent; moderate if 8 to 15 percent; severe if more than 15 percent.	Severe: moderately rapid permeability.	Slight if slope is less than 8 percent; moderate if 8 to 15 percent; severe if more than 15 percent.	Slight if slope is less than 8 percent; moderate if 8 to 15 percent; severe if more than 15 percent.	Severe: moderately rapid permeability.	Slight if slope is less than 8 percent; moderate if 8 to 15 percent; severe if more than 15 percent.

See footnotes at end of table.

interpretations

mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions for referring in the first column of this table]

Suitability as a source of—			Soil features affecting—			
Road fill	Sand and gravel	Topsoil	Pond reservoir areas	Dikes, levees, and other embankments	Drainage for crops and pasture	Irrigation
Poor: high shrink-swell potential.	Unsuited: excessive fines.	Poor: clay and silty clay texture.	Slopes more than 7 percent.	Low shear strength; poor workability.	Good drainage	Slow permeability; erosion hazard.
Poor: extremely stony; very shallow over bedrock.	Unsuited: excessive fines.	Poor: very shallow and extremely stony.	Very shallow over fractured bedrock; slopes of 2 to 65 percent.	Limited volume; material stony and shallow.	Good drainage	Very shallow soils; some steep slopes; very low available water capacity.
Fair: somewhat poorly drained.	Unsuited: excessive fines.	Fair for Ba, Bc, and Bd: saline-alkali salts. Fair for Bk: silty clay loam texture.	Water table at a depth of 3 to 5 feet; moderately slow permeability; Bk has moderately rapid permeability in lower part of substratum; slopes of 0 to 2 percent.	Medium to low shear strength; seasonal high water table; medium to high susceptibility to piping.	Moderately slow permeability; seasonal high water table; outlets hard to find.	High available water capacity; drainage needed.
Poor: poorly drained.	Fair: sand and gravel below depth of 30 inches; high water table.	Good	Seasonal high water table at depth of 1 to 3 feet; rapid permeability in lower part of substratum; slopes of 0 to 21 percent.	Medium to high shear strength; high susceptibility to piping above depth of 32 inches; seasonal high water table.	Moderate permeability; seasonal high water table; outlets hard to find.	Moderate available water capacity; drainage needed.
Fair: low strength.	Poor for sand: excessive fines. Unsuited for gravel.	Good	Moderately rapid permeability; slopes of 0 to 7 percent.	Medium to high shear strength; medium to high susceptibility to piping; medium permeability where compacted.	Good drainage	Moderate available water capacity; moderately rapid permeability; moderately coarse textured soils.
Poor: poorly drained.	Good for gravel below a depth of 48 inches. Fair for sand below a depth of 30 inches.	Poor: poorly drained.	Water table at a depth of 1 to 2 feet; slopes of 0 to 2 percent; very rapid permeability in lower part of substratum.	Medium to high shear strength; medium to high susceptibility to piping; medium to high permeability when compacted; high water table.	Low wet areas; moderately rapid permeability; seasonal high water table.	Moderate available water capacity; drainage needed.
Fair: low shear strength; moderate shrink-swell potential.	Unsuited: excessive fines.	Fair: thin layer to a depth of 8 to 16 inches; hardpan at a depth of 20 to 40 inches.	Hardpan at a depth of 20 to 40 inches; moderately rapid permeability below pan; slopes of 1 to 7 percent.	Limited quantity; medium to low shear strength; medium to high susceptibility to piping.	Good drainage	Low to moderate available water capacity; slow permeability; hardpan at a depth of 20 to 40 inches.
Good if slope is less than 15 percent; fair if 15 to 25 percent; poor if more than 25 percent.	Poor for sand: excessive fines. Unsuited for gravel.	Good if slope is less than 8 percent; fair if 8 to 15 percent; poor if more than 15 percent.	Moderately rapid permeability; steep slopes in some places.	Medium to low shear strength; medium to high susceptibility to piping.	Good drainage	High available water capacity; level to moderately steep slopes; moderately rapid permeability.

TABLE 4.—*Engineering*

Soil series and map symbols	Degree and kind of limitation for—					
	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings without basements	Sanitary landfills	Local roads and streets
*Elijah: EcC, EeB, EID, EID2. For Chilcott and Vickery parts of EcC and EeB, see Chilcott and Vickery series; for Sebree part of EeB, see Sebree series; for Vickery part of EID and EID2, see Vickery series.	Severe: hardpan at a depth of 20 to 40 inches.	Severe: hardpan at a depth of 20 to 40 inches; moderately rapid permeability below hardpan.	Moderate: hardpan at a depth of 20 to 40 inches.	Moderate: moderate shrink-swell potential in subsoil.	Moderate: silty clay loam texture.	Moderate: moderate shrink-swell potential.
Emerson: Em	Slight [1]	Severe: moderately rapid permeability.	Slight	Slight	Severe: moderately rapid permeability.	Slight
Falk: Fa	Severe: high water table.[1]	Severe: high water table; moderately rapid permeability.	Moderate: high water table.	Moderate: somewhat poorly drained.	Severe: high water table.	Moderate: somewhat poorly drained.
*Gem: GBE, GBF. For Bakeoven part of GBE and GBF, see Bakeoven series.	Severe: bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches.	Severe: bedrock at a depth of 20 to 40 inches.	Severe: extremely stony.	Severe: extremely stony.	Moderate: bedrock at a depth of 20 to 40 inches; severe if slope is more than 15 percent.
Greenleaf: GeA, GeB, GeC, GeC2, GeD2, GeE2, GfB.	Severe: moderately slow permeability.	Slight if slope is less than 2 percent; moderate if 2 to 7 percent; severe if more than 7 percent.	Slight if slope is less than 8 percent; moderate if 8 to 15 percent; severe if more than 15 percent.	Slight if slope is less than 8 percent; moderate if 8 to 15 percent; severe if more than 15 percent.	Slight if slope is less than 15 percent; moderate if 15 to 25 percent; severe if more than 25 percent.	Moderate: low shear strength; severe if slope is more than 15 percent.
Greenleaf wet variant: Gm, Gn.	Severe: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: somewhat poorly drained.	Severe: seasonal high water table.	Moderate: somewhat poorly drained; low shear strength.
*Gross: GOF, GRF. For Bakeoven part, see Bakeoven series.	Severe: slopes of 30 to 65 percent.	Severe: slopes of 30 to 65 percent.	Severe: slopes of 30 to 65 percent.	Severe: slopes of 30 to 65 percent.	Severe: slopes of 30 to 65 percent.	Severe: slopes of 30 to 65 percent.

See footnotes at end of table.

interpretations—Continued

Suitability as a source of—			Soil features affecting—			
Road fill	Sand and gravel	Topsoil	Pond reservoir areas	Dikes, levees, and other embankments	Drainage for crops and pasture	Irrigation
Fair: low shear strength.	Unsuited: excessive fines.	Fair: thin layer to a depth of 8 to 16 inches; underlain by hardpan.	Hardpan at a depth of 20 to 40 inches; moderately rapid permeability below hardpan.	Medium to low shear strength; limited quantity above hardpan; medium susceptibility to piping.	Good drainage	Moderate available water capacity; hardpan at a depth of 20 to 40 inches; moderately slow permeability.
Good	Fair for sand below a depth of 36 inches. Unsuited for gravel.	Good	Moderately rapid permeability.	Medium to high shear strength; medium to high susceptibility to piping.	Good drainage	Moderate available water capacity; moderately rapid permeability.
Fair: somewhat poorly drained.	Good for sand below a depth of 36 inches.	Good	Moderately rapid permeability; water table at a depth of 3 to 4 feet; slopes of 0 to 2 percent.	Medium to high shear strength; water table at a depth of 3 to 4 feet; medium to high susceptibility to piping above a depth of 35 inches.	Moderately rapid permeability; seasonal high water table.	Moderate available water capacity; drainage needed.
Poor: extremely stony.	Unsuited: excessive fines.	Poor: extremely stony.	Moderately deep over fractured bedrock; steep slopes in some places.	Limited quantity; extremely stony.	Good drainage	Stones prevent intensive cultivation; slow permeability.
Fair or poor: low shear strength; severe if slope is more than 25 percent.	Unsuited: excessive fines.	Good	Moderately slow permeability; steep slopes in some places.	Medium to low shear strength; medium to low susceptibility to piping.	Good drainage	High available water capacity; moderately slow permeability; level to moderately steep slopes.
Fair or poor: somewhat poorly drained; low shear strength.	Unsuited: excessive fines.	Good	Moderately slow permeability; water table at a depth of 3 to 5 feet; slopes of 0 to 2 percent.	Medium to low shear strength; low permeability; water table at a depth of 3 to 5 feet; medium to low susceptibility to piping.	Moderately slow permeability; seasonal high water table.	High available water capacity; moderately slow permeability; drainage needed.
Poor: slopes of 30 to 65 percent.	Unsuited: excessive fines.	Poor: slopes of 30 to 65 percent.	Slopes of 30 to 65 percent.	Steep slopes; stony; medium to high susceptibility to piping; medium to low shear strength; shallow over bedrock.	Good drainage	Slopes too steep for irrigation.

TABLE 4.—*Engineering*

Soil series and map symbols	Degree and kind of limitation for—					
	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings without basements	Sanitary landfills	Local roads and streets
Harpt: HaA, HaB, HaC, HaD.	Slight [1]	Moderate: moderate permeability; severe if slope is more than 7 percent.	Slight if slope is less than 8 percent; moderate if more than 8 percent.	Slight if slope is less than 8 percent; moderate if more than 8 percent.	Slight	Slight if slope is less than 8 percent; moderate if more than 8 percent.
Harpt wet variant: He	Severe: seasonal high water table.	Moderate: seasonal high water table.	Moderate: seasonal high water table.	Moderate: somewhat poorly drained.	Severe: seasonal high water table.	Moderate: somewhat poorly drained.
Haw: HIA, HIB, HIC, HID, HIE, HIE2, HMF, HVD.	Severe: moderately slow permeability.[2]	Severe: moderately rapid permeability in substratum.	Slight if slope is less than 8 percent; moderate if 8 to 15 percent; severe if more than 15 percent.	Moderate: moderate shrink-swell potential; severe if slope is more than 15 percent.	Slight if slope is less than 15 percent; moderate if 15 to 25 percent; severe if more than 25 percent.	Moderate: moderate shrink-swell potential; severe if slope is more than 15 percent.
Jenness: JeA, JeB	Slight [1]	Moderate: moderate permeability.	Slight	Slight	Slight	Moderate: low shear strength.
*Lankbush: LaC, LaE2, LbE, LOE2. For Purdam part of LbE, see Purdam series; for Lolalita part of LOE2, see Lolalita series.	Severe: moderately slow permeability.[2]	Moderate: permeability moderately slow in subsoil, moderately rapid in substratum.	Slight if slope is less than 8 percent; moderate if 8 to 15 percent; severe if more than 15 percent.	Slight if slope is less than 8 percent; moderate if 8 to 15 percent; severe if more than 15 percent.	Slight if slope is less than 15 percent; moderate if 15 to 25 percent; severe if more than 25 percent.	Moderate: low strength; severe if slope is more than 15 percent.
*Lanktree: LcB, LcC For Haw part, see Haw series.	Severe: slow permeability.	Moderate: floor material needs compaction.	Slight	Moderate: moderate shrink-swell potential.	Moderate: silty clay loam texture.	Moderate: moderate shrink-swell potential.
Letha: Le, Lf	Severe: seasonal high water table.[1]	Severe: seasonal high water table.	Moderate: seasonal high water table.	Moderate: somewhat poorly drained.	Severe: seasonal high water table.	Moderate: somewhat poorly drained.

See footnotes at end of table.

interpretations—Continued

Suitability as a source of—			Soil features affecting—			
Road fill	Sand and gravel	Topsoil	Pond reservoir areas	Dikes, levees, and other embankments	Drainage for crops and pasture	Irrigation
Fair: hazard of frost action; low shear strength.	Unsuited: excessive fines.	Good	Moderate permeability; slopes are 0 to 12 percent.	Medium to low shear strength; fair compaction characteristics; medium to high susceptibility to piping.	Good drainage	High available water capacity; moderate permeability.
Fair: somewhat poorly drained.	Unsuited: excessive fines.	Good	Moderate permeability; water table at a depth of 3 to 4 feet.	Medium to low shear strength; fair compaction characteristics; medium to high susceptibility to piping; water table at a depth of 3 to 4 feet.	Moderate permeability; seasonal high water table.	High available water capacity; drainage needed; moderate permeability.
Fair: low shear strength; poor if slope is more than 25 percent.	Poor for sand below a depth of 36 inches: excessive fines.	Fair: clay loam texture; poor if slope is more than 15 percent.	Moderately rapid permeability in substratum; slopes of 0 to 65 percent.	Medium to low shear strength; low to medium compressibility; medium to high susceptibility to piping below a depth of about 28 inches.	Good drainage	High available water capacity; moderately slow permeability; level to steep slopes.
Fair: low shear strength.	Poor for sand below a depth of 36 inches: excessive fines.	Good	Moderate permeability; slopes of 0 to 3 percent.	Medium to low shear strength; low to medium compressibility; medium to high susceptibility to piping.	Good drainage	High available water capacity; moderate permeability.
Fair if slope is less than 25 percent: low shear strength; poor if slope is more than 25 percent.	Poor for sand below a depth of 30 inches: excessive fines.[3]	Fair: thin layer, 8 to 16 inches thick; poor if slope is more than 15 percent.	Moderately rapid permeability in substratum; slopes of 3 to 30 percent.	Medium to low shear strength; low to medium compressibility and permeability; medium to high susceptibility to piping except between depths of 12 to 30 inches.	Good drainage	Moderate to high available water capacity; moderately slow permeability; gently sloping to moderately steep slopes.
Fair: low shear strength.	Unsuited: excessive fines.	Fair: silty clay loam texture.	Slow permeability; slopes of 0 to 7 percent.	Poor compaction characteristics; low shear strength; medium compressibility; medium susceptibility to piping.	Good drainage	High available water capacity; slow permeability.
Fair: somewhat poorly drained.	Poor for sand below a depth of 48 inches; excessive fines.	Good	Permeability slow, except moderately rapid in lower part of substratum; water table at a depth of 3 to 4 feet.	Medium to low shear strenght; medium compressibility; low permeability; seasonal high water table; medium to high susceptibility to piping.	Slow permeability; seasonal high water table; alkaline; outlets difficult to locate.	High available water capacity; slow permeability; drainage needed.

TABLE 4.—*Engineering*

Soil series and map symbols	Degree and kind of limitation for—					
	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings without basements	Sanitary landfills	Local roads and streets
*Lolalita: LIB, LIC, LID, LIE, LMG, LOE2, LSF. For Rough broken land part of LMG, see Rough broken land; for Lankbush part of LOE2, see Lankbush series; for Haw and Saralegui parts of LSF, see Haw and Saralegui series.	Slight if slope is less than 8 percent; moderate if 8 to 15 percent; severe if more than 15 percent.	Severe: moderately rapid permeability.	Slight if slope is less than 8 percent; moderate if 8 to 15 percent; severe if more than 15 percent.	Slight if slope is less than 8 percent; moderate if 8 to 15 percent; severe if more than 15 percent.	Severe: moderately rapid permeability.	Moderate: low strength; severe if slope is more than 15 percent.
Moulton: Mo, Mu	Severe: seasonal high water table.[1]	Severe: seasonal high water table; moderately rapid permeability.	Moderate: seasonal high water table.	Severe: poorly drained.	Severe: seasonal high water table.	Severe: poorly drained.
Newell: NcB, NED	Severe: moderately slow permeability.	Moderate: floor material needs compaction.	Moderate: texture.	Moderate: moderate shrink-swell potential.	Moderate: clay loam texture.	Severe: low shear strength.
Notus: No	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table; gravelly.	Moderate: somewhat poorly drained.	Severe: seasonal high water table.	Moderate: somewhat poorly drained.
Nyssaton: NyA, NyB, NyC, NyD, NyE.	Severe: moderately slow permeability.	Moderate: floor material needs compaction; severe if slope is more than 7 percent.	Slight if slope is less than 8 percent; moderate if 8 to 15 percent; severe if more than 15 percent.	Slight if slope is less than 8 percent; moderate if 8 to 15 percent; severe if more than 15 percent.	Slight if slope is less than 15 percent; moderate if 15 to 25 percent; severe if more than 25 percent.	Moderate: low shear strength; severe if slope is more than 15 percent.
Owyhee: OwA, OwB, OwC, OwD2, OwE2.	Severe: moderately slow permeability.	Moderate: floor material needs compaction; severe if slope is more than 7 percent.	Slight if slope is less than 8 percent; moderate if 8 to 15 percent; severe if more than 15 percent.	Slight if slope is less than 8 percent; moderate if 8 to 15 percent; severe if more than 15 percent.	Slight if slope is less than 15 percent; moderate if 15 to 25 percent; severe if more than 25 percent.	Moderate: low shear strength; severe if slope is more than 15 percent.

See footnotes at end of table.

interpretations—Continued

Suitability as a source of—			Soil features affecting—			
Road fill	Sand and gravel	Topsoil	Pond reservoir areas	Dikes, levees, and other embankments	Drainage for crops and pasture	Irrigation
Good if slope is less than 15 percent; fair if 15 to 25 percent; poor if more than 25 percent.	Poor for sand: excessive fines.	Good if slope is less than 8 percent; fair if 8 to 15 percent; poor if more than 15 percent.	Moderately rapid permeability; slopes of 1 to 80 percent.	Medium shear strength; low to medium compressibility and permeability; medium to high susceptibility to piping.	Good drainage	Moderate available water capacity; moderately rapid permeability; very gently sloping to very steep slopes.
Poor: poorly drained.	Good for gravel below a depth of 30 inches. Poor for sand.	Poor: poorly drained.	Seasonal high water table; moderately rapid permeability.	High shear strength and permeability below a depth of 30 inches; low to medium compressibility; medium to high susceptibility to piping above a depth of 30 inches; seasonal high water table.	Moderately rapid permeability; seasonal high water table.	Moderate available water capacity; moderately rapid permeability; drainage needed.
Poor: high shrink-swell potential; low shear strength.	Unsuited: excessive fines.	Fair: clay loam texture.	Moderately rapid permeability in lower part of substratum; slopes of 1 to 12 percent.	Low shear strength; medium to high compressibility; low to medium susceptibility to piping; low permeability when compacted.	Good drainage	High available water capacity; moderately slow permeability.
Fair: somewhat poorly drained.	Good for gravel and sand below a depth of 14 inches.	Fair: thin layer, 8 to 16 inches thick.	Water table at a depth of 2 to 3 feet; sand and gravel at a depth of less than 20 inches.	High shear strength; moderately rapid permeability below a depth of 20 inches; low compressibility; medium to high susceptibility to piping above a depth of 20 inches.	Moderately rapid permeability; seasonal high water table.	Very low available water capacity; moderately rapid permeability; drainage needed.
Fair: low shear strength; poor if slope is more than 25 percent.	Unsuited: excessive fines.	Good if slope is less than 8 percent; fair if 8 to 15 percent; poor if more than 15 percent.	Moderately slow permeability; slopes of 0 to 30 percent.	Low shear strength; medium compressibility; medium to low permeability; medium to high susceptibility to piping.	Good drainage	High available water capacity; moderately slow permeability; level to moderately steep slopes.
Fair: low shear strength; poor if slope is more than 25 percent.	Unsuited: excessive fines.	Good if slope is less than 8 percent; fair if 8 to 15 percent; poor if more than 15 percent.	Moderately slow permeability; slopes of 0 to 30 percent.	Low shear strength; medium compressibility; medium to low permeability when compacted; medium to high susceptibility to piping.	Good drainage	High available water capacity; moderately slow permeability; level to moderately steep slopes.

TABLE 4.—*Engineering*

Soil series and map symbols	Degree and kind of limitation for—					
	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings without basements	Sanitary landfills	Local roads and streets
*Payette: PAF, PCF. For Van Dusen part of PCF, see Van Dusen series.	Severe: slopes of 30 to 65 percent.	Severe: slopes of 30 to 65 percent.	Severe: slopes of 30 to 65 percent.	Severe: slopes of 30 to 65 percent.	Severe: slopes of 30 to 65 percent; moderately rapid permeability.	Severe: slopes of 30 to 65 percent.
*Power: PeB, PeC, PeD, PoD. For Elijah and Vickery parts of PeB, PeC, and PeD, see Elijah and Vickery series; for Purdam part of PoD, see Purdam series.	Severe: moderately slow permeability; hardpan at a depth of 40 to 60 inches.	Severe: rapid permeability below hardpan.	Slight	Moderate: moderate shrink-swell potential.	Slight	Moderate: low shear strength.
*Purdam: PpB, PpC. For Power part, see Power series.	Severe: hardpan at a depth of 20 to 40 inches.	Severe: rapid permeability below hardpan.	Moderate: hardpan at a depth of 20 to 40 inches.	Moderate: low shear strength	Slight	Moderate: low shear strength.
*Reywat: RBE, RBF. For Bakeoven part, see Bakeoven series.	Severe: shallow over bedrock.	Severe: shallow over bedrock.	Severe: shallow over bedrock.	Severe: shallow over bedrock; extremely stony.	Severe: shallow over bedrock.	Severe: shallow over bedrock.
Riverwash: Rh. Properties too variable to be rated.						
*Rock outcrop: RKG. Properties too variable to be rated. For Bakeoven part, see Bakeoven series.[3]						
Rough broken land: Properties too variable to be rated. Mapped only with Lolalita soils.[3]						
*Ruckles: RuE, RVE, RVF. For Bakeoven part of RVE and RVF, see Bakeoven series.	Severe: shallow over bedrock.	Severe: shallow over bedrock.	Severe: shallow over bedrock.	Severe: shallow over bedrock; extremely stony.	Severe: shallow over bedrock.	Severe: shallow over bedrock.
*Saralegui: SAD, SAE, SHE2, SLF. For Haw part of SHE2 and SLF, see Haw series; for Ager part of SLF, see Ager deep variant.	Slight if slope is less than 8 percent; moderate if 8 to 15 percent; severe if more than 15 percent.[1]	Severe: moderately rapid permeability.	Slight if slope is less than 8 percent; moderate if 8 to 15 percent; severe if more than 15 percent.	Slight if slope is less than 8 percent; moderate if 8 to 15 percent; severe if more than 15 percent.	Severe: moderately rapid permeability.	Moderate: low strength; severe if slope is more than 15 percent.

See footnotes at end of table.

interpretations—Continued

Suitability as a source of—			Soil features affecting—			
Road fill	Sand and gravel	Topsoil	Pond reservoir areas	Dikes, levees, and other embankments	Drainage for crops and pasture	Irrigation
Poor: slopes of 30 to 65 percent.	Poor for sand: excessive fines.	Poor: slopes of 30 to 65 percent.	Slopes of 30 to 65 percent.	Fair to good compaction characteristics; medium to high susceptibility to piping; medium to low permeability; steep slopes.	Good drainage	Steep slopes.
Fair: low shear strength.	Unsuited: excessive fines.	Fair: silty clay loam texture.	Permeability moderately slow above hardpan, moderately rapid below pan; slopes of 1 to 12 percent.	Low shear strength; fair to good compaction characteristics; low to medium susceptibility to piping; low permeability when compacted.	Good drainage	High available water capacity; moderately slow permeability; very gently sloping to moderately sloping.
Fair: low shear strength.	Unsuited: excessive fines.	Fair: silty clay loam texture.	Hardpan at a depth of 20 to 40 inches; permeability moderately rapid below pan.	Low shear strength; fair to poor compaction characteristics; medium susceptibility to piping.	Good drainage	Moderate or high available water capacity; moderately slow permeability; hardpan at a depth of 20 to 40 inches; very gently sloping to moderately sloping.
Poor: extremely stony; shallow over bedrock.	Unsuited: excessive fines.	Poor: extremely stony.	Shallow over fractured bedrock.	Limited material; steep slopes.	Good drainage	Very shallow and very stony soils.
Poor: extremely stony; shallow over bedrock.	Unsuited: excessive fines.	Poor: stony or extremely stony; shallow over bedrock.	Shallow over fractured bedrock.	Limited material; steep slopes.	Good drainage	Very shallow and very stony soils.
Good if slope is less than 15 percent; fair if 15 to 25 percent; poor if more than 25 percent.	Poor for sand; excessive fines.	Good if slope is less than 8 percent; fair if 8 to 15 percent; poor if more than 15 percent.	Moderately rapid permeability; slopes of 1 to 60 percent.	Medium shear strength; fair to good compaction characteristics; medium to low permeability when compacted; medium to high susceptibility to piping.	Good drainage	Moderately sloping to steep slopes.

TABLE 4.—*Engineering*

Soil series and map symbols	Degree and kind of limitation for—					
	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings without basements	Sanitary landfills	Local roads and streets
Sebree Mapped only with Elijah soils.	Severe: hardpan at a depth of 20 to 40 inches; very slow permeability.	Severe: rapid permeability below hardpan.	Moderate: hardpan at a depth of 20 to 40 inches.	Slight	Slight	Moderate: low shear strength.
Terrace escarpments: TE. Properties too variable to be rated.						
*Tindahay: ThE, TIC, TID, TmD. For Cashmere part of TmD, see Cashmere series.	Slight if slope is less than 8 percent; moderate if 8 to 15 percent; severe if more than 15 percent.	Severe: moderately rapid permeability.	Slight if slope is less than 8 percent; moderate if 8 to 15 percent; severe if more than 15 percent.	Slight if slope is less than 8 percent; moderate if 8 to 15 percent; severe if more than 15 percent.	Severe: moderately rapid permeability.	Slight if slope is less than 8 percent; moderate if 8 to 15 percent; severe if more than 15 percent.
Truesdale: TrC, TrD	Severe: hardpan at a depth of 20 to 40 inches.	Severe: moderately rapid permeability.	Moderate: hardpan at a depth of 20 to 40 inches.	Slight if slope is less than 8 percent; moderate if more than 8 percent.	Severe: moderately rapid permeability.	Moderate: percent fines.
Turbyfill: TuB, TuC, TuD	Slight if slope is less than 8 percent; moderate if more than 8 percent.	Severe: moderately rapid permeability.	Slight if slope is less than 8 percent; moderate if more than 8 percent.	Slight if slope is less than 8 percent; moderate if more than 8 percent.	Severe: moderately rapid permeability.	Moderate: percent fines.
*Van Dusen: VDF For Haw part, see Haw series.	Severe: slopes of 30 to 65 percent.	Severe: slopes of 30 to 65 percent.	Severe: slopes of 30 to 65 percent.	Severe: slopes of 30 to 65 percent.	Severe: slopes of 30 to 65 percent.	Severe: slopes of 30 to 65 percent.
Vickery Mapped only with Chilcott, Sebree, Elijah, and Power soils.	Severe: hardpan at a depth of 20 to 40 inches.	Severe: rapid permeability below hardpan at a depth of 20 to 40 inches.	Moderate: hardpan at a depth of 20 to 40 inches.	Slight	Slight	Moderate: low shear strength.

[1] Pollution is a hazard in places because of permeability in substratum.
[2] If drainfield is below subsoil, limitation is slight where slope is less than 8 percent and moderate where 8 to 15 percent.
[3] Black Canyon Area south of Fruitland has local strata of gravel below 6 to 10 feet of overburden. Gravel is not located under these soils in all locations.

interpretations—Continued

Suitability as a source of—			Soil features affecting—			
Road fill	Sand and gravel	Topsoil	Pond reservoir areas	Dikes, levees, and other embankments	Drainage for crops and pasture	Irrigation
Fair: low shear strength; hardpan at a depth of 20 to 40 inches.	Unsuited: excessive fines.	Fair: clay loam texture; hardpan at a depth of 20 to 40 inches.	Permeability very slow over hardpan at a depth of 20 to 40 inches; moderately rapid below pan; slopes of 0 to 12 percent.	Medium to low shear strength; fair to poor compaction characteristics; medium susceptibility to piping.	Good drainage	Moderate available water capacity; very slow permeability; alkaline.
Good if slope is less than 15 percent; fair if more than 15 percent.	Poor for sand: excessive fines.	Poor: coarse texture; loamy coarse sand.	Moderately rapid permeability; slopes of 3 to 30 percent.	Medium shear strength; fair to good compaction characteristics; medium permeability when compacted; high susceptibility to piping.	Good drainage	Moderate available water capacity; moderately rapid permeability; gently sloping to moderately steep.
Fair: percent fines.	Unsuited: excessive fines.	Good if slope is less than 8 percent; fair if more than 8 percent.	Hardpan at a depth of 20 to 40 inches; slopes of 3 to 12 percent.	Low to medium shear strength; fair to good compaction characteristics; medium permeability when compacted; high susceptibility to piping.	Good drainage	Low to moderate available water capacity; moderately rapid permeability; hardpan at a depth of 20 to 40 inches; gently sloping to moderately sloping.
Fair: percent fines.	Unsuited: excessive fines.	Good if slope is less than 8 percent; fair if more than 8 percent.	Moderately rapid permeability; slopes of 1 to 12 percent.	Low to medium shear strength; fair to good compaction characteristics; medium permeability when compacted; high susceptibility to piping.	Good drainage	Moderate to high available water capacity; moderately rapid permeability; very gently sloping to moderately sloping.
Poor: slopes of 30 to 65 percent.	Unsuited: excessive fines.	Poor: slopes of 30 to 65 percent.	Steep slopes	Medium compressibility; low permeability when compacted; medium susceptibility to piping; steep slopes.	Good drainage	Steep slopes.
Fair: low shear strength.	Unsuited: excessive fines.	Fair: hardpan at a depth of 20 to 40 inches.	Permeability moderate above hardpan at a depth of 20 to 40 inches, moderately rapid below pan.	Low shear strength; fair to poor compaction characteristics; medium susceptibility to piping.	Good drainage	High available water capacity; moderate permeability; hardpan at a depth of 20 to 40 inches; very gentle sloping to moderately sloping.

hold water for use by most plants. It is commonly defined as the difference between the amount of water in the soil at field capacity and the amount at the wilting point of most plants.

Reaction is the degree of acidity or alkalinity of a soil, expressed as a pH value. The pH value and terms used to describe soil reaction are explained in the Glossary.

Salinity refers to the amount of soluble salts in the soil. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25° C. Salinity affects the suitability of a soil for crop production, its stability when used as construction material, and its corrosiveness to metals and concrete.

Shrink-swell potential is the relative change in volume to be expected of soil material with changes in moisture content; that is, the extent to which the soil shrinks as it dries out or swells when it gets wet. Extent of shrinking and swelling is influenced by the amount and kind of clay in the soil. Shrinking and swelling of soils cause much damage to building foundations, roads, and other structures. A *high* shrink-swell potential indicates a hazard to maintenance of structures built in, on, or with materials that have this rating.

Risk of corrosion to uncoated steel pertains to potential soil-induced chemical action that dissolves or weakens uncoated steel. The rate of corrosion of uncoated steel is related to such soil properties as drainage, texture, total acidity, and electrical conductivity of the soil material. Installations of uncoated steel that intersect soil boundaries or soil horizons are more susceptible to corrosion than installations made entirely in one kind of soil or in one soil horizon. A rating of *low* means that the probability of soil-induced corrosion damage is low. A rating of *high* means the probability of damage is high, so that protective measures for steel should be used to avoid or minimize damage. Estimates of the risk of corrosion to concrete are not shown in table 3. The risk is low for all soils except Baldock, Letha, and Sebree soils. For those soils it is moderate.

Engineering interpretations

The estimated interpretations in table 4 are based on the engineering properties of soils shown in table 3, on test data for soils in this survey area and others nearby or adjoining, and on the experience of engineers and soil scientists with the soils of Payette County. In table 4, ratings are used to summarize limitation or suitability of the soils for all listed purposes other than for drainage of crops and pasture, irrigation, ponds and reservoirs, and embankments. For these particular uses, table 4 lists those soil features not to be overlooked in planning, installation, and maintenance.

Soil limitations are expressed as slight, moderate, and severe. *Slight* means that soil properties are generally favorable for the rated use or, in other words, limitations are minor and easily overcome. *Moderate* means that some soil properties are unfavorable but can be overcome or modified by special planning and design. *Severe* indicates soil properties so unfavorable and so difficult to correct or overcome that major soil reclamation, special designs, or intensive maintenance is required.

Soil suitability is expressed as *good, fair,* and *poor,* which have, respectively, meanings approximately parallel to the terms slight, moderate, and severe.

Following are explanations of some of the columns in table 4.

Septic tank absorption fields are subsurface systems of tile or perforated pipe that distribute effluent from a septic tank into natural soil. The soil material between depths of 18 inches and 6 feet is evaluated. The soil properties considered are those that affect both absorption of effluent and construction and operation of the system. Properties that affect absorption are permeability, depth to water table or rock, and susceptibility to flooding. Slope is a soil property that affects difficulty of layout and construction and also the risk of soil erosion, lateral seepage, and downslope flow of effluent. Large rocks or boulders increase construction costs.

Sewage lagoons are shallow ponds constructed to hold sewage within a depth of 2 to 5 feet long enough for bacteria to decompose the solids. A lagoon has a nearly level floor and sides, or embankments, of compacted soil material. It is assumed that the embankment is compacted to medium density and the pond is protected from flooding. Properties that affect the pond floor and the embankment are considered. Those that affect the pond floor are permeability, organic matter, and slope. If the floor needs to be leveled, depth to bedrock is important. The soil properties that affect the embankment are the engineering properties of the embankment material as interpreted from the Unified soil classification and the content of stones that influence the ease of excavation and compaction of the embankment material.

Shallow excavations are those that require digging or trenching to a depth of less than 6 feet as, for example, excavations for pipelines, sewer lines, phone and power transmission lines, basements, open ditches, and cemeteries. Desirable soil properties are good workability, moderate resistance to sloughing, gentle slopes, absence of rock outcrops or big stones, and freedom from flooding or a high water table.

Dwellings, as rated in table 4, are not more than three stories high and are supported by foundation footings placed in undisturbed soil. The features that affect the rating of a soil for dwellings are those that relate to capacity to support load and resist settlement under load and those that relate to ease of excavation. Soil properties that affect capacity to support load are wetness, susceptibility to flooding, density, plasticity, texture, and shrink-swell potential. Those that affect excavation are wetness, slope, depth to bedrock, and content of stones and rocks.

Sanitary landfill is a method of disposing of refuse in dug trenches. The waste is spread in thin layers, compacted, and covered with soil throughout the disposal period. Landfill areas are subject to heavy vehicular traffic. Some soil properties that affect suitability for landfill are ease of excavation, hazard of polluting ground water, and trafficability. The best soils have

moderately slow permeability, withstand heavy traffic, and are friable and easy to excavate. Unless otherwise stated, the ratings in table 4 apply only to a depth of about 6 feet. Limitation ratings of *slight* or *moderate* may not be valid if trenches are to be much deeper than that. For some soils, reliable predictions can be made to a depth of 10 or 15 feet; regardless of that, every site should be investigated before it is selected.

Local roads and streets, as rated in table 4, have an all-weather surface expected to carry automobile traffic all year. They have a subgrade of underlying soil material; a base consisting of gravel, crushed rock, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. These roads are graded to shed water and have ordinary provisions for drainage. They are built mainly from soil at hand, and most cuts and fills are less than 6 feet deep.

Soil properties that most affect design and construction of roads and streets are load-supporting capacity and stability of the subgrade and the workability and quantity of cut and fill material available. The AASHO and Unified classifications of the soil material and the shrink-swell potential indicate traffic-supporting capacity. Wetness and flooding affect stability of the material. Slopes, depth to hard rock, content of stones and rocks, and wetness affect ease of excavation and amount of cut and fill needed to reach an even grade.

Road fill is soil material used in embankments for roads. The suitability ratings reflect (1) the predicted performance of soil after it has been placed in an embankment that has been properly compacted and provided with adequate drainage and (2) the relative ease of excavating the material at borrow areas.

Sand and gravel are used in great quantities in many kinds of construction. The ratings in table 4 provide guidance about where to look for probable sources. A soil rated as a good or fair source of sand or gravel generally has a layer at least 3 feet thick, the top of which is within a depth of 6 feet. The ratings do not take into account thickness of overburden, location of the water table, or other factors that affect mining of the materials; neither do they indicate the quality of the deposit.

Topsoil is used for topdressing an area where vegetation is to be established and maintained. Suitability is affected mainly by ease of working and spreading the soil material, as for preparing a seedbed; natural fertility of the material, or the response of plants when fertilizer is applied; and absence of substances toxic to plants. Texture of the soil material and the content of stone fragments are characteristics that affect suitability. Also considered in the ratings is damage that will result at the area from which topsoil is taken.

Pond reservoir areas hold water behind a dam or embankment. Soils suitable for pond reservoir areas have low seepage, which is related to their permeability and depth to fractured or permeable bedrock or other permeable material.

Dikes, levees, and other embankments require soil material that is resistant to seepage and piping and of favorable stability, shrink-swell potential, shear strength, and compactibility. Presence of stones or organic material in a soil are among the factors that are unfavorable.

Drainage for crops and pasture is affected by such soil properties as permeability, texture, and structure; depth of claypan, rock, or other layers that influence rate of water movement; depth to the water table; slope stability in ditchbanks; susceptibility to flooding; salinity or alkalinity; and availability of outlets for drainage.

Irrigation of a soil is affected by such features as slope; susceptibility to flooding, water erosion, or soil blowing; soil texture; content of stones; accumulations of salts and alkali; depth of root zone; rate of water intake at the surface; permeability of soil layers below the surface layer and in fragipans or other layers that restrict movement of water; amount of water held available to plants; and need for drainage, or depth to water table or bedrock.

Use of the Soils for Recreational Development

Knowledge of soils is necessary in planning, developing, and maintaining areas used for recreation. In table 5 the soils of Payette County are rated according to limitations that affect their suitability for camp areas, playgrounds, picnic areas, and paths and trails.

In table 5 the soils are rated as having slight, moderate, or severe limitations for the specified uses. For all of these ratings, it is assumed that a good cover of vegetation can be established and maintained. A limitation of *slight* means that soil properties are generally favorable and limitations are so minor that they can easily be overcome. A *moderate* limitation can be overcome or modified by planning, design, or special maintenace. A *severe* limitation means that costly soil reclamation, special design, intense maintenance, or a combination of these is required.

Camp areas are used intensively for tents and small camp trailers and the accompanying activities of outdoor living. Little preparation of the site is required, other than shaping and leveling for tent and parking areas. Camp areas are subject to heavy foot traffic and limited vehicular traffic. The best soils have gentle slopes, good drainage, a surface free of rocks and coarse fragments, freedom from flooding during periods of heavy use, and a surface that is firm after rain but not dusty when dry.

Playgrounds are areas used intensively for baseball, football, badminton, and similar organized games. Soils suitable for this use need to withstand intensive foot traffic. The best soils have a nearly level surface free of coarse fragments and rock outcrops, good drainage, freedom from flooding during periods of heavy use, and a surface that is firm after rain but not dusty when dry. If grading and leveling are required, depth to rock is important.

Picnic areas are attractive natural or landscaped tracts used primarily for preparing meals and eating outdoors. These areas are subject to heavy foot traffic. Most of the vehicular traffic, however, is confined to

TABLE 5.—*Limitations of soils for recreational development*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils in such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions for referring to other series that appear in the first column of this table]

Soil series and map symbols	Degree and kinds of limitations for—			
	Camp areas	Playgrounds	Picnic areas	Paths and trails
Ager, deep variant: AGD, AGE	Severe: clay surface layer.	Severe: clay surface layer; slope of more than 6 percent.	Severe: clay surface layer.	Severe: clay surface layer.
Bakeoven Mapped only with Gem, Gross, Reywat, and Ruckles soils and Rock outcrop.	Severe: extremely stony.	Severe: extremely stony.	Moderate if slope is 0 to 15 percent; extremely stony; severe if slope is more than 15 percent.	Severe: extremely stony.
Baldock: Ba, Bc, Bd, Bk	Moderate: water table at depth of 3 to 5 feet; somewhat poorly drained.	Moderate: water table at depth of 3 to 5 feet; somewhat poorly drained.	Moderate: somewhat poorly drained.	Moderate: somewhat poorly drained.
Bowman: Bo	Severe: poorly drained.	Severe: poorly drained.	Severe: poorly drained.	Severe: poorly drained.
Cashmere: CaB, CaC	Slight if slope is less than 8 percent, moderate if more than 8 percent.	Slight if slope is less than 2 percent, moderate if 2 to 6 percent, severe if more than 6 percent.	Slight if slope is less than 8 percent, moderate if more than 8 percent.	Slight.
Chance: Ch	Severe: poorly drained.	Severe: poorly drained.	Severe: poorly drained.	Severe: poorly drained.
Chilcott Mapped only with Elijah soils.	Moderate: slow permeability.	Moderate: slow permeability; severe if slope more than 6 percent.	Slight	Slight.
Clems: ClB, ClC, ClD, ClE	Slight if slope is less than 8 percent; moderate if 8 to 15 percent, severe if more than 15 percent.	Slight if slope is less than 2 percent, moderate if 2 to 6 percent, severe if more than 6 percent.	Slight if slope is less than 8 percent, moderate if 8 to 15 percent, severe if more than 15 percent.	Slight if slope is less than 15 percent, moderate if 15 to 25 percent, severe if more than 25 percent.
*Elijah: EcC, EeB, ElD, ElD2 For Chilcott and Vickery parts of EcC and EeB, see Chilcott and Vickery series; for Sebree part of EeB, see Sebree series; for Vickery part of ElD and ElD2, see Vickery series.	Moderate: moderately slow permeability.	Moderate: moderately slow permeability; severe if slope is more than 6 percent.	Slight if slope is less than 8 percent, moderate if more than 8 percent.	Slight.
Emerson: Em	Slight	Slight	Slight	Slight.
Falk: Fa	Moderate: somewhat poorly drained; water table at a depth of 3 to 4 feet.	Moderate: somewhat poorly drained; water table at a depth of 3 to 4 feet.	Moderate: somewhat poorly drained.	Moderate: somewhat poorly drained.
*Gem: GBE, GBF For Bakeoven part, see Bakeoven series.	Severe: extremely stony.	Severe: extremely stony.	Moderate: extremely stony; severe if slope is more than 15 percent.	Severe: extremely stony.

TABLE 5.—*Limitations of soils for recreational development*—Continued

Soil series and map symbols	Degree and kinds of limitations for—			
	Camp areas	Playgrounds	Picnic areas	Paths and trails
Greenleaf: GeA, GeB, GeC2, GeD2, GeE2, GfB	Moderate: moderately slow permeability; severe if slope is more than 15 percent.	Moderate: moderately slow permeability; severe if slope is more than 6 percent.	Slight if slope is less than 8 percent, moderate if 8 to 15 percent, severe if more than 15 percent.	Slight if slope is less than 15 percent, moderate if 15 to 25 percent, severe if more than 25 percent.
Greenleaf wet variant: Gm, Gn	Moderate: somewhat poorly drained; water table at depth of 3 to 5 feet.	Moderate: somewhat poorly drained; water table at depth of 3 to 5 feet.	Moderate: somewhat poorly drained.	Moderate: somewhat poorly drained.
*Gross: GOF, GRF For Bakeoven part, see Bakeoven series.	Severe if slope is more than 15 percent.	Severe if slope is more than 6 percent.	Severe if slope is more than 15 percent.	Severe if slope is more than 25 percent.
Harpt: HaA, HaB, HaC, HaD	Slight if slope is less than 8 percent, moderate if more than 8 percent.	Slight if slope is less than 2 percent, moderate if 2 to 6 percent, severe if more than 6 percent.	Slight if slope is less than 8 percent, moderate if more than 8 percent.	Slight.
Harpt wet variant: He	Moderate: somewhat poorly drained; water table at depth of 3 to 4 feet.	Moderate: somewhat poorly drained; water table at depth of 3 to 4 feet.	Moderate: somewhat poorly drained.	Moderate: somewhat poorly drained.
Haw: HIA, HIB, HIC, HID, HIE, HIE2, HMF, HVD	Moderate: moderately slow permeability; severe if slope is more than 15 percent.	Slight if slope is less than 2 percent, moderate if 2 to 6 percent, severe if more than 6 percent.	Slight if slope is less than 8 percent, moderate if 8 to 15 percent, severe if more than 15 percent.	Slight if slope is less than 15 percent, moderate if 15 to 25 percent, severe if more than 25 percent.
Jenness: JeA, JeB	Slight	Slight	Slight	Slight.
*Lankbush: LaC, LaE2, LbE, LOE2 For Purdam part of LbE, see Purdam series; for Lolalita part of LOE2, see Lolalita series.	Moderate: moderately slow permeability; severe if slope is more than 15 percent.	Moderate if slope is 3 to 6 percent, severe if more than 6 percent.	Slight if slope is less than 8 percent, moderate if 8 to 15 percent, severe if more than 15 percent.	Slight if slope is less than 15 percent, moderate if 15 to 25 percent, severe if more than 25 percent.
*Lanktree: LcB, LcC For Haw part, see Haw series.	Moderate: slow permeability.	Moderate: slow permeability; severe if slope is more than 6 percent.	Slight	Slight.
Letha: Le, Lf	Moderate: somewhat poorly drained; water table at depth of 3 to 4 feet.	Moderate: somewhat poorly drained; water table at depth of 3 to 4 feet.	Moderate: somewhat poorly drained.	Moderate: somewhat poorly drained.
*Lolalita: LIB, LIC, LID, LIE, LMG, LOE2, LSF For Rough broken land part of LMG, see Rough broken land; for Lankbush part of LOE2, see Lankbush series; for Haw and Saralegui parts of LSF, see Haw and Saralegui series.	Slight if slope is less than 8 percent, moderate if 8 to 15 percent, severe if more than 15 percent.	Slight if slope is less than 2 percent, moderate if 2 to 6 percent, severe if more than 6 percent.	Slight if slope is less than 8 percent, moderate if 8 to 15 percent, severe if more than 15 percent.	Slight if slope is less than 15 percent, moderate if 15 to 25 percent, severe if more than 25 percent.
Moulton: Mo, Mu	Severe: poorly drained.	Severe: poorly drained.	Severe: poorly drained.	Severe: poorly drained.

TABLE 5.—*Limitations of soils for recreational development*—Continued

Soil series and map symbols	Degree and kinds of limitations for—			
	Camp areas	Playgrounds	Picnic areas	Paths and trails
Newell: NcB, NED	Moderate: clay loam surface layer; moderately slow permeability.	Moderate: clay loam surface layer; moderately slow permeability; severe if slope is more than 6 percent.	Moderate: clay loam surface layer.	Moderate: clay loam surface layer.
Notus: No	Moderate: somewhat poorly drained; water table at depth of 2 to 3 feet.	Moderate: somewhat poorly drained; water table at depth of 2 to 3 feet.	Moderate: somewhat poorly drained.	Moderate: somewhat poorly drained.
Nyssaton: NyA, NyB, NyC, NyD, NyE	Moderate: moderately slow permeability; severe if slope is more than 15 percent.	Slight if slope is less than 2 percent, moderate if 2 to 6 percent, severe if more than 6 percent.	Slight if slope is less than 8 percent, moderate if 8 to 15 percent, severe if more than 15 percent.	Slight if slope is less than 15 percent, moderate if 15 to 25 percent, severe if more than 25 percent.
Owyhee: OwA, OwB, OwC, OwD2, OwE2	Moderate: moderately slow permeability; severe if slope is more than 15 percent.	Slight if slope is less than 2 percent, moderate if 2 to 6 percent, severe if more than 6 percent.	Slight if slope is less than 8 percent, moderate if 8 to 15 percent, severe if more than 15 percent.	Slight if slope is less than 15 percent, moderate if 15 to 25 percent, severe if more than 25 percent.
*Payette: PAF, PCF For Van Dusen part of PCF, see Van Dusen series.	Severe if slope is more than 15 percent.	Severe if slope is more than 6 percent.	Severe if slope is more than 15 percent.	Severe if slope is more than 25 percent.
*Power: PeB, PeC, PeD, PoD For Elijah and Vickery parts of PeB, PeC, and PeD, see Elijah and Vickery series; for Purdam part of PoD, see Purdam series.	Moderate: moderately slow permeability.	Slight if slope is less than 2 percent, moderate if 2 to 6 percent, severe if more than 6 percent.	Slight if slope is less than 8 percent, moderate if more than 8 percent.	Slight.
*Purdam: PpB, PpC For Power part, see Power series.	Moderate: moderately slow permeability.	Slight if slope is less than 2 percent, moderate if 2 to 6 percent, severe if more than 6 percent.	Slight if slope is less than 8 percent, moderate if more than 8 percent.	Slight.
*Reywat: RBE, RBF For Bakeoven part, see Bakeoven series.	Severe: extremely stony; slope of more than 15 percent.	Severe: extremely stony; slope of more than 6 percent.	Moderate: extremely stony; severe if slope is more than 15 percent.	Severe: extremely stony.
Riverwash: Rh. Material too variable to rate. Severe limitations for most uses.				
*Rock outcrop: RKG. Material too variable to rate. Severe limitation for most uses. For Bakeoven part, see Bakeoven series.				
Rough broken land. Mapped only with Lolalita soils. Material too variable to rate. Severe limitations for most uses.				
*Ruckles: RuE, RVE, RVF For Bakeoven part of RVE and RVF; see Bakeoven series.	Severe: extremely stony; slope of more than 15 percent.	Severe: extremely stony; slope of more than 6 percent.	Moderate: extremely stony; severe if slope is more than 15 percent.	Severe: extremely stony.

TABLE 5.—*Limitations of soils for recreational development*—Continued

Soil series and map symbols	Degree and kinds of limitations for—			
	Camp areas	Playgrounds	Picnic areas	Paths and trails
*Saralegui: SAD, SAE, SHE2, SLF For Haw part of SHE2 and SLF, see Haw series; for Ager part of SLF, see Ager deep variant.	Slight if slope is less than 8 percent, moderate if 8 to 15 percent, severe if more than 15 percent.	Slight if slope is less than 2 percent, moderate if 2 to 6 percent, severe if more than 6 percent.	Slight if slope is less than 8 percent, moderate if 8 to 15 percent, severe if more than 15 percent.	Slight if slope is less than 15 percent, moderate if 15 to 25 percent, severe if more than 25 percent.
Sebree Mapped only with Elijah soils.	Severe: very slow permeability.	Severe: very slow permeability.	Slight	Slight.
Terrace escarpments: TE. Material too variable to rate. Severe limitation for most uses.				
*Tindahay: ThE, TIC, TID, TmD For Cashmere part of TmD, see Cashmere series.	Moderate: too sandy.	Severe: coarse-textured surface layer.	Moderate: coarse-textured surface layer.	Moderate: coarse-textured surface layer.
Truesdale: TrC, TrD	Slight if slope is less than 8 percent; moderate if more than 8 percent.	Slight if slope is less than 2 percent, moderate if 2 to 6 percent, severe if more than 6 percent.	Slight if slope is less than 8 percent, moderate if more than 8 percent.	Slight.
Turbyfill: TuB, TuC, TuD	Slight if slope is less than 8 percent; moderate if more than 8 percent.	Slight if slope is less than 2 percent, moderate if 2 to 6 percent, severe if more than 6 percent.	Slight if slope is less than 8 percent, moderate if more than 8 percent.	Slight.
*Van Dusen: VDF For Haw part, see Haw series.	Severe: slope of more than 15 percent.	Severe: slope of more than 6 percent.	Severe: slope of more than 15 percent.	Severe: slope of more than 25 percent.
Vickery Mapped only with Chilcott, Elijah, Sebree, and Power soils.	Slight if slope is less than 8 percent; moderate if more than 8 percent.	Slight if slope is less than 2 percent, moderate if 2 to 6 percent, severe if more than 6 percent.	Slight if slope is less than 8 percent, moderate if more than 8 percent.	Slight.

access roads. The best soils are firm when wet but not dusty when dry; are free of flooding during the season of use; and do not have slopes or stoniness that greatly increase the cost of leveling sites or of building access roads.

Paths and trails are used for local and cross-country travel by foot or horseback. Design and layout should require little or no cutting and filling. The best soils are at least moderately well drained, are firm when wet but not dusty when dry, are flooded not more than once during the season of use, have slopes of less than 15 percent, and have few or no rocks or stones on the surface.

Formation and Classification of the Soils

This section describes the major factors of soil formation, tells how these factors have affected the soils of Payette County, and explains some of the major processes of soil formation. It also defines the current system of soil classification and classifies the soils of the county according to that system.

Factors of Soil Formation

Soil is the organic and mineral material on the surface of the earth in which plants grow. Soil forms through the forces of climate and living matter acting on parent material as modified by relief over a period of time. The properties of soils are determined by five factors: (1) the physical and mineral composition of the parent material, (2) the climate under which the soil existed, (3) the topography, or relief, of the land, (4) living organisms, and (5) the length of time the forces of soil formation have acted on the parent material (*5*).

Soils differ according to the degree of influence of each soil-forming factor. Sometimes one factor dominates and influences the properties of the soil more than the other four, but usually the interaction of all five factors determines what kind of soil develops.

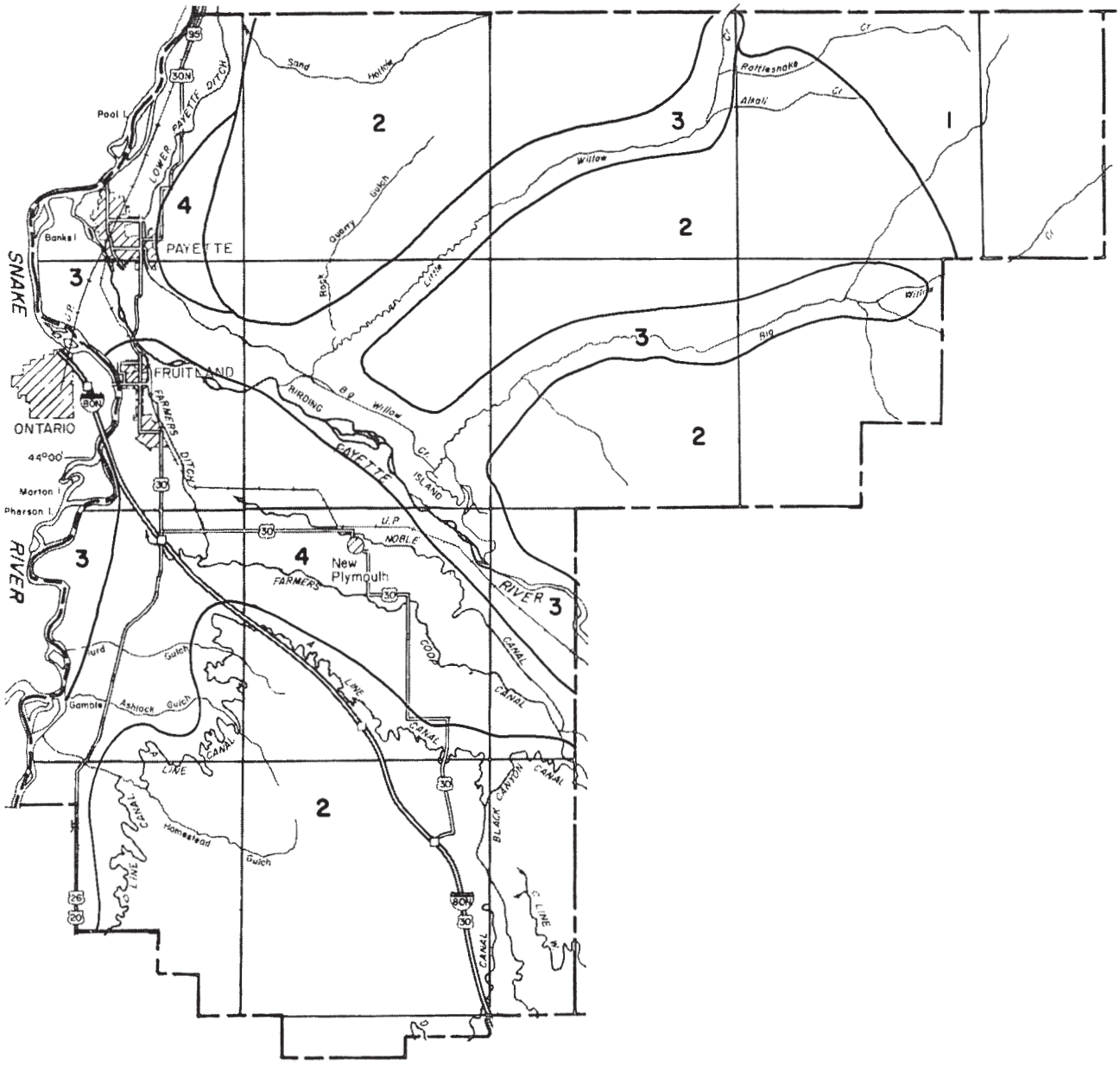

***Figure 13.*—Geologic formations in Payette County: (1) basaltic material; (2) Idaho Formation and related formations; (3) recent alluvium; (4) lacustrine material.**

Parent material

Figure 13 shows the kinds and sources of the material in which the soils of Payette County formed (*12*). In the northeastern corner of the county a thin mantle of loess overlies Columbia River basalt. Soils in this area formed in thin loess over basalt residuum. The Gem soil is one of these. Its B2t horizon has an accumulation of clay that has moved down from the A horizon. Clay accumulations are typical of all the soils derived from basalt but the shallow Bakeoven soils.

Soils formed in the Idaho Formation and related formations are widespread throughout the county. They are covered with loess also. Material in this formation contains sand of granitic origin and has layers of tuffaceous material. Lolalita and Saralegui soils formed in coarse-textured sand of the Idaho and related formations. The fine-textured Ager variant formed in tuffaceous material.

Soils of the bottom land show little profile formation. Granitic sand dominates the alluvium, except in the upper part of the Big Willow and Little Willow Creek drainageways, where basalt is a greater influence.

Soils formed in calcareous lacustrine material are mainly on terraces and uplands south of the Payette River. On steep and disturbed areas, erosion has kept pace with soil formation. Nyssaton soils are much like the original lacustrine sediments. Owyhee soils have the calcium carbonate leached out of the surface. In the more stable areas the Greenleaf soils, which

formed in the same material, have a B horizon and an accumulation of clay.

Climate

The climate of this area is semiarid and has variations associated with differences in elevation. The average annual precipitation is 11.4 inches at Payette. Precipitation in the southern part of the county is about 1 inch lower and increases to an estimated average of about 16 inches in the northeast corner of the county. Summers are dry and warm, and winters are cold and moist. Precipitation is lowest during July, August, and September.

One effect of climate upon soil is related to the amount of vegetation produced with available moisture. Larger amounts of precipitation produce greater amounts of vegetation, hence more organic matter and a thicker and darker surface layer. For example, the dark-colored Gross soils formed under more moisture than the light-colored Nyssaton soils.

Freezing and thawing help in the breakdown of rocks to form soil parent material. These processes are active in the breaking and cracking of basalt rocks in Bakeoven, Reywat, and Gem soils.

Water movement in the soil influences soil formation. Water moves soluble salts downward as it percolates through the soil and toward the surface as it evaporates. Clay and carbonates are also moved downward by the percolating water. The greater the precipitation, the deeper they are moved. Differences in depth to lime and amount of clay accumulation in Gem and Purdam soils illustrate this. In Gem soils, which have 13 to 15 inches of precipitation, carbonates occur at a depth of 20 to 30 inches and may only be in the cracks of the bedrock, whereas in Purdam soils, which have 9 to 11 inches of precipitation, carbonates occur at a depth of 12 to 24 inches.

Topography

Topography, or relief, in Payette County influences soil formation mainly through its effect on climate. Areas that have the same amount of precipitation may have differences in microclimate. Steep northerly slopes are cooler and lose less water through evaporation than neighboring southerly slopes. For example, the dark-colored Van Dusen soils on steep northerly slopes accumulate more organic matter than the light-colored Saralegui soils on the southerly slopes, which receive the same amount of precipitation.

Erosion is more severe on sloping soils than on nearly level ones. Sheet erosion in some areas keeps pace with soil formation. For example, Lolalita soils occur where erosion maintains relatively young surfaces. Eroded material is transported to lower levels, forming colluvial and alluvial fans. This process leaves the larger, heavier soil particles on the upper slopes and carries the finer particles farther downslope. The sandy Tindahay soils occur near the upper parts of alluvial fans; the coarse loamy Cashmere soils are in the center; and the fine loamy Harpt soils are on the lower parts.

Level to gently sloping soils that have been stable for a long time have distinct horizons. Lankbush soils, for example, have a B2t horizon of clay accumulation and prismatic or blocky structure. In addition to a B2t horizon of clay accumulation, a hardpan has formed in Chilcott and Purdam soils.

On some level to nearly level stream bottoms enough water accumulates to form a water table. The water comes from stream flooding and irrigation of crops. Removal of the water is difficult in low areas. The soils affected are low in oxygen, iron, and manganese compounds and as a result are mottled and gleyed. The Chance soils are mottled and gleyed because their water table remains near the surface. Moulton soils are mottled throughout because the water table fluctuates.

A water table that is high enough to allow water to reach the surface and capillary action causes saline and alkali conditions. Water moving upward through the soil carries dissolved salts that are left on the surface as the water evaporates. If rainfall is insufficient to wash the salts out of the soil, they accumulate. In some areas salts move upward during the dry summer and downward during the moist winter. Accumulations of sodium and other salts cause alkaline conditions. Alkali spots occur in some areas of Baldock and Letha soils.

Living organisms

Plant and animal life play an important part in soil formation. The kind and amount of vegetation influence the amount of organic matter added to the soil. Before settlement, bunchgrasses were the main vegetation of the county. Decomposed abundant fine grass roots darken the surface layer and produce granular structure. In some areas of Baldock soils, the greasewood shrub absorbs sodium from the lower horizons and deposits it on the surface when the sodium-filled leaves decay. The taproots of alfalfa and other deep-rooted plants open channels in soils that otherwise are slowly permeable.

Overgrazing in many areas has destroyed the plant cover and resulted in erosion and loss of organic matter. In some areas where Payette soils were inspected, overgrazing and erosion had reduced the organic-matter content to levels too low for those soils.

Man's use of soil for farming can cause great changes. Plowing mixes the upper layers. Ripping breaks up and mixes hardpans and tight subsoils. Deep plowing to a depth of about 35 inches, as is often done in the Sebree soil, completely changes the soil by a mixing process. In some places, in preparing for irrigation, soil material is moved from one place to another by land smoothing or land leveling. Artificial climate introduced by irrigation also changes soil. Increased vegetation improves the organic-matter content. Water accumulation makes otherwise well-drained soils like a wet variant. The well-drained Greenleaf soils and the Greenleaf wet variant are examples. The management and cropping systems determine if the organic-matter content of the soil stays the same, increases, or decreases over a long period.

Time

The length of time required for the formation of a soil depends largely on the other factors of soil formation. Large amounts of water can remove soluble material from the soil surface in a short time, but smaller amounts of water require longer periods. The amount of organic matter depends on the amount of vegetation produced and its rate of decomposition.

The length of time that parent material remains in place is reflected in soil formation. Older soils have well-defined horizons, and younger soils have less distinct ones.

In this area, soils on smooth ridgetops and high older terraces have well-defined horizons. Sloping soils that are being eroded and soils on flood plains that receive new deposits do not have distinct horizons because they have been in place a relatively short time.

Greenleaf, Owyhee, and Nyssaton soils formed in lacustrine sediments. They occur on terraces in areas of different ages. The Greenleaf soil is in the oldest, most stable areas, and the Nyssaton soil in the youngest. The Greenleaf soil has distinct horizons. Water has moved some carbonates and clay from the A horizon into the B2t horizon, and the B2t horizon has accumulated some sodium. In the Owyhee soil water has moved some carbonates out of the surface and some clay from the A horizon to the B2t horizon, but less clay than in the Greenleaf soil. In the Nyssaton soil the parent material has been changed very little. The amount of organic matter in the surface layer parallels the age of the soils; the Greenleaf soil has the most, the Owyhee soil intermediate amounts, and the Nyssaton soil the least.

Classification of the Soils

Classification enables us to assemble knowledge about the soils, to see their relationship to one another and to the whole environment, and to develop principles that help us to understand their behavior and their response to manipulation. First through classification, and then through use of soil maps, we can apply our knowledge of soils to specific fields and other tracts of land.

The narrow categories of classification, such as those used in detailed soil surveys, allow us to organize and apply knowledge about soils in managing farms, fields, and woodlands; in developing rural areas; in engineering work; and in many other ways. Soils are placed in broad classes to facilitate study and comparison in large areas, such as countries and continents.

The system of soil classification currently used was adopted by the National Cooperative Soil Survey in 1965. Because this system is under continual study, readers interested in developments of the current system should search the latest literature available (*6, 8, 9*).

The current system of classification has six categories. Beginning with the broadest, these categories are the order, the suborder, the great group, the subgroup, the family, and the series. In this system the criteria used as a basis for classification are soil properties that are observable and measurable. The properties are chosen, however, so that soils of similar genesis, or mode of origin, are grouped together. Classes of the current system are briefly defined in the following paragraphs.

Order.—Ten soil orders are recognized. The properties used to differentiate among soil orders are those that tend to give broad climatic groupings of soils. The two exceptions to this are Entisols and Histosols, which occur in many different climates. Each order is named with a word of three or four syllables ending in *sol* (Ent-i-sol).

Suborder.—Each order is divided into suborders, based primarily on those soil characteristics that seem to produce classes that have the greatest genetic similarity. The suborders narrow the broad climatic range permitted in the order. The soil properties used to separate suborders are mainly those that reflect either the presence or absence of waterlogging or soil differences that result from the climate or vegetation. The names of suborders have two syllables, the last of which indicates the order. An example is *Aquent* (*Aqu,* meaning water or wet, and *ent,* from Entisol).

Great group.—Each suborder is divided into great groups on the basis of uniformity in the kinds and sequence of major soil horizons and features. The horizons used to make separations are those in which clay, iron, or humus has accumulated; those that have pans that interfere with growth of roots, movement of water, or both; and thick, dark-colored surface horizons. The features used are the self-mulching properties of clay, soil temperature, major differences in chemical composition (mainly calcium, magnesium, sodium, and potassium), dark-red and dark-brown colors associated with basic rocks, and the like. The names of great groups have three or four syllables and are made by adding a prefix to the name of the suborder. An example is Haplaquents (*Hapl,* meaning simple horizons, *aqu* for wetness or water, and *ent,* from Entisols).

Subgroup.—Each great group is divided into subgroups, one that represents the central (typic) segment of the group and others, called intergrades, that have properties of the group and also one or more properties of another great group, suborder, or order. Subgroups may also be made in those instances where soil properties intergrade outside of the range of any great group, suborder, or order. The names of subgroups are derived by placing one or more adjectives in front of the name of the great group. An example is Typic Haplaquents (a typical Haplaquent).

Family.—Soil families are established within a subgroup primarily on the basis of properties important to the growth of plants or on the behavior of soils when used for engineering. Among the properties considered are texture, mineralogy, reaction, soil temperature, permeability, thickness of horizons, and consistence. A family name consists of a series of adjectives preceding the subgroup name. The adjectives are the class names for texture, mineralogy, and so on that are used as family differentiae (see table 6). An example is the fine-silty, mixed, mesic family of Xerollic Haplargids.

Series.—The series is a collection of individual soils that are essentially uniform in differentiating characteristics and in arrangement of horizons; or, if genetic horizons are thin or absent, a collection of individual soils that, within defined depth limits, are uniform in soil properties diagnostic for differentiating a soil series.

A *taxadjunct* to a series is recognized when a soil differs only slightly from other soils in a series. The difference is recognized and identified, but the name of a series that resembles the soil is used instead of establishing a new series.

A *variant* is recognized when a soil differs sufficiently from other known soils of a series that establishing a new soil series appears to be feasible, but the soil is of such limited known area that creation of a new series is not believed justified.

Five of the 10 orders are represented in Payette County—Aridisols, Entisols, Inceptisols, Mollisols, and Vertisols. *Aridisols* have a light-colored surface layer and are typically dry. *Entisols* show little or no evidence of well-defined horizons. They are young soils, or they formed in material that weathers very slowly. *Inceptisols* generally form on young, but not recent, land surfaces. They have weak or indistinct horizons. *Mollisols* formed under grass. They have a thick, friable, dark-colored surface layer. Base saturation is more than 50 percent. *Vertisols* are swelling clays that have wide cracks when dry. Surface material falls into the cracks, resulting in a self mixing of the profile.

The soils of Payette County are classified into 23 subgroups and 16 families. Table 6 lists the soils series of the county and their classification by family, subgroup, and order.

TABLE 6.—*Soil series classified according to the current system of classification*

Series	Family	Subgroup	Order
Ager deep variant	Fine, montmorillonitic, mesic	Entic Chromoxererts	Vertisols.
Bakeoven	Loamy-skeletal, mixed, mesic	Lithic Haploxerolls	Mollisols.
Baldock silty clay loam	Fine-loamy, mixed (calcareous), mesic	Typic Haplaquepts	Inceptisols.
Baldock silt loam [1]	Fine-loamy, mixed (calcareous), mesic	Typic Haplaquepts	Inceptisols.
Bowman	Coarse-loamy over sandy or sandy-skeletal, mixed (calcareous), mesic.	Typic Haplaquolls	Mollisols.
Cashmere	Coarse-loamy, mixed, mesic	Aridic Haploxerolls	Mollisols.
Chance	Coarse-loamy over sandy or sandy-skeletal, mixed, nonacid, mesic.	Mollic Haplaquepts	Inceptisols.
Chilcott	Fine, montmorillonitic, mesic	Abruptic Xerollic Durargids	Aridisols.
Clems	Coarse-loamy, mixed, mesic	Xerollic Camborthids	Aridisols.
Elijah	Fine-silty, mixed, mesic	Xerollic Durargids	Ardisols.
Emerson	Coarse-loamy over sandy or sandy-skeletal, mixed, nonacid, mesic.	Xeric Torriorthents	Entisols.
Falk	Coarse-loamy over sandy or sandy-skeletal, mixed, nonacid, mesic.	Aquic Xerorthents	Entisols.
Gem	Fine, montmorillonitic, mesic	Calcic Argixerolls	Mollisols.
Greenleaf	Fine-silty, mixed, mesic	Xerollic Haplargids	Aridisols.
Greenleaf wet variant	Fine-loamy, mixed, mesic	Xerollic Haplargids	Aridisols.
Gross	Fine-loamy, mixed, frigid	Calcic Pachic Argixerolls	Mollisols.
Harpt	Fine-loamy, mixed, mesic	Torrifluventic Haploxerolls	Mollisols.
Harpt wet variant	Fine-loamy, mixed, mesic	Fluvaquentic Haploxerolls	Mollisols.
Haw	Fine-loamy, mixed, mesic	Aridic Calcic Argixerolls	Mollisols.
Jenness	Coarse-loamy, mixed, nonacid, mesic	Xeric Torriorthents	Entisols.
Lankbush	Fine-loamy, mixed, mesic	Xerollic Haplargids	Aridisols.
Lanktree	Fine, montmorillonitic, mesic	Xerollic Haplargids	Aridisols.
Letha	Coarse-loamy, mixed (calcareous), mesic	Aquic Xerorthents	Entisols.
Lolalita	Coarse-loamy, mixed, nonacid, mesic	Xeric Torriorthents	Entisols.
Moulton	Coarse-loamy over sandy or sandy-skeletal, mixed, mesic.	Typic Haplaquolls	Mollisols.
Newell	Fine-loamy, mixed, mesic	Calcic Pachic Argixerolls	Mollisols.
Notus	Sandy-skeletal, mixed, mesic	Aquic Xerofluvents	Entisols.
Nyssaton	Coarse-silty, mixed, mesic	Xerollic Calciorthids	Aridisols.
Owyhee	Coarse-silty, mixed, mesic	Xerollic Camborthids	Aridisols.
Payette	Coarse-loamy, mixed, mesic	Aridic Calcic Argixerolls	Mollisols.
Power	Fine-silty, mixed, mesic	Xerollic Haplargids	Aridisols.
Purdam	Fine-silty, mixed, mesic	Haploxerollic Durargids	Aridisols.
Reywat	Loamy-skeletal, mixed, mesic	Lithic Argixerolls	Mollisols.
Ruckles [2]	Clayey, skeletal, montmorillonitic, mesic	Lithic Argixerolls	Mollisols.
Saralegui	Coarse-loamy, mixed, mesic	Xerollic Haplargids	Aridisols.
Sebree	Fine-silty, mixed, mesic	Xerollic Nadurargids	Aridisols.
Tindahay	Sandy, mixed, mesic	Xeric Torriorthents	Entisols.
Truesdale	Coarse-loamy, mixed, mesic	Haploxerollic Durorthids	Aridisols.
Turbyfill	Coarse-loamy, mixed (calcareous), mesic	Xeric Torriorthents	Entisols.
Van Dusen	Fine-loamy, mixed, mesic	Pachic Argixerolls	Mollisols.
Vickery	Fine-loamy, mixed, mesic	Xerollic Durorthids	Aridisols.

[1] Baldock silt loam is a taxadjunct to the Baldock series. The classification shown is for the series, not the taxadjunct. The Baldock silt loam mapping units in Payette County are taxadjuncts to the series because they are less than 15 percent fine sand or coarser particles and less than 18 percent clay between depths of 10 and 40 inches.

[2] The Ruckles soils in Payette County are taxadjuncts to the series because they are less than 35 percent coarse fragments.

General Nature of the County

The first permanent settlement in the Payette Valley was in 1884. First known as Boomerang, it later became known as Payette. Payette County was established in 1917 from a part of Canyon County.

The county, river, town, and valley took their name from Francois Payette, an early French trapper of the Hudson Bay Company.

According to the 1970 census, the population of the county was 12,401. The city of Payette had a population of 5,521, Fruitland 1,576, and New Plymouth 986. In 1960, the population was 12,439.

Newspapers, public libraries, radio, and television are available throughout the county. Recreational facilities include parks, golf course, bowling alley, swimming pool, and athletic fields. Fishing, hunting, boating, and water skiing are available in the county. Big game hunting, salmon fishing, snow skiing, camping, and snowmobiling are in the nearby mountains.

Limited scheduled airline service is available at Ontario, Oregon. Major airline service is obtained at Boise, Idaho. Rail and truck freight service is available. Bus is the only passenger service available.

Climate [8]

Payette County is in the lower valley of the Payette River. Elevations range from about 2,100 feet at the river to almost 4,650 feet in the northeastern part of the county and 2,700 feet in the south-central part.

Climatically, the survey area may be described as midlatitude, semiarid, on the boundary between steppe (semiarid) and desert (arid). This type of climate typically has warm dry summers, relatively low annual precipitation, and sparse natural vegetation (*3*). Adequate irrigation, however, transforms the desert or steppe into highly productive land. Such is the case in Payette County, where much of the land is irrigated.

A characteristic of precipitation in all dry climates is the great variability. According to Conrad (*2*), the percentage of variability from normal increases with a decrease in average annual precipitation. At Payette during a 30-year period, annual precipitation totals show a range from slightly more than 5 inches to more than 16 inches and an average of 11.41 inches. This variability greatly affects natural vegetation as well as all farming. The source of moisture in the air masses that traverse Payette County is almost exclusively the North Pacific Ocean. However, much of this moisture is normally left on or west of the Coastal and Cascade Mountains.

The average monthly evaporation in inches from open pan at the nearby Branch Experiment Station in Parma from April to October is 5.22, 7.61, 7.54, 10.54, 8.41, 5.23, and 2.24. After comparing these measurements with the average monthly rainfall for these same months in table 7, it is obvious that supplemental moisture is needed for plant growth. Moisture from snowfall is variable; however, the annual average of 20 inches at Payette is evidence that snowfall is not uncommon. Based on 30 years of records at Tripod Mountain, 12 or 13 miles northeast of the county, the northeastern part of Payette County can expect an estimated average of 40 to 50 inches of snow per year. Seasonal snowfall at Payette has ranged from 1.4 inches in 1953–54 to 66.7 inches in 1915–16. Table 7 shows data on snow depth, based on records since 1940.

Abundant sunshine is normal during the growing season. Based on sunshine records for Boise, Idaho, the average daily hours of sunshine, in order, for the 7 months from April to October are 9.0, 10.2, 11.5, 13.4, 12.0 10.0, and 7.3. These totals reflect a range from 67 percent of possible sunshine in April and October to more than 80 percent in July, August, and September.

Damaging storms occur infrequently. Those that do occur can be expected to accompany thunderstorms or a strong, cold weather frost. Based on an analysis by the Bonneville Power Administration, extreme winds that have a 1-minute average speed of 45 to 50 miles per hour can be expected, on the average, once in 2 years; 55 to 60 miles per hour, once in 10 years; and 70 to 80 miles per hour, once in 50 years. Hail damage is reported less than 1 percent of the time in any month. Hail damage has been reported in February, March, May, June, and October. It occurs during thunderstorms.

Freeze-free temperatures at Payette can normally be expected from June to almost the end of September. The average period when temperatures are above 32° F. is from May 4 to September 28, a period of 147 days. The average period when temperatures are above 28° runs from April 23 to October 10, a period of 170 days (see table 8). Freezing temperatures normally threaten the fruit crops around Fruitland and Payette.

Based on 24 years of record for the Fruitland-Payette Fruit Frost District, cold nights (32° or lower), April through May, average 15 at Fruitland and Payette. The annual range has been 4 to 44 nights. The highest number was recorded in 1970. In the vicinity of Fruitland, a summary of data for apples shows that the average date for appearance of green leaf tips is April 4, full bloom May 1, and the formation of small green fruit May 12. Green leaf tips appear as early as March 24 and as late as April 20.

Extreme winter temperatures come most often in January. However, on rare occasion, as in November 1955, subzero temperatures damage fruit trees before they become fully dormant. For the latitude and elevation, Payette County has relatively low incidence of subzero temperatures; the average is only two per year at Payette. Based on limited information on frost depth, the evidence is that the extreme cold was in January 1949, the coldest month on record, when under little snow cover frost penetrated to a depth of 2½ to 3 feet. In most winters frost penetration is generally less than 1 foot.

[8] By KENNETH A. RICE, climatologist for Idaho, National Weather Service, U.S. Department of Commerce.

TABLE 7.—*Temperature and precipitation data*

[Based on records from Payette, Idaho. Elevation 2,150 feet]

Month	Temperature				Precipitation				
	Average daily maximum	Average daily minimum	Two years in 10 will have at least 4 days with:		Average total	One year in 10 will have:		Days that have snow cover of 1 inch or more	Average depth of snow on days that have snow cover
			Maximum temperature equal to or higher than—	Minimum temperature equal to or lower than—		Less than—	More than—		
	°F	°F	°F	°F	*Inches*	*Inches*	*Inches*	*Number*	*Inches*
January	36	20	49	2	1.51	0.3	2.3	15	2.8
February	44	25	58	11	1.24	.2	2.1	6	1.9
March	55	30	70	20	.88	.2	1.6	[1]	.2
April	65	35	80	28	.92	.1	1.6	0	0
May	74	44	88	33	1.09	.2	2.2	0	0
June	81	50	94	41	1.24	.1	1.7	0	0
July	92	56	103	47	.13	[2]	.3	0	0
August	90	54	97	45	.41	[2]	.5	0	0
September	79	45	94	34	.49	[2]	.8	0	0
October	66	36	80	25	.80	.1	1.4	0	0
November	49	28	61	16	1.30	.3	2.3	0	0
December	39	24	51	9	1.40	.4	2.3	1	.5
Year	64	37	[3] 103	[4] −4	11.41	7.4	15.0	6	1.7

[1] Less than 0.5 day.
[2] Trace.
[3] Average annual highest temperature.
[4] Average annual lowest temperature.

Water Supply

Most crops in Payette County depend on irrigation. The main source of water is the Payette River. In recent years, the water supply has been adequate.

Big Willow Creek Valley is irrigated by gravity flow from the creek, when sufficient water from early runoff is available. Additional water is pumped from wells. Not all areas suitable for irrigation have a supply of irrigation water.

Little Willow Creek Valley is irrigated from Paddock Valley Reservoir, which was constructed in 1917. The dam has since been rebuilt, but the area still has water shortages at times.

The Lower Payette Ditch was the first major diversion from the Payette River. In 1884, about 16 miles of canal were constructed from the diversion point, near the mouth of Little Willow Creek, to north of Payette. An extension was begun in 1890 that extended the length to 28 miles and into Washington County. The canal irrigates about 12,800 acres. Irrigation water for the town of Payette is obtained from this canal and from shallow wells.

The Noble Ditch was the first of three large diversions on the south side of the Payette River. The ditch construction, with diversion point near Letha in Gem County, was started in 1873 by individuals. A company was later formed to extend the length to 30 miles

TABLE 8.—*Probabilities of last freezing temperatures in spring and first in fall*

[Based on records from Payette, Idaho. Elevation 2,150 feet]

Probability	Dates for given probability and temperature				
	16° F	20° F	24° F	28 F	32° F
Spring:					
1 year in 10 later than	March 17	March 26	April 19	May 13	May 26
2 years in 10 later than	March 10	March 20	April 11	May 6	May 19
5 years in 10 later than	February 24	March 10	March 28	April 23	May 4
Fall:					
1 year in 10 earlier than	November 4	October 18	October 6	September 26	September 14
2 years in 10 earlier than	November 11	October 25	October 13	October 1	September 19
5 years in 10 earlier than	November 25	November 8	October 27	October 10	September 28

and enlarge the canal. Construction was completed in the late 1890's. The canal irrigates about 5,600 acres in Payette County. Most of the irrigation water for the town of Fruitland comes from the canal.

The Farmers Cooperative Ditch, constructed in 1892 and 1893, is 44 miles long. The diversion point is near Emmett in Gem County. The canal irrigates about 17,800 acres, including the town of New Plymouth, which was founded in 1895.

Water shortages in 1917 and 1918 on the Payette River caused the formation of the Lake Reservoir and Storage Company by the five then operating ditch companies that obtained water from the Payette River. Their water storage was in the Payette Lakes. Lower Payette, Noble, and Farmers Cooperative Ditches participated in this company.

The last big canal constructed in the county was the Black Canyon Irrigation Canal. The Black Canyon Dam in Gem County is the point of diversion. The dam and canal were constructed by the Bureau of Reclamation in the 1930's. The canal system has 150 miles of canal and laterals and irrigates about 19,500 acres.

Several smaller ditches divert water from the Payette River. The largest of these is the Washoe Irrigating and Water Power Company, which irrigates about 2,200 acres. In addition to Payette Lakes, storage on the Payette River includes Cascade and Deadwood Reservoirs. Some water is pumped for individual farms from the Payette and Snake Rivers.

In recent years, areas not covered by irrigation canals have been drilling wells for irrigation water. Many of these have obtained adequate water. Average depth has been about 400 feet. The pumping of fine sand with the water has been a problem in some cases. Water for domestic use in the three towns and the rural residences comes from wells.

Vegetation

About 30 percent of the acreage in the county is used for irrigated crops. Many kinds of plants grow in the noncultivated areas. In much of the county the native vegetation was bunchgrass. Heavy grazing by livestock killed the native vegetation in many areas, and cheatgrass and annual weeds invaded. In recent years, medusahead wildrye has also invaded the area and in many areas has replaced the cheatgrass. A list of many of the plants that commonly occur in Payette County is given in the Soil Survey of Gem County Area, Idaho (*10*).

Farming

Early enterprises in the county consisted of raising cattle, sheep, and horses. Water was diverted from the streams to raise winter feed for livestock.

With the advent of the irrigation companies to provide water for large acreages, apple orchards became the major crop in the county. In recent years the number of orchards has decreased and the acreage of cultivated row crops has increased.

The principal crops grown in the county are listed in table 2.

Beef cattle, dairying, and sheep are important enterprises. Hogs, chickens, and horses are of minor importance. The 1969 Census of Agriculture (*11*) reported livestock numbers as follows: cattle and calves, 50,699; milk cows, 4,395; sheep and lambs, 6,264; hogs and pigs, 1,927; chickens, 5,485; and horses and ponies, 736. Livestock numbers are on the increase. Most of the increase is the result of feedlot enterprises, not of increased numbers on the range.

The 1969 Census of Agriculture reported 665 farms in the county and an average size of 218.5 acres. The 1964 census reported 844 farms and an average size of 201.6 acres. The trend is toward larger and fewer farms. Large acreages are being removed from crop production for highways, houses, and industrial facilities.

New acreages irrigated by wells are now in production. Most of these soils are not well suited to crop production because they are rolling and steep. Fields are necessarily small.

Many farmers in the county are working away from the farm in food processing and other industries. Thus, movement is particularly true of farmers who have small acreages. The number of landowners who rent their land to larger operators is increasing. Improvement of the land by leveling to increase field size and by improving the irrigation facilities with pipelines or concrete-lined ditches is needed to make the land attractive to renters.

According to the 1969 Census of Agriculture, the market value of farm products was $20,932,909, as compared with $9,967,508 in 1964.

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Glossary

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as crumbs, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern.

Available water capacity. Ratings for irrigated soils in this survey are *high*, more than 7.5 inches; *moderate*, 5.0 to 7.5 inches; *low*, 3.0 to 5.0 inches; and *very low*, less than 3.0 inches.

Base saturation. The degree to which material that has base-exchange properties is saturated with exchangeable cations other than hydrogen, expressed as a percentage of the cation-exchange capacity.

Calcareous soil. Based upon calcium carbonate equivalent. Ratings in this survey are slightly calcareous, 1 to 3 percent; moderately calcareous, 3 to 15 percent; strongly calcareous, 15 to 30 percent; and very strongly calcareous, more than 30 percent.

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 clay on the surface of a soil aggregate. Synonyms: clay coat, clay skin.

Colluvium. Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Cobblestone. A rounded or partly rounded fragment of rock, 3 to 10 inches in diameter.

Complex, soil. A mapping unit consisting of different kinds of soils that occur in such small individual areas or in such an intricate pattern that they cannot be shown separately on a publishable soil map.

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 and brittle; little affected by moistening.

Cover crop. A close growing crop grown primarily to improve and to protect the soil between periods of regular crop production; or a crop grown between trees and vines in orchards and vineyards.

Deciduous. Refers to plants that lose their leaves at maturity, or at certain seasons. Contrasts with evergreen.

Drainage class (natural). Refers to the conditions of frequency and duration of periods of saturation or partial saturation that existed during the development of the soil, 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 different classes of natural soil drainage are recognized.

Excessively drained soils are commonly very porous and rapidly permeable and have a low water-holding capacity.

Somewhat excessively drained soils are also very permeable and are free from mottling throughout their profile.

Well-drained soils are nearly free from mottling and are commonly of intermediate texture.

Moderately well drained soils commonly have a slowly permeable layer in or immediately beneath the solum. They have uniform color in the A and upper B horizons and mottling in the lower B and the C horizons.

Somewhat poorly drained soils are wet for significant periods but not all the time, and some soils commonly have mottling at a depth below 6 to 16 inches.

Poorly drained soils are wet for long periods and are light gray and generally mottled from the surface downward, although mottling may be absent or nearly so in some soils.

Very poorly drained soils are wet nearly all the time. They have a dark-gray or black surface layer and are gray or light gray, with or without mottling, in the deeper parts of the profile.

Effective rooting depth. Depth to which plant roots can penetrate without being inhibited by a cemented layer or bedrock. The classes in this survey are very shallow, less than 10 inches; shallow, 10 to 20 inches; moderately deep, 20 to 40 inches; deep 40 to 60 inches; and very deep, more than 60 inches.

Erosion. The wearing away of the land surface by wind (sandblast), running water, and other geological agents.

Gleyed soil. A soil in which waterlogging and lack of oxygen have caused the material in one or more horizons to be neutral gray in color. The term "gleyed" is applied to soil horizons with yellow and gray mottling caused by intermittent waterlogging.

Green manure (agronomy). A crop grown for the purpose of being turned under in an early stage of maturity or soon after maturity for soil improvement.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material may be sandy or clayey, and it may be cemented by iron oxide, silica, calcium carbonate, or other substance.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes. These are the major horizons:

O horizon.—The layer of organic matter on the surface of a mineral soil. This layer consists of decaying plant residues.

A horizon.—The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living organisms are most active and therefore is marked by the accumulation of humus. The horizon may have lost one or more of soluble salts, clay, and sesquioxides (iron and aluminum oxides).

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 some combination of these; (2) by prismatic or blocky structure; (3) by redder or stronger colors than the A horizon; or (4) by some combination of these. Combined A and B horizons are usually called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The weathered rock material immediately beneath the solum. In most soils this material is presumed to be like that from which the overlying horizons were formed. If the material is known to be different from that in the solum, a Roman numeral precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock usually underlies a C horizon but may be immediately beneath an A or B horizon.

Humus. The well-decomposed, more or less stable part of the organic matter in mineral soils.

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 materials.

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 relatively level plots 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, to confine the flow of water to one direction.

Furrow.—Water is applied in small ditches made by cultivation implements 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.—Irrigation water, released at high points, flows onto the field without controlled distribution.

Irrigation set. That part of a field covered at one time by a controlled flow of water for a single application.

Land smoothing. Removal of irregularities by reshaping the land surface to provide an improved grade, but not a uniform grade, for more efficient irrigation.

Leaching. The removal of soluble materials from soils or other material by percolating water.

Loess. Fine-grained material, dominantly of silt-sized particles, that has been deposited by wind.

Mottling, soil. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of 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 these: *fine,* less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium,* ranging from 5 millimeters to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse,* more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Parent material. Disintegrated and partly weathered rock from which soil has formed.

Ped. An individual natural soil aggregate, such as a crumb, a prism, or a block, in contrast to a clod.

Permeability. The quality that enables the soil to transmit water or air. Terms used to describe permeability are as follows: *very slow, slow, moderately slow, moderate, moderately rapid, rapid,* and *very rapid.*

pH value. A numerical means for designating acidity and alkalinity in soils. A pH value of 7.0 indicates precise neutrality; a higher value, alkalinity; and a lower value, acidity.

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.

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction because it is neither acid nor alkaline. An acid, or "sour," soil is one that gives an acid reaction; an alkaline soil is one that is alkaline in reaction. In words, the degrees of acidity or alkalinity are expressed thus:

	pH		*pH*
Extremely acid	Below 4.5	Neutral	6.6 to 7.3
Very strongly acid	4.5 to 5.0	Mildly alkaline	7.4 to 7.8
Strongly acid	5.1 to 5.5	Moderately alkaline	7.9 to 8.4
Medium acid	5.6 to 6.0	Strongly alkaline	8.5 to 9.0
Slightly acid	6.1 to 6.5	Very strongly alkaline	9.1 and higher

Rotation grazing. Grazing two or more pastures, or parts of a range, in regular order, with definite recovery periods between grazing periods. Contrasts with continuous grazing.

Saline-alkali soil. A soil that contains a harmful concentration of salts and exchangeable sodium; or contains harmful salts and has a highly alkaline reaction; or contains harmful salts and exchangeable sodium and is strongly alkaline in reaction. The salts, exchangeable sodium, and alkaline reaction occur in the soil in such location that growth of most crop plants is less than normal.

Saline soil. A soil that contains soluble salts in amounts that impair growth of plants but that does not contain excess exchangeable sodium.

Sand. Individual rock or mineral fragments in a soil that range in diameter from 0.05 to 2.0 millimeters. Most sand grains consist of quartz, but they may be of any mineral composition. The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

Silt. Individual mineral particles in a soil that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). Soil of the silt textural class is 80 percent or more silt and less than 12 percent clay.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on relatively steep slopes and in swelling clays, where there is marked change in moisture content.

Soil. A natural, three-dimensional body on the earth's surface that supports plants and that 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 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). The separates recognized by the International Society of Soil Science are as follows: I (2. to 0.2 millimeter); II (0.2 to 0.002 millimeter); III (0.02 to 0.002 millimeter); IV (less than .002 millimeter).

Soil slope. Slope classes in this survey are level or nearly level, 0 to 1 percent; very gently sloping, 1 to 3 percent; gently sloping, 3 to 7 percent; moderately sloping, 7 to 12 percent; strongly sloping, 12 to 20 percent; moderately steep, 20 to 30 percent; steep, 30 to 65 percent; and very steep, 65 to 80 percent.

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in mature soil includes 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 characteristic of the soil are largely confined to the solum.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. 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 together without any regular cleavage, as in many claypans and hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. Technically, the part of the soil below the solum.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, about 5 to 8 inches in thickness. The plowed layer.

Taxadjunct. A soil named for the series it strongly resembles. It differs from that series in ways too small to be of consequence in interpreting usefulness or behavior.

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 may soak into the soil or flow slowly to a prepared outlet without

harm. Terraces in fields are generally built so they can be farmed. Terraces intended mainly for drainage have a deep channel that is maintained in permanent sod.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "sparse," "fine," or "very fine."

Topsoil. A presumed fertile soil or soil material, or one that responds to fertilization, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Water table. The highest part of the soil or underlying rock material that is wholly saturated with water. In some places an upper, or perched, water table may be separated from a lower one by a dry zone.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which plants (specifically sunflower) wilt so much that they do not recover when placed in a dark, humid atmosphere.

GUIDE TO MAPPING UNITS

For a full description of a mapping unit, read both the description of the mapping unit and that of the soil series to which the mapping unit belongs. Other information is given in tables as follows:

Acreage and extent, table 1, page 8.
Estimated yields, table 2, page 50.

Engineering uses of the soils, tables 3 and 4, pages 64 to 81.
Recreation, table 5, page 84.

Map symbol	Mapping unit	Page	Capability unit: Irrigated Symbol	Irrigated Page	Capability unit: Nonirrigated Symbol	Nonirrigated Page	Range site: Name	Range site Page	Windbreak suitability group Number
AGD	Ager clay, deep variant, 7 to 12 percent slopes--	9	-----	--	IVe-5	48	Dense Clay, 12 to 16 inch PZ [1/]	58	---
AGE	Ager clay, deep variant, 12 to 30 percent slopes----------	9	-----	--	VIe-2	50	Dense Clay, 12 to 16 inch PZ	58	---
Ba	Baldock silt loam---------	10	IIIw-6	47	-----	--	----------	--	3
Bc	Baldock silt loam, saline-alkali----------	10	IVw-3	48	-----	--	----------	--	3
Bd	Baldock silt loam, strongly saline-alkali--	10	IVw-3	48	-----	--	----------	--	---
Bk	Baldock silty clay loam---	11	IIIw-6	47	-----	--	----------	--	3
Bo	Bowman loam---------------	12	IIIw-6	47	-----	--	----------	--	3
CaB	Cashmere sandy loam, 0 to 3 percent slopes--------	12	IIe-3	46	VIc-1	50	Loamy, 8 to 12 inch PZ	55	1
CaC	Cashmere sandy loam, 3 to 7 percent slopes--------	12	IIIe-3	46	VIe-2	50	Loamy, 8 to 12 inch PZ	55	2
Ch	Chance fine sandy loam----	14	-----	--	Vw	49	----------	--	---
ClB	Clems fine sandy loam, 0 to 3 percent slopes-----	15	IIe-3	46	-----	--	----------	--	1
ClC	Clems fine sandy loam, 3 to 7 percent slopes-----	16	IIIe-3	46	-----	--	----------	--	2
ClD	Clems fine sandy loam, 7 to 12 percent slopes----	16	IVe-2	48	-----	--	----------	--	2
ClE	Clems fine sandy loam, 12 to 30 percent slopes----	16	VIe-1	49	VIe-2	50	----------	--	---
EcC	Elijah-Chilcott silt loams, 3 to 7 percent slopes----------	16	IIIe-8	47	VIe-2	50	Loamy, 8 to 12 inch PZ	55	2
EeB	Elijah-Sebree silt loams, 1 to 3 percent slopes---	17	IIIe-6	46	VIc-1	50	Loamy, 8 to 12 inch PZ	55	---
	Elijah soil----------	--	-----	--	-----	--	----------	--	1
	Sebree soil----------	--	-----	--	-----	--	----------	--	---
ElD	Elijah-Vickery silt loams, 7 to 12 percent slopes--	17	IVe-1	48	VIe-2	50	Loamy, 8 to 12 inch PZ	55	2
ElD2	Elijah-Vickery silt loams, 7 to 12 percent slopes, eroded----------	17	IVe-1	48	VIe-2	50	Loamy, 8 to 12 inch PZ	55	2
Em	Emerson sandy loam--------	17	IIe-3	46	-----	--	----------	--	5
Fa	Falk fine sandy loam------	18	IIIw-1	47	-----	--	----------	--	4
GBE	Gem-Bakeoven complex, 2 to 30 percent slopes----	19	-----	--	VIIs-1	50	----------	--	---
	Gem soil----------	--	-----	--	-----	--	Stony, 12 to 16 inch PZ	58	---
	Bakeoven soil---------	--	-----	--	-----	--	Very Shallow, 8 to 16 inch PZ	59	---
GBF	Gem-Bakeoven complex, 30 to 65 percent slopes----	19	-----	--	VIIs-1	50	----------	--	---
	Gem soil----------	--	-----	--	-----	--	Steep Stony Slope, 12 to 16 inch PZ	58	---
	Bakeoven soil---------	--	-----	--	-----	--	Very Shallow, 8 to 16 inch PZ	59	---
GeA	Greenleaf silt loam, 0 to 1 percent slopes--------	20	I-1	45	-----	--	----------	--	1

GUIDE TO MAPPING UNITS--Continued

Map symbol	Mapping unit	Page	Capability unit: Irrigated Symbol	Page	Capability unit: Nonirrigated Symbol	Page	Range site: Name	Page	Windbreak suitability group: Number
GeB	Greenleaf silt loam, 1 to 3 percent slopes	20	IIe-2	45	-----	--	----------	--	1
GeC	Greenleaf silt loam, 3 to 7 percent slopes	20	IIIe-2	46	-----	--	----------	--	2
GeC2	Greenleaf silt loam, 3 to 7 percent slopes, eroded	20	IIIe-2	46	-----	--	----------	--	2
GeD2	Greenleaf silt loam, 7 to 12 percent slopes, eroded	20	IVe-1	48	-----	--	----------	--	2
GeE2	Greenleaf silt loam, 12 to 30 percent slopes, eroded	20	VIe-1	49	-----	--	----------	--	---
GfB	Greenleaf silt loam, saline-alkali, 1 to 3 percent slopes	21	IIe-2	45	-----	--	----------	--	1
Gm	Greenleaf silt loam, wet variant	21	IIIw-6	47	-----	--	----------	--	3
Gn	Greenleaf silt loam, wet variant, saline-alkali	21	IVw-3	48	-----	--	----------	--	3
GOF	Gross stony loam, 30 to 65 percent slopes	22	-----	--	VIIe-1	50	Steep Slope, 16 to 22 inch PZ, less than 47° F.	57	---
GRF	Gross-Bakeoven complex, 30 to 65 percent slopes-	22	-----	--	VIIs-1	50	----------	--	---
	Gross soil	--	-----	--	-----	--	Steep Slope, 16 to 22 inch PZ, less than 47° F.	57	---
	Bakeoven soil	--	-----	--	-----	--	Very Shallow, 8 to 16 inch PZ	59	---
HaA	Harpt loam, 0 to 1 percent slopes	23	I-1	45	IVc-1	49	Loamy, 8 to 12 inch PZ	55	1
HaB	Harpt loam, 1 to 3 percent slopes	23	IIe-2	45	IVc-1	49	Loamy, 8 to 12 inch PZ	55	1
HaC	Harpt loam, 3 to 7 percent slopes	23	IIIe-2	46	IVe-5	48	Loamy, 8 to 12 inch PZ	55	2
HaD	Harpt loam, 7 to 12 percent slopes	23	IVe-1	48	IVe-5	48	Loamy, 8 to 12 inch PZ	55	2
He	Harpt loam, wet variant	23	IIIw-1	47	-----	--	----------	--	4
HlA	Haw loam, 0 to 1 percent slopes	24	I-1	45	IVc-1	49	Loamy, 12 to 16 inch PZ	56	1
HlB	Haw loam, 1 to 3 percent slopes	24	IIe-2	45	IVc-1	49	Loamy, 12 to 16 inch PZ	56	1
HlC	Haw loam, 3 to 7 percent slopes	24	IIIe-2	46	IVe-5	48	Loamy, 12 to 16 inch PZ	56	2
HlD	Haw loam, 7 to 12 percent slopes	24	IVe-1	48	IVe-5	48	Loamy, 12 to 16 inch PZ	56	2
HlE	Haw loam, 12 to 30 percent slopes	24	VIe-1	49	VIe-2	50	Loamy, 12 to 16 inch PZ	56	---
HlE2	Haw loam, 12 to 30 percent slopes, eroded	25	-----	--	VIe-2	50	Loamy, 12 to 16 inch PZ	56	---
HMF	Haw loam, 30 to 65 percent slopes	25	-----	--	VIIe-1	50	Steep Slope, 12 to 16 inch PZ	57	---
HVD	Haw very stony loam, 2 to 12 percent slopes	25	-----	--	VIIs-1	50	Loamy, 12 to 16 inch PZ	56	2
JeA	Jenness loam, 0 to 1 percent slopes	25	I-1	45	VIc-1	50	Loamy, 8 to 12 inch PZ	55	1
JeB	Jenness loam, 1 to 3 percent slopes	26	IIe-2	45	VIc-1	50	Loamy, 8 to 12 inch PZ	55	1

GUIDE TO MAPPING UNITS--Continued

Map symbol	Mapping unit	Page	Capability unit: Irrigated Symbol	Irrigated Page	Capability unit: Nonirrigated Symbol	Nonirrigated Page	Range site: Name	Range site Page	Windbreak suitability group Number
LaC	Lankbush sandy loam, 3 to 7 percent slopes	26	IIIe-3	46	VIe-2	50	Loamy, 8 to 12 inch PZ	55	2
LaE2	Lankbush sandy loam, 12 to 30 percent slopes, eroded	26	VIe-1	49	VIe-2	50	Loamy, 8 to 12 inch PZ	55	---
LbE	Lankbush-Purdam complex, 12 to 30 percent slopes	26	VIe-1	49	VIe-2	50	Loamy, 8 to 12 inch PZ	55	---
LcB	Lanktree-Haw complex, 0 to 3 percent slopes	27	IIe-2	45	IVc-1	49	Loamy, 12 to 16 inch PZ	56	1
LcC	Lanktree-Haw complex, 3 to 7 percent slopes	27	IIIe-2	46	IVe-5	48	Loamy, 12 to 16 inch PZ	56	2
Le	Letha fine sandy loam	28	IVw-3	48	-----	--	---	--	---
Lf	Letha fine sandy loam, slightly saline-alkali	28	IIIw-6	47	-----	--	---	--	4
L1B	Lolalita sandy loam, 1 to 3 percent slopes	28	IIe-3	46	VIc-1	50	Loamy, 8 to 12 inch PZ	55	1
L1C	Lolalita sandy loam, 3 to 7 percent slopes	29	IIIe-3	46	VIe-2	50	Loamy, 8 to 12 inch PZ	55	2
L1D	Lolalita sandy loam, 7 to 12 percent slopes	29	IVe-2	48	VIe-2	50	Loamy, 8 to 12 inch PZ	55	2
L1E	Lolalita sandy loam, 12 to 30 percent slopes	29	-----	--	VIe-2	50	Loamy, 8 to 12 inch PZ	55	---
LMG	Lolalita complex, very steep	29	-----	--	VIIIs-1	50	---	--	---
L0E2	Lolalita-Lankbush complex, 12 to 30 percent slopes, eroded	29	-----	--	VIe-2	50	Loamy, 8 to 12 inch PZ	55	---
LSF	Lolalita-Saralegui association, steep	29	-----	--	VIIe-1	50	---	--	---
	Lolalita soil	--	-----	--	-----	--	Steep Granitic, 8 to 12 inch PZ	57	---
	Saralegui soil	--	-----	--	-----	--	Steep Granitic, 8 to 12 inch PZ	57	---
	Haw soil	--	-----	--	-----	--	Steep Slope, 12 to 16 inch PZ	57	---
Mo	Moulton fine sandy loam	30	IIIw-1	47	-----	--	---	--	4
Mu	Moulton fine sandy loam, slightly saline-alkali	30	IIIw-6	47	-----	--	---	--	4
NcB	Newell clay loam, 1 to 3 percent slopes	31	IIe-2	45	IVc-1	49	Loamy, 12 to 16 inch PZ	56	1
NED	Newell stony clay loam, 3 to 12 percent slopes	31	-----	--	IVe-5	48	Loamy, 12 to 16 inch PZ	56	2
No	Notus coarse sandy loam	32	IVw-5	49	-----	--	---	--	---
NyA	Nyssaton silt loam, 0 to 1 percent slopes	32	I-1	45	-----	--	---	--	1
NyB	Nyssaton silt loam, 1 to 3 percent slopes	32	IIe-2	45	-----	--	---	--	1
NyC	Nyssaton silt loam, 3 to 7 percent slopes	32	IIIe-2	46	-----	--	---	--	2
NyD	Nyssaton silt loam, 7 to 12 percent slopes	32	IVe-1	48	-----	--	---	--	2
NyE	Nyssaton silt loam, 12 to 30 percent slopes	32	VIe-1	49	VIe-2	50	---	--	---
OwA	Owyhee silt loam, 0 to 1 percent slopes	33	I-1	45	-----	--	---	--	1
OwB	Owyhee silt loam, 1 to 3 percent slopes	33	IIe-2	45	-----	--	---	--	1
OwC	Owyhee silt loam, 3 to 7 percent slopes	33	IIIe-2	46	-----	--	---	--	2
OwD2	Owyhee silt loam, 7 to 12 percent slopes, eroded	33	IVe-1	48	-----	--	---	--	2

Map symbol	Mapping unit	Page	Capability unit: Irrigated Symbol	Irrigated Page	Capability unit: Nonirrigated Symbol	Nonirrigated Page	Range site: Name	Range site Page	Windbreak suitability group Number
OwE2	Owyhee silt loam, 12 to 30 percent slopes, eroded--	33	VIe-1	49	VIe-2	50	----------	--	---
PAF	Payette coarse sandy loam, 30 to 65 percent slopes-	34	-----	--	VIIe-1	50	Steep Slope, 12 to 16 inch PZ	57	---
PCF	Payette-Van Dusen association, steep------	34	-----	--	VIIe-1	50	Steep Slope, 12 to 16 inch PZ	57	---
PeB	Power-Elijah silt loams, 1 to 3 percent slopes---	35	IIe-2	45	VIc-1	50	Loamy, 8 to 12 inch PZ	55	1
PeC	Power-Elijah silt loams, 3 to 7 percent slopes---	35	IIIe-8	47	VIe-2	50	Loamy, 8 to 12 inch PZ	55	2
PeD	Power-Elijah silt loams, 7 to 12 percent slopes--	35	IVe-1	48	VIe-2	50	Loamy, 8 to 12 inch PZ	55	2
PoD	Power-Purdam silt loams, 7 to 12 percent slopes--	35	IVe-1	48	VIe-2	50	Loamy, 8 to 12 inch PZ	55	2
PpB	Purdam-Power silt loams, 1 to 3 percent slopes---	36	IIIe-6	46	VIc-1	50	Loamy, 8 to 12 inch PZ	55	1
PpC	Purdam-Power silt loams, 3 to 7 percent slopes---	36	IIIe-8	47	VIe-2	50	Loamy, 8 to 12 inch PZ	55	2
RBE	Reywat-Bakeoven complex, 2 to 30 percent slopes--	37	-----	--	VIIs-1	50	----------	--	---
	Reywat soil----------	--	-----	--	-----	--	Shallow Stony, 12 to 16 inch PZ	59	---
	Bakeoven soil---------	--	-----	--	-----	--	Very Shallow, 8 to 16 inch PZ	59	---
RBF	Reywat-Bakeoven complex, 30 to 60 percent slopes-	37	-----	--	VIIs-1	50	----------	--	---
	Reywat soil----------	--	-----	--	-----	--	Shallow Stony, 12 to 16 inch PZ	59	---
	Bakeoven soil---------	--	-----	--	-----	--	Very Shallow, 8 to 16 inch PZ	59	---
Rh	Riverwash----------	37	-----	--	VIIIw-2	50	----------	--	---
RKG	Rock outcrop-Bakeoven complex, 60 to 80 percent slopes----------	37	-----	--	VIIIs-1	50	----------	--	---
	Rock outcrop----------	--	-----	--	-----	--	----------	--	---
	Bakeoven soil---------	--	-----	--	-----	--	Very Shallow, 8 to 16 inch PZ	59	---
RuE	Ruckles stony loam, 7 to 20 percent slopes-------	38	-----	--	VIIs-1	50	Shallow Stony, 12 to 16 inch PZ	59	---
RVE	Ruckles-Bakeoven extremely stony loams, 2 to 30 percent slopes--	38	-----	--	VIIs-1	50	----------	--	---
	Ruckles soil----------	--	-----	--	-----	--	Shallow Stony, 12 to 16 inch PZ	59	---
	Bakeoven soil---------	--	-----	--	-----	--	Very Shallow, 8 to 16 inch PZ	59	---
RVF	Ruckles-Bakeoven extremely stony loams, 30 to 65 percent slopes-	38	-----	--	VIIs-1	50	----------	--	---
	Ruckles soil----------	--	-----	--	-----	--	Shallow Stony, 12 to 16 inch PZ	59	---
	Bakeoven soil---------	--	-----	--	-----	--	Very Shallow, 8 to 16 inch PZ	59	---
SAD	Saralegui coarse sandy loam, 1 to 12 percent slopes----------	39	-----	--	VIe-2	50	Loamy, 8 to 12 inch PZ	55	5
SAE	Saralegui coarse sandy loam, 12 to 30 percent slopes----------	39	-----	--	VIe-2	50	Loamy, 8 to 12 inch PZ	55	---

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Map symbol	Mapping unit	Page	Capability unit: Irrigated Symbol	Irrigated Page	Capability unit: Nonirrigated Symbol	Nonirrigated Page	Range site: Name	Range site Page	Windbreak suitability group Number
SHE2	Saralegui-Haw complex, 12 to 30 percent slopes, eroded----------	39	-----	--	VIe-2	50	----------	--	---
	Saralegui soil--------	--	-----	--	-----	--	Loamy, 8 to 12 inch PZ	55	---
	Haw soil----------	--	-----	--	-----	--	Loamy, 12 to 16 inch PZ	56	---
SLF	Saralegui complex, 30 to 60 percent slopes-------	39	-----	--	VIIe-1	50	----------	--	---
	Saralegui soil--------	--	-----	--	-----	--	Steep Granitic, 8 to 12 inch PZ	57	---
	Ager soil----------	--	-----	--	-----	--	Dense Clay, 12 to 16 inch PZ	58	---
TE	Terrace escarpments-------	40	-----	--	VIIIs-1	50	----------	--	---
ThE	Tindahay loamy coarse sand, 12 to 30 percent slopes----------	40	VIe-1	49	VIe-2	50	Loamy, 8 to 12 inch PZ	55	---
T1C	Tindahay coarse sandy loam, 3 to 7 percent slopes----------	40	IIIe-3	46	VIe-2	50	Loamy, 8 to 12 inch PZ	55	5
T1D	Tindahay coarse sandy loam, 7 to 12 percent slopes----------	41	IVe-2	48	VIe-2	50	Loamy, 8 to 12 inch PZ	55	5
TmD	Tindahay-Cashmere complex, 7 to 12 percent slopes--	41	IVe-2	48	VIe-2	50	Loamy, 8 to 12 inch PZ	55	5
TrC	Truesdale fine sandy loam, 3 to 7 percent slopes---	41	IIIe-3	46	-----	--	----------	--	2
TrD	Truesdale fine sandy loam, 7 to 12 percent slopes--	41	IVe-2	48	-----	--	----------	--	2
TuB	Turbyfill fine sandy loam, 1 to 3 percent slopes---	42	IIe-3	46	-----	--	----------	--	1
TuC	Turbyfill fine sandy loam, 3 to 7 percent slopes---	42	IIIe-3	46	-----	--	----------	--	2
TuD	Turbyfill fine sandy loam, 7 to 12 percent slopes--	42	IVe-2	48	-----	--	----------	--	2
VDF	Van Dusen-Haw loams, 30 to 65 percent slopes----	43	-----	--	VIIe-1	50	Steep Slope, 12 to 16 inch PZ	57	---

1/ PZ = precipitation zone.

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