SOIL SURVEY

Teton Area Idaho-Wyoming

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with
IDAHO AND WYOMING AGRICULTURAL EXPERIMENT STATIONS

Issued October 1969

Major fieldwork for this soil survey was done in the period 1955–1960. Soil names and descriptions were approved in 1966. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1960. This survey was made cooperatively by the Soil Conservation Service, the Idaho Agricultural Experiment Station, and the Wyoming Agricultural Experiment Station; it is part of the technical assistance furnished to the Teton Soil Conservation District in Idaho and the Teton Soil and Water Conservation District in Wyoming.

HOW TO USE THIS SOIL SURVEY

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

Locating Soils

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

On each sheet of the detailed map, soil areas are outlined and are identified by symbol. 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 in the survey. This guide lists all of the soils of the Area in alphabetic order by map symbol. It shows the page where each kind of soil is described, and also the page for the capability unit, woodland group, and range site in which the soil has been placed.

Interpretations not included can be developed by using information in the text to group the soils according to their suitability or limitations for a particular use. 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 with a moderate limitation can be colored yellow, and those with 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 the discussions of the capability units, range sites, woodland groups, and wildlife groups.

Foresters and others can refer to the section "Management of the Soils for Woodland," where the soils of the Area are grouped according to their suitability for trees.

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

Ranchers and others interested in range can find, under "Management of the Soils for Range," groupings of the soils according to their suitability for range.

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

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

Newcomers in the Teton Area may be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the section "General Nature of the Area."

Cover picture

The Teton Area is nearly surrounded by mountains, such as these snow-covered Tetons, which are just east of the Area. Lantonia and Rin soils are in the foreground; Driggs and Badgerton soils are in the valley toward the background; Turnerville and Swanner soils are predominant on the foothills.

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SOIL SURVEY OF TETON AREA, IDAHO-WYOMING

BY D. M. DANIELS, H. L. HANSEN, T. W. PRIEST, AND W. G. PERRIN, SOIL CONSERVATION SERVICE[1]

UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, IN COOPERATION WITH UNIVERSITY OF IDAHO, IDAHO AGRICULTURAL EXPERIMENT STATION, AND UNIVERSITY OF WYOMING, WYOMING AGRICULTURAL EXPERIMENT STATION

THE TETON AREA consists of the privately owned land of Teton County, Idaho, and that part of the privately owned land of Teton County, Wyoming, around Alta (fig. 1). The scenic Teton peaks are a few miles east of the Area.

The Area covers 201,930 acres, or nearly 316 square miles, of which 194,060 acres is in Idaho, and 7,870 acres is in Wyoming. About 45,000 acres is irrigated, 82,000 acres is dryfarmed, 31,000 acres is in pasture and range, 26,000 acres is in woodland, and the rest is used for miscellaneous purposes.

The southeastern part of the Area is a valley that extends north and south for about 20 miles and is about 12 miles wide at the widest point. The elevation ranges from 6,000 to 6,600 feet. Mountains rise abruptly from the valley to the east, south, and west, and slightly elevated, silt-covered uplands adjoin it on the north. The valley consists of long, gently sloping alluvial fans, low terraces, and the level bottom lands of the Teton River and its tributaries. The river flows northward through the Area, enters a canyon northwest of Tetonia, then flows westward through this deep canyon along the north county line.

Most of the soils at the higher elevations on the fans are irrigated. A shortage of irrigation water, especially during the last part of the growing season, has somewhat limited agricultural development. During the growing season, the water from the mountain streams is diverted to the alluvial fans for irrigation. Springs and water surfacing in the bottom lands near the center of the valley keep the Teton River at a fairly high level during the summer. Shortage of irrigation water, a short growing season, low productivity of the soils, inadequate drainage, and erosion are the main problems that farmers have to overcome in this part of the Area.

The foothills and mountains adjoining the valley to the east, south, and southwest are wooded with aspen and conifers and are used chiefly for grazing and timber production.

The level to hilly uplands in the northern part of the Area are covered with deep silt loams. The elevation ranges from 5,800 to 7,000 feet. These soils are generally dryfarmed for wheat and barley in a grain-fallow system. Water erosion, drought, and unseasonal frost are the main problems in this part of the Area.

[1] D. J. LEWIS, W. R. ROSS, D. L. SHRYDER, C. W. CASE, and BOYD HULSE, Soil Conservation Service, assisted in the field survey.

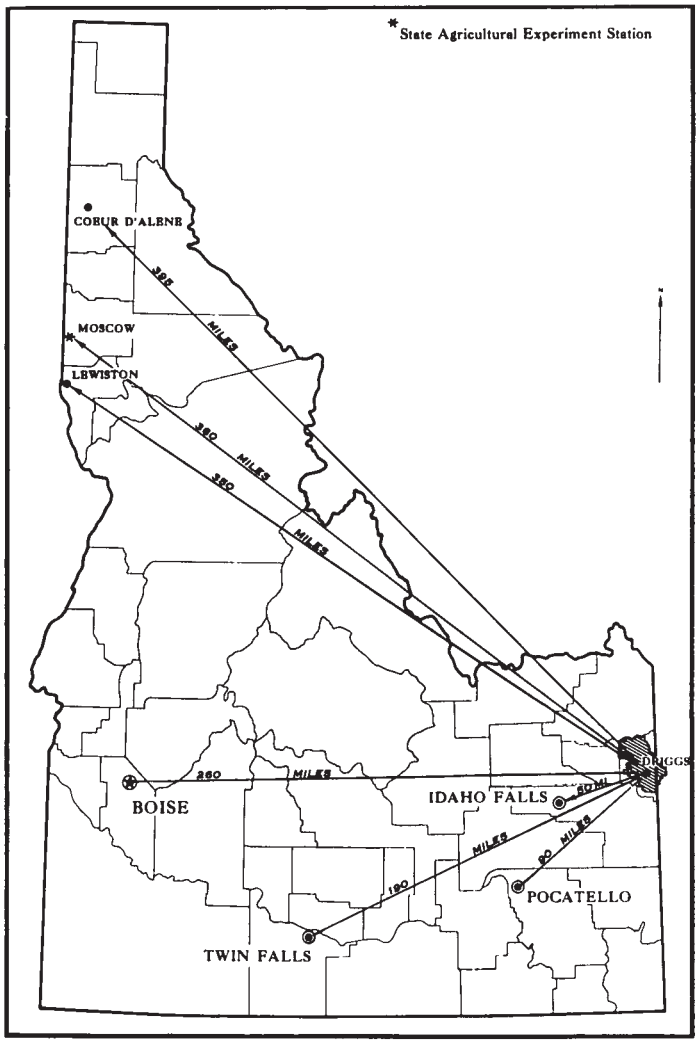

Figure 1.—Location of the Teton Area in Idaho and Wyoming.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soils are in the Teton Area, where they are located, and how they can be used. They went into the Area knowing they

likely would find many soils they had already seen and perhaps some they had not. As they traveled over the Area, they observed steepness, length, and shape of slopes; size and speed of streams; kinds of native plants or crops; 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 roots of plants.

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. To use this information efficiently, it is necessary to know the kinds of groupings most used in a local soil classification.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, the major horizons of all the soils of one series 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. Driggs and Foxcreek, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in those characteristics that affect their behavior in the natural, undisturbed landscape. Soils of one series can differ somewhat in texture of the surface soil and in slope, stoniness, or some other characteristic that affects use of the soils by man.

Many soil series contain soils that differ in texture of their surface layer. According to such differences in texture, separations called soil types are made. Within a series, all the soils having a surface layer of the same texture belong to one soil type. Foxcreek loam and Foxcreek silty clay loam are two soil types in the Foxcreek series. The difference in texture of their surface layers is apparent from their names.

Some types vary so much in slope, degree of erosion, number and size of stones, or some other feature affecting their use, that practical suggestions about their management could not be made if they were shown on the soil map as one unit. Such soil types are divided into phases. The name of a soil phase indicates a feature that affects management. For example, Driggs silt loam, 2 to 4 percent slopes, is one of several phases of Driggs silt loam, a soil type that has a slope range of 0 to 8 percent.

In the Teton Area the availability of irrigation water has influenced the mapping of the soils. The soils that are in irrigated areas have been mapped within narrower slope ranges than soils of the same series in dryfarmed areas. For example, some of the Lantonia silt loams that are in dryfarmed areas have been mapped with slope ranges of 0 to 4 percent and 4 to 12 percent, whereas the Lantonia silt loams that are in irrigated areas have been mapped with slope ranges of 2 to 4 percent, 4 to 8 percent, and 8 to 12 percent.

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 the aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning management of farms and fields, a mapping unit is nearly equivalent to a soil type or a phase of a soil type. 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 type or soil phase.

In preparing some detailed maps, the soil scientists have a problem of delineating areas where different kinds of soils are so intricately mixed and occur in individual areas of such small size that it is not practical to show them separately on the map. They show such a mixture of soils as one mapping unit and call it a soil complex. Ordinarily, a soil complex is named for the major kinds of soil in it, for example, Badgerton-Wiggleton complex.

Most surveys include areas where the soil material is so rocky, so shallow, or so frequently worked by wind and water that it cannot be classified by soil series. These areas are shown on the map like other mapping units, but are given descriptive names, such as Rock land or Marsh, and are called land types.

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

But only part of a soil survey is done when the soils have been named, described, and delineated on the map and the laboratory data and yield data have been assembled. The mass of detailed information then needs to be organized in such a way that it is readily useful to different groups of readers, among them farmers, ranchers, managers of woodland, engineers, and homeowners. Grouping soils that are similar in suitability for each specified use is the method of organization commonly used in the soil survey. On the basis of the yield and practice tables and other data, the soil scientists set up trial groups. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others, 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 present 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 the Teton Area of Idaho and Wyoming. 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 map showing soil associations is useful to people who want a general idea of the soils in an area, who want to compare different parts of an area, or who want to know the location of large tracts that are suitable for a certain kind of farming or other land use. Such a map is not suitable for planning the management of a farm or field, because the soils in any one association ordinarily

differ in slope, depth, stoniness, drainage, and other characteristics that affect management.

The eight soil associations in the Teton Area are described here.

1. *Tetonia-Lantonia-Ririe association*

Gently undulating to rolling, well-drained soils that formed in loess on uplands

This association is made up of very deep, loamy soils that formed in loess under grass and sagebrush. These soils are at an elevation of 5,800 to 6,200 feet. They receive from 13 to 16 inches of precipitation annually, the amount generally increasing from west to east. This association is in the northwestern part of the Area and occupies about 27 percent of the acreage.

Tetonia soils make up about 45 percent of the association, Lantonia soils 25 percent, and Ririe soils 15 percent. Swanner, Greys, Rin, Judkins, Rammel, and other soils make up the rest.

In a typical pattern (fig. 2), Tetonia soils are on broad ridgetops, Lantonia, Rin, and Greys soils are on north and east slopes, Ririe and Swanner soils are on south and west slopes, and Judkins and Rammel soils are on canyon walls.

Tetonia, Lantonia, Ririe, Rin, and Greys soils have a silt loam profile more than 36 inches deep. A small acreage of these soils is sprinkler irrigated with water from the Teton River, but most of the acreage is dryfarmed and used for wheat and barley. Some alfalfa is grown for hay. Much of the acreage of Greys soils is covered with aspen and is used for grazing. Rammel and Swanner soils, which are generally stony, are idle or are used for grazing. Judkins soils, which have a cover of pine, are too stony or too steep for cultivation and are used for grazing and for timber.

The farms in this association are comparatively large. Most of the families live on their farms only during the cropping season and move to Driggs or Tetonia or out of the Area during the winter.

2. *Lantonia-Tetonia-Rin association*

Undulating and rolling, well-drained soils that formed in loess on uplands

Very deep, dark-colored, loamy soils make up this association. These soils formed in loess under tall bunchgrass and some sagebrush and aspen. They are at an elevation of 6,000 to 6,400 feet and receive from 16 to 20 inches of precipitation annually. This association is in the northeastern part of the Area and occupies about 8 percent of the acreage.

Lantonia soils make up about 35 percent of the association, Tetonia soils 30 percent, and Rin soils 15 percent. Greys, Rammel, Judkins, and other soils make up the rest. Lantonia soils generally are on broad ridgetops, Tetonia soils on gentle to moderate south slopes, and Rin soils on north or east slopes (fig. 3). Rammel soils are on steep south canyon walls, and Judkins and Greys soils are on north canyon walls.

Lantonia, Tetonia, Rin, and Greys soils have a silt loam profile more than 36 inches deep. The Lantonia, Tetonia, and Rin soils are dryfarmed for wheat and barley. Most of the acreage of Greys soils has a cover of aspen. Rammel

Figure 2.—Looking west, a view of the Tetonia-Lantonia-Ririe association. Dark-colored Lantonia soils are on north slopes; light-colored Ririe soils are on south slopes; and Tetonia soils are on ridgetops.

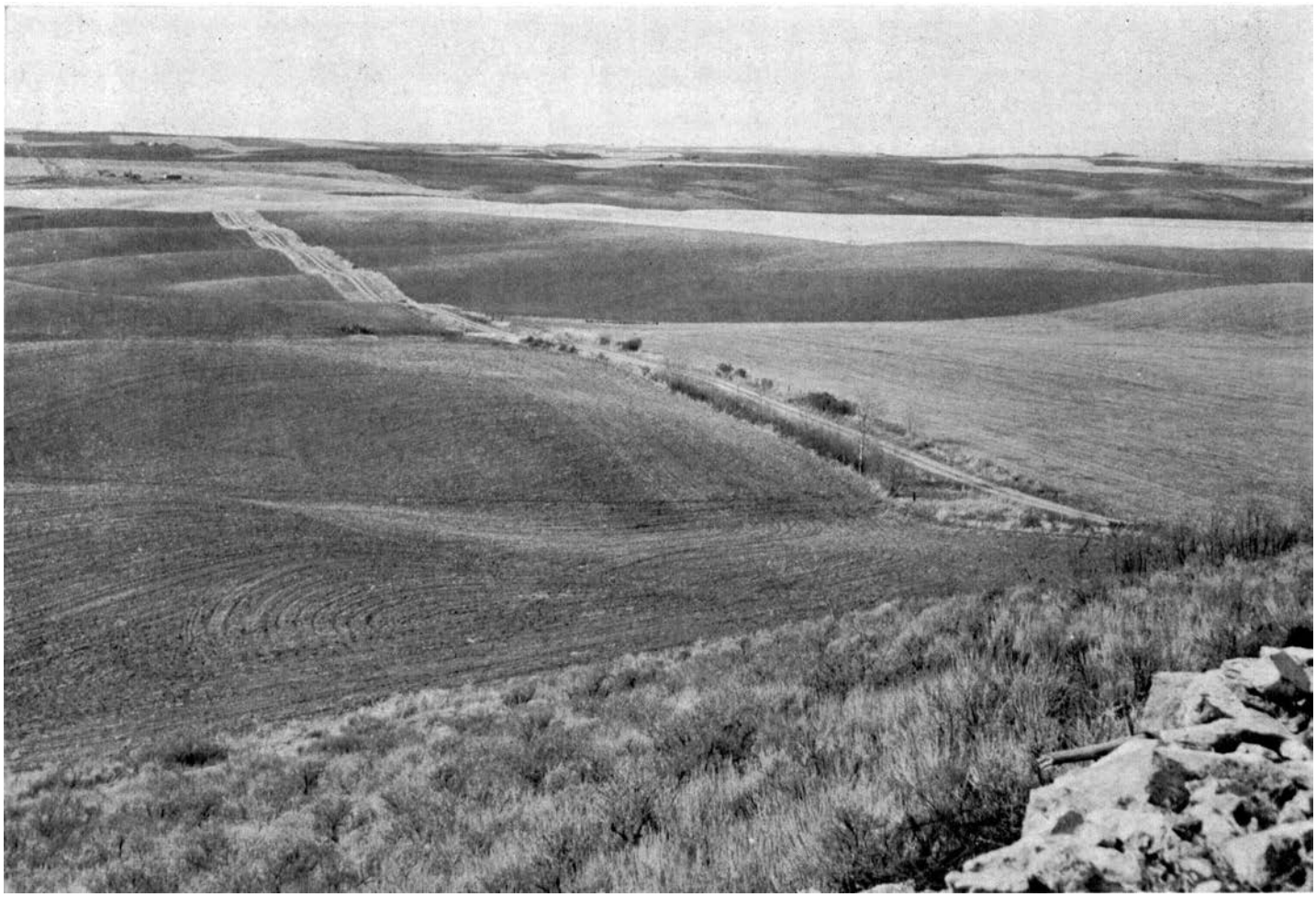

Figure 3.—**Looking northwest, a view of the Lantonia-Tetonia-Rin association. This part of the association is northeast of Felt. Rin soils are on north slopes, Tetonia soils are on south slopes, Lantonia soils are on ridgetops and gentle north slopes, and Rammel soils are in the stony sagebrush area in the foreground.**

soils are generally too steep and stony for cultivation. Judkins soils, also steep and stony, have a pine cover and are used for grazing and timber.

The farms in this association are comparatively large. Most of the families live on their farms during the cropping season and move to towns during winter.

3. *Driggs-Tetonia-Badgerton association*

Level to gently sloping, well-drained soils that formed in alluvium and loess over gravel and sand

This association is made up of soils that formed in medium-textured alluvium and loess underlain by gravel and sand. The original vegetation was mostly bunchgrass and sagebrush. The elevation is 6,000 to 7,000 feet, and the annual precipitation is 13 to 20 inches. This association occupies about 25 percent of the Area and is on the east side of the Teton River valley.

Driggs soils make up about 65 percent of the association, Tetonia soils 15 percent, and Badgerton soils 7 percent. Also in the association are Wiggleton, Felt, Feltonia, and other soils.

All of these soils are loamy, and some are gravelly. The depth to gravel is 20 to 36 inches in Driggs and Felt soils and 36 to 60 inches in Tetonia and Feltonia soils. These soils are irrigated and used for wheat, barley, potatoes, and hay. If irrigation water is not available, they are dry-farmed or used for grazing. Badgerton and Wiggleton soils are along the more recent stream channels and have a channeled relief. Badgerton soils are 20 to 36 inches deep over gravel, and Wiggleton soils less than 20 inches. Both are very gravelly in some places. They are used for grazing.

Much water is lost as a result of canal seepage and excessive irrigation. The Badgerton soils are subject to flooding after heavy runoff.

Most of the farms are operated by families who live on them the entire year.

4. *Driggs-Richvale-Tetonia association*

Level to hilly, well-drained soils on alluvial fans and upland ridges

Very deep soils in loess on upland ridges and moderately deep and deep soils on alluvial fans make up this association. These soils formed under bunchgrass and sagebrush. They are at an elevation of 5,800 to 6,000 feet and receive

13 to 20 inches of precipitation annually. This association occupies about 8 percent of the Area and is west of the Teton River.

Driggs soils make up about 25 percent of the association, Richvale soils 20 percent, and Tetonia soils 20 percent. Rin, Ririe, Lantonia, Packsaddle, and other soils make up the rest.

The very deep and deep Tetonia, Ririe, Lantonia, and Rin soils are on ridges. These soils are dryfarmed, except for a few areas where irrigation water is available. The moderately deep Driggs and the deep and very deep Richvale and Packsaddle soils are along drainageways. Large areas of these soils are irrigated if water is available. The rest of the acreage is dryfarmed or grazed. Barley, potatoes, and alfalfa are grown in irrigated areas, and wheat or barley in dryfarmed areas.

The farms are comparatively large and are operated by families who live on them the year round.

5. *Karlan-Ard-Swanner association*

Gently sloping to sloping, moderately deep and shallow, well-drained soils that formed in loess and residuum over bedrock on uplands

This association is made up of medium-textured soils on long, broad upland ridges that are dissected by a few scattered ravines. These soils are less than 36 inches deep to rhyolite bedrock. They formed mostly under bunchgrass and sagebrush. They are at an elevation of 6,000 to 7,000 feet and receive from 12 to 18 inches of precipitation annually. This association occupies about 7 percent of the Area and is at the northern end of the Big Hole Mountains.

Karlan soils make up about 25 percent of the association, Ard soils 25 percent, and Swanner soils 15 percent. Greys, Judkins, and other minor soils make up the rest.

Karlan and Ard soils have a silt loam profile underlain by bedrock at a depth of 20 to 36 inches. They are dryfarmed and are used for wheat and barley. Swanner soils, generally on south and west slopes, are shallow and stony and are idle or are used for grazing. Greys soils are deep silt loams on north and east slopes. They are generally aspen covered and are used for grazing.

Controlling erosion is important because of the limited depth to bedrock. Much of the acreage is stripcropped to control erosion. Stripcropping is fairly easy because the slopes are long, gentle, and uniform.

The farms are comparatively large, and most of the families live on them only during the cropping season.

6. *Foxcreek-Furniss-Zohner association*

Nearly level, poorly drained soils that formed in alluvium on bottom lands

Wet bottom lands in the center of the Teton Valley make up this association. Most of the soils formed in moderately fine textured alluvium and are influenced by a high water table. The vegetation consists of sedges, rushes, willows, shrubby cinquefoil, and other water-tolerant plants (fig. 4). The elevation is 5,900 to 6,200 feet, and the annual precipitation is 13 to 20 inches. This association occupies about 13 percent of the Area.

Foxcreek soils make up about 30 percent of the association, Furniss soils 17 percent, and Zohner soils 17 percent. Latahco, Zundell, Tonks, Tepete, Cedron, and other soils and Marsh make up the rest.

The poorly drained Furniss, Zohner, Tepete, and Cedron soils generally are in the wetter parts near the Teton River. They are used mostly for grazing, but some areas are used as hay meadows. One area of the Tepete soil is mined for peat. The Foxcreek, Tonks, and Latahco soils are on the outer edges of the bottom lands. Some of these areas are irrigated and used for hay and pasture, and some are cultivated occasionally. Zundell soils are on low terraces and have better drainage than the other soils. The Marsh areas are covered by water most of the time and have little value for farming.

Because of the high water table, these soils are generally not suitable for crops. They can be made more productive of pasture and hay by careful management of grazing and water and by seeding with improved grasses and legumes. They provide good habitats for waterfowl.

The ownerships in this association vary in size but are comparatively large. Most of the land is owned by farmers who live on the surrounding irrigated farmland and use these areas for grazing and for hay. A few families live in these areas.

7. *Turnerville-Greys-Rammel association*

Gently sloping to very steep, moderately deep to very deep, well-drained soils that formed in loess and residuum over bedrock on uplands

This soil association, dissected by ravines, rises abruptly above the surrounding country. The vegetation is predominantly lodgepole pine and aspen. The elevation is 6,400 to 7,000 feet, and the annual precipitation is 20 to 25 inches. The total acreage is about 6 percent of the Area.

Turnerville soils make up about 25 percent of the association, Greys soils 25 percent, and Rammel soils 20 percent. Judkins, Badgerton, Lantonia, Rin, and other soils occur to a minor extent.

At the lower elevations, Greys soils are on ridgetops and north slopes. At the higher elevations, Turnerville soils are in these positions. Greys and Turnerville soils have a silt loam or silt surface layer. The subsoil contains more clay than the surface layer. These soils are used for timber and grazing.

The Rammel soils, which are on south and west slopes, are extremely stony and are used only for grazing. Proper management of grazing and timber is necessary to keep these soils productive, to control erosion, and to conserve the water supply.

Most of this association is owned in conjunction with adjoining farmland.

8. *Greys-Mikesell-Dranyon association*

Strongly rolling to very steep, well-drained soils that formed in loess and residuum on mountain foot slopes

Mountain foot slopes rising abruptly on both sides of the Teton Valley make up this association. Most of the soils are underlain by bedrock. The elevation is 6,000 to 7,000 feet, and the annual precipitation is 16 to 28 inches. This association occupies about 6 percent of the Area and is in the southern part.

Greys soils make up about 30 percent of the association, Mikesell soils 12 percent, and Dranyon soils 8 percent. Dra, Ridgecrest, Turnerville, and other minor soils make up the rest.

Figure 4.—**Willows and wet-meadow vegetation on Foxcreek, Furniss, Zohner, and Cedron soils along the Teton River. The Teton Mountains in the background are outside the survey Area.**

Greys soils formed in deep loess, and the stony Dranyon soils formed in deep residuum. These soils are aspen covered and are used for grazing. Mikesell soils also formed in deep residuum, and are mostly on north and east slopes. They have a cover of pines and are used for timber and grazing. Dra and Ridgecrest soils, which are generally on south and west slopes, are gravelly or stony in places and have a sagebrush and grass vegetation. They are used for grazing. Careful management of grazing and timber is necessary to protect these soils.

Most of the association is owned in conjunction with adjoining farmland.

Descriptions of the Soils

The soil series and their component mapping units are described in this section. The approximate acreage and proportionate extent of each mapping unit are given in table 1.

Each series description contains information about the soil features and related factors that affect the use of the soils for farming and other purposes. Following each series description are descriptions of the mapping units. The first mapping unit has a profile that is representative of the series, and the profile is described in detail. The rest of the mapping units are then described briefly, and, if they differ from the first mapping unit in ways that are not obvious from the name, the differences are pointed out.

Following the name of each mapping unit is a symbol in parentheses that identifies the mapping unit on the detailed soil map. Listed at the end of the description of each mapping unit are the capability unit, range site, and woodland group in which the mapping unit has been placed. The pages on which these are described are given in the "Guide to Mapping Units" at the back of this publication.

Many terms used in the soil descriptions are defined in the Glossary.

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

Soil	Acres	Percent
Ard silt loam, 4 to 12 percent slopes	3,990	2.0
Ard silt loam, 0 to 4 percent slopes	526	.3
Ard silt loam, 20 to 35 percent slopes	126	.1
Badgerton loam, 0 to 2 percent slopes	1,577	.8
Badgerton loam, 2 to 4 percent slopes	366	.2
Badgerton loam, deep, 0 to 2 percent slopes	184	.1
Badgerton gravelly loam, 0 to 2 percent slopes	1,108	.5
Badgerton gravelly loam, 2 to 4 percent slopes	82	(1)
Badgerton gravelly loam, 4 to 8 percent slopes	341	.2
Badgerton very stony loam, 4 to 8 percent slopes	307	.1
Badgerton-Wiggleton complex, 0 to 2 percent slopes	1,241	.6
Cedron silty clay loam	517	.3
Dra silt loam, 12 to 20 percent slopes	558	.3
Dra very stony loam, 12 to 20 percent slopes	187	.1
Dra very stony loam, 30 to 60 percent slopes	294	.1
Dranyon stony loam, 30 to 60 percent slopes	582	.3
Dranyon stony loam, 20 to 30 percent slopes	468	.2
Driggs silt loam, 0 to 2 percent slopes	14,692	7.3
Driggs silt loam, 0 to 2 percent slopes, channeled	469	.2
Driggs silt loam, 2 to 4 percent slopes	6,723	3.3
Driggs silt loam, 4 to 8 percent slopes	619	.3
Driggs gravelly loam, 0 to 2 percent slopes	13,026	6.4
Driggs gravelly loam, 2 to 4 percent slopes	2,145	1.1
Driggs gravelly loam, 4 to 12 percent slopes	666	.3
Driggs cobbly loam, 0 to 2 percent slopes	447	.2
Driggs-Wiggleton gravelly loams, 0 to 2 percent slopes	999	.5
Felt loam, 0 to 2 percent slopes	876	.4
Felt loam, 2 to 4 percent slopes	307	.1
Felt loam, 4 to 8 percent slopes	105	(1)
Felt loam, 8 to 12 percent slopes	294	.1
Felt gravelly loam, 4 to 12 percent slopes	326	.2
Feltonia loam, 0 to 2 percent slopes	1,257	.6
Feltonia loam, 2 to 4 percent slopes	348	.2
Feltonia loam, sandy substratum, 2 to 4 percent slopes	298	.1
Feltonia loam, sandy substratum, 4 to 12 percent slopes	280	.1
Foxcreek loam	4,532	2.2
Foxcreek loam, shallow variant	180	.1
Foxcreek gravelly loam	2,592	1.3
Foxcreek gravelly loam, shallow variant	393	.2
Foxcreek silty clay loam, heavy subsoil variant	534	.3
Furniss silty clay loam	3,912	1.9
Furniss mucky silty clay loam	715	.4
Greys silt loam, 4 to 12 percent slopes	3,435	1.7
Greys silt loam, 12 to 20 percent slopes	3,167	1.6
Greys silt loam, 20 to 30 percent slopes	3,405	1.7
Greys silt loam, thick surface variant, 30 to 60 percent slopes	662	.3
Greys-Rin silt loams, 12 to 20 percent slopes	199	.1
Judkins extremely stony loam, 60 to 80 percent slopes	935	.5
Judkins extremely stony loam, 12 to 30 percent slopes	367	.2
Judkins extremely stony loam, 30 to 60 percent slopes	840	.4
Karlan silt loam, 4 to 12 percent slopes	3,206	1.6
Karlan silt loam, 0 to 4 percent slopes	517	.3
Karlan silt loam, 12 to 20 percent slopes	349	.2
Karlan silt loam, 20 to 40 percent slopes	364	.2
Lantonia silt loam, 4 to 12 percent slopes	6,210	3.1
Lantonia silt loam, 0 to 4 percent slopes	1,449	.7
Lantonia silt loam, 2 to 4 percent slopes	1,966	1.0
Lantonia silt loam, 4 to 8 percent slopes	1,370	.7
Lantonia silt loam, 8 to 12 percent slopes	229	.1
Lantonia silt loam, 12 to 20 percent slopes	754	.4
Lantonia silt loam, 12 to 20 percent slopes, eroded	109	.1
Lantonia silt loam, 20 to 30 percent slopes	470	0.2
Lantonia-Rin silt loams, 4 to 12 percent slopes	534	.3
Lantonia-Rin silt loams, 12 to 20 percent slopes	628	.3
Lantonia-Tetonia silt loams, 0 to 4 percent slopes	967	.5
Lantonia-Tetonia silt loams, 4 to 8 percent slopes	256	.1
Lantonia-Tetonia silt loams, 4 to 12 percent slopes	3,350	1.7
Lantonia-Tetonia silt loams, 12 to 20 percent slopes	2,465	1.2
Lantonia-Tetonia silt loams, 12 to 20 percent slopes, eroded	410	.2
Latahco loam, cold variant	680	.3
Marsh	226	.1
Mikesell stony silt loam, 20 to 30 percent slopes	496	.2
Mikesell very stony silt loam, 30 to 50 percent slopes	1,039	.5
Packsaddle silt loam, 0 to 2 percent slopes	1,050	.5
Packsaddle silt loam, 2 to 4 percent slopes	97	(1)
Packsaddle loam, 4 to 12 percent slopes	72	(1)
Rammel extremely stony loam, 30 to 60 percent slopes	2,385	1.2
Rammel extremely stony loam, 12 to 30 percent slopes	1,391	.7
Rammel extremely stony loam, 60 to 80 percent slopes	319	.2
Rammel very stony loam, 2 to 12 percent slopes	546	.3
Rammel-Swanner extremely stony complex, 60 to 80 percent slopes	263	.1
Richvale silt loam, 0 to 2 percent slopes	1,734	.9
Richvale silt loam, 2 to 4 percent slopes	661	.3
Ridgecrest stony loam, 30 to 60 percent slopes	639	.3
Ridgecrest stony loam, 4 to 30 percent slopes	372	.2
Rin silt loam, 4 to 12 percent slopes	1,576	.8
Rin silt loam, 2 to 4 percent slopes	1,219	.6
Rin silt loam, 4 to 8 percent slopes	819	.4
Rin silt loam, 8 to 12 percent slopes	244	.1
Rin silt loam, 12 to 20 percent slopes	458	.2
Rin silt loam, 20 to 30 percent slopes	322	.2
Rin-Greys silt loams, 12 to 20 percent slopes	565	.3
Ririe silt loam, 4 to 12 percent slopes, eroded	5,012	2.5
Ririe silt loam, 4 to 12 percent slopes, severely eroded	357	.2
Ririe silt loam, 12 to 20 percent slopes, eroded	953	.5
Ririe silt loam, 12 to 20 percent slopes, severely eroded	391	.2
Ririe silt loam, 20 to 30 percent slopes, eroded	218	.1
Ririe-Tetonia silt loams, 4 to 12 percent slopes	1,210	.6
Ririe-Tetonia silt loams, 12 to 20 percent slopes	229	.1
Ririe-Tetonia silt loams, 12 to 20 percent slopes, severely eroded	141	.1
Rock land	49	(1)
Swanner extremely stony loam, 12 to 30 percent slopes	1,457	.7
Swanner stony loam, 0 to 12 percent slopes	333	.2
Swanner very stony loam, 0 to 12 percent slopes	1,072	.5
Swanner extremely stony loam, 30 to 60 percent slopes	1,774	.9
Swanner extremely stony loam, 60 to 80 percent slopes	1,119	.6
Tepete peat, shallow	1,616	.8
Tepete peat	336	.2
Tetonia silt loam, 0 to 4 percent slopes	13,705	6.8
Tetonia silt loam, 0 to 2 percent slopes	1,270	.6
Tetonia silt loam, 2 to 4 percent slopes	4,235	2.1
Tetonia silt loam, 4 to 8 percent slopes	385	.2
Tetonia silt loam, 4 to 12 percent slopes	9,977	4.9
Tetonia silt loam, 8 to 12 percent slopes	345	.2
Tetonia silt loam, 12 to 20 percent slopes	1,027	.5
Tetonia-Lantonia silt loams, 4 to 12 percent slopes	1,717	.8

See footnote at end of table.

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

Soil	Acres	Percent	Soil	Acres	Percent
Tetonia-Lantonia silt loams, 12 to 20 percent slopes	1, 549	0. 8	Turnerville silt loam, 30 to 45 percent slopes	817	0. 4
Tetonia-Ririe silt loams, 4 to 12 percent slopes	4, 439	2. 2	Wiggleton gravelly loam	726	. 4
Tetonia-Ririe silt loams, 12 to 20 percent slopes	400	. 2	Wiggleton very gravelly loam	2, 662	1. 3
Tonks silty clay loam	2, 687	1. 3	Wiggleton loam	273	. 1
Tonks-Cedron silty clay loams	547	. 3	Wiggleton-Badgerton gravelly loams	319	. 2
Tonks silt loam, strongly calcareous variant, 2 to 4 percent slopes	202	. 1	Zohner silty clay loam	3, 944	2. 0
Tonks silt loam, strongly calcareous variant, 0 to 2 percent slopes	479	. 2	Zohner silty clay loam, moderately deep variant	742	. 4
Turnerville silt loam, 4 to 12 percent slopes	507	. 2	Zufelt loam	970	. 5
Turnerville silt loam, 12 to 20 percent slopes	969	. 5	Zufelt-Foxcreek loams	1, 056	. 5
Turnerville silt loam, 20 to 30 percent slopes	1, 482	. 7	Zundell silty clay loam	3, 257	1. 6
			Total	201, 930	100. 0

[1] Less than 0.05 percent.

Ard Series

The Ard series consists of well-drained, medium-textured soils underlain by rhyolite bedrock at a depth of 20 to 36 inches. These soils formed in shallow loess that has been deposited on and mixed with residuum from rhyolite, rhyolitic tuff, or latite. The original vegetation consisted predominantly of bluebunch wheatgrass and sagebrush.

Ard soils are south of Clementsville in the northwestern part of the Area. They generally occupy long, gentle to moderate, north slopes at an elevation of 6,000 to 7,000 feet, and they receive from 12 to 17 inches of precipitation annually. The mean annual temperature is 40° F., and there are about 80 days between killing frosts.

The surface layer is silt loam 6 to 16 inches thick. It is dark grayish brown in the upper part and grayish brown in the lower part. Underlying the surface layer is strongly calcareous, light-gray to white loam that contains flagstones and other platy stones and extends to bedrock, which is at a depth of 20 to 36 inches.

These soils are associated with darker colored Karlan soils and shallow Swanner soils.

Ard silt loam, 4 to 12 percent slopes (ArD).—This soil occupies large areas south of Clementsville. It has long, north slopes, predominantly of 5 to 8 percent. Included in mapping were small areas of shallower, stonier soils, and also some drainageways that are eroded to bedrock but total less than 10 percent of any given area.

Representative profile, 10 feet east of road right-of-way and 1,220 feet north of the southwest corner of sec 10, T. 6 N., R. 43 E., in a cultivated field:

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam that contains a few pebbles, very dark brown (10YR 2/2) when moist; weak, very fine, granular structure; slightly hard when dry, very friable when moist, and slightly sticky and slightly plastic when wet; plentiful, fine and very fine roots; common, very fine, tubular pores; no bleached silt grains or only very few; noncalcareous; mildly alkaline (pH 7.8); abrupt, smooth boundary. Lowermost 1 inch has weak, medium and thin, platy structure and apparently is a plowsole.

A11—7 to 11 inches, dark grayish-brown (10YR 4/2) silt loam that contains a few pebbles, very dark grayish brown (10YR 3/2) when moist; very weak, medium and coarse, prismatic structure parting to weak, very fine, granular structure; slightly hard when dry, very friable when moist, and slightly sticky and slightly plastic when wet; plentiful very fine and fine roots; many micropores and very fine, continuous, tubular pores; slightly calcareous; moderately alkaline (pH 8.0); clear, smooth boundary.

A12—11 to 16 inches, grayish-brown (10YR 5/2) silt loam that contains a few pebbles, very dark grayish brown (10YR 3/2) when moist; very weak, medium and coarse, prismatic structure parting to weak, medium, subangular blocky structure; slightly hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; plentiful very fine and fine roots; many, very fine, continuous, tubular pores; moderately calcareous; moderately alkaline (pH 8.2); clear, wavy boundary.

C1ca—16 to 25 inches, light-gray (10YR 7/2) loam that contains a few pebbles 2 to 5 millimeters in diameter, grayish brown (10YR 5/2) when moist; weak, medium and fine, subangular blocky structure; few ¼- to ½-inch subrounded nodules of soil material; hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; few very fine and fine roots; common, very fine, continuous, tubular pores; strongly calcareous; common calcium carbonate veins 1 millimeter in diameter; rock fragments coated with calcium carbonate on lower side; strongly alkaline (pH 8.5); clear, smooth boundary.

C2ca—25 to 32 inches, white (10YR 8/2) channery loam that contains many flagstones and platy stones of rhyolite or rhyolitic tuff, pale brown (10YR 6/3) when moist; massive; hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; few fine roots; many, very fine, tubular pores; strongy calcareous; rock fragments coated with calcium carbonate on lower side; strongly alkaline (pH 8.5); abrupt, irregular boundary.

R—32 inches, gray (5YR 5/1), fractured rhyolitic tuff or rhyolite, light gray (5YR 7/1) when moist; cracks contain small quantities of strongly calcareous channery loam or coarse sandy loam.

The A horizon of this soil has a color value of 4 to 5 when dry and is at least one color value darker than the C horizon. The Cca horizon is more than 15 percent carbonates. The depth to bedrock ranges from 20 to 36 inches. There are a few angular pieces of gravel throughout the profile. In some places, the surface layer is slightly calcareous as a result of cultivation, erosion, or rodent activity.

Natural drainage is good, permeability is moderate, and the available moisture capacity is moderate. Roots penetrate the cracks in the upper part of the fractured bedrock. The organic-matter content is moderate, and natural fertility is high. The erosion hazard is severe.

Most areas of this soil are dryfarmed. The principal crops are wheat and barley, grown in a grain-fallow system. Some areas are used for grazing. (Capability unit IVe–47, dryland; Loamy range site, 13-inch to 16-inch precipitation zone; not in a woodland group)

Ard silt loam, 0 to 4 percent slopes (ArB).—Most of this soil is south of Clementsville and north of Tetonia. The surface layer is generally 2 or 3 inches thicker than that of Ard silt loam, 4 to 12 percent slopes. The erosion hazard is severe.

Most of the acreage is dryfarmed for wheat or barley. Some of the acreage is grazed. (Capability unit IVe–47, dryland; Loamy range site, 13-inch to 16-inch precipitation zone; not in a woodland group)

Ard silt loam, 20 to 35 percent slopes (ArF).—This soil is north and northeast of Tetonia. It contains more gravel and stones than Ard silt loam, 4 to 12 percent slopes. The depth to bedrock is 20 to 30 inches. The erosion hazard is very severe.

Most of the acreage is range, and this soil is better suited to range than to other uses. Some of the acreage is dryfarmed. (Capability unit VIe–2, dryland; Loamy range site, 13-inch to 16-inch precipitation zone; not in a woodland group)

Badgerton Series

The Badgerton series consists of well drained or moderately well drained, noncalcareous, medium-textured and moderately coarse textured soils underlain by gravel at a depth of 20 to 45 inches. These soils formed in medium-textured recent alluvium derived from granite, gneiss, quartzite, sandstone, limestone, and loess. The original vegetation consisted of cottonwood, aspen, sagebrush, and grass.

Badgerton soils occur mainly as long, narrow, level to gently sloping strips on alluvial fans surrounding the valley. Most areas are dissected by meandering stream channels (fig. 5). These soils are at an elevation of 6,000 to 6,700 feet and receive from 15 to 22 inches of precipitation annually. The mean annual temperature is 40° F., and there are about 80 days betweeen killing frosts.

The surface layer is about 30 inches thick and is dark grayish-brown loam. In some areas it is gravelly, and in some it is stony. The lower half is stratified in places with thin layers of sandy loam or clay loam. The underlying material consists of sand, gravel, and cobblestones. The gravel is loose, and some of it is lime coated on the underside. The reaction is mildly to moderately alkaline.

Badgerton soils occur with the shallow Wiggleton soils and in some areas are mapped with them as a complex.

Figure 5.—**Typical landscape of Badgerton soils, which have a rough, channeled microrelief.**

Badgerton loam, 0 to 2 percent slopes (BaA).—This soil occurs as long, narrow strips along recent stream channels. In most places the slope is between 1 and 2 percent. Included in mapping were small areas of shallower soil that contains more gravel and small areas west of the Teton River where the soil is calcareous at a depth of 15 to 20 inches.

Representative profile, 50 feet south and 450 feet east of the northwest corner of the NE¼ sec. 36, T. 5 N., R. 45 E., in an area of grass and trees:

A11—0 to 5 inches, dark grayish-brown (10YR 4/2) loam, very dark brown (10YR 2/2) when moist; moderate, fine, granular structure; slightly hard when dry, very friable when moist, and slightly sticky and slightly plastic when wet; abundant fine and very fine roots and a few medium roots; common, very fine, tubular pores; few earthworm holes and casts; noncalcareous; mildly alkaline (pH 7.8); abrupt, smooth boundary.

A12—5 to 14 inches, dark grayish-brown (10YR 4/2) loam, very dark brown (10YR 2/2) when moist; weak, coarse, prismatic structure parting to weak, very fine, granular structure; slightly hard when dry, very friable when moist, and slightly sticky and slightly plastic when wet; plentiful fine and very fine roots; common, very fine, tubular pores; few earthworm holes and casts; noncalcareous; moderately alkaline (pH 7.9); abrupt, smooth boundary.

A13—14 to 30 inches, dark grayish-brown (10YR 4/2) light loam or heavy sandy loam, very dark grayish brown (10YR 3/2) when moist; very weak, coarse, prismatic structure parting to weak, coarse and medium, subangular blocky structure; slightly hard when dry, very friable when moist, and slightly sticky and slightly plastic when wet; few fine and very fine roots; many, very fine and common, fine, tubular pores; few earthworm holes and casts to a depth of 24 inches; noncalcareous; mildly alkaline (pH 7.7); abrupt, smooth boundary.

IIC—30 inches, brown (10YR 5/3) sand, gravel, and cobblestones that are dominantly granite, gneiss, sandstone, quartzite, and limestone; sand is dark brown (10YR 3/3) when moist; single grain; loose; mostly noncalcareous; mildly alkaline (pH 7.6).

The color value of the A horizon ranges from 4 to 5 (dry). The soil is dominantly medium textured to a depth of 20 inches. In some areas there are a few pebbles and cobblestones throughout the profile. The depth to gravel ranges from 20 to 36 inches.

This soil is well drained or moderately well drained but is subject to flooding for short periods in the spring. Permeability is moderate in the upper part and very rapid in the sand and gravel. The available water capacity is moderate. Roots penetrate into the uppermost few inches of the gravel layer. The organic-matter content is moderate, and natural fertility is moderate.

Under natural vegetation, the erosion hazard is slight. If the vegetation is removed, the erosion hazard is severe because of the susceptibility to flooding.

Most areas are used for range. Small areas are used for hay. Leveling is generally required for irrigation. Some trees are cut for firewood and fenceposts. (Capability unit IVw–3, dryland; River Bottom range site; woodland group 7)

Badgerton loam, 2 to 4 percent slopes (BaB).—Most of this soil is grazed. Small areas are used for hay. Some trees are cut for firewood and fenceposts. (Capability unit IVw–3, dryland; River Bottom range site; woodland group 7)

Badgerton loam, deep, 0 to 2 percent slopes (BdA).—This soil occurs as long, narrow strips along stream channels. The largest acreage is near Judkins. The profile is similar to that of Badgerton loam, 0 to 2 percent slopes, except that the depth to loose gravel and sand is 36 to 45 inches. Although this soil is deeper than is typical of the Badgerton series, it is included in the series because of its small acreage. The original vegetation consisted mostly of willows. The available water capacity is high.

This soil is used for range and for hay. (Capability unit IVw–3, dryland; River Bottom range site; not in a woodland group)

Badgerton gravelly loam, 0 to 2 percent slopes (BgA).—This soil has a low to moderate available water capacity and moderately low natural fertility.

The gravel in the surface layer interferes with cultivation. Most areas are grazed. Small areas are used for hay. Some trees are cut for firewood and fenceposts. (Capability unit IVw–3, dryland; River Bottom range site; woodland group 7)

Badgerton gravelly loam, 2 to 4 percent slopes (BgB).—This soil has a low to moderate available water capacity.

Most areas are grazed. Small areas are used for hay. Some trees are cut for firewood and fenceposts. (Capability unit IVw–3, dryland; River Bottom range site; woodland group 7)

Badgerton gravelly loam, 4 to 8 percent slopes (BgC).—This soil is on alluvial fans at the base of mountains. It is less subject to flooding than Badgerton loam, 0 to 2 percent slopes, and contains more cobblestones. It also contains some stones.

This soil is used for range and is better suited to range than to other uses. (Capability unit VIs–4, dryland; River Bottom range site; woodland group 7)

Badgerton very stony loam, 4 to 8 percent slopes (BvC).—Most of this soil is on upper fans of Spring Creek and Rapid Creek south of Alta. The profile is similar to that of Badgerton loam, 0 to 2 percent slopes, but the surface layer is too stony for cultivation. There are also a few stones and cobblestones in the underlying layer. The available moisture capacity is low.

This soil is used for range and is better suited to range than to other uses. (Capability unit VIs–4, dryland; South Slope range site; not in a woodland group)

Badgerton-Wiggleton complex, 0 to 2 percent slopes (BwA).—Most areas of this complex occur along the recent stream channels that dissect the alluvial fan east and northeast of Driggs. From 50 to 75 percent of the complex is Badgerton loam. Most of the rest is Wiggleton gravelly loam. Small areas of very gravelly soil were included in mapping.

The erosion hazard is slight if the natural vegetation is maintained. If the vegetation is removed, the hazard is severe because of flooding.

These soils are used for range and are better suited to range than to other uses. (Badgerton loam in capability unit IVw–3, dryland; River Bottom range site; woodland group 7. Wiggleton gravelly loam in capability unit IVw–3, dryland; Gravelly range site; woodland group 7)

Cedron Series

The Cedron series consists of poorly drained soils that formed in deep or very deep alluvium of mixed origin. Although stratified, the alluvium is mostly moderately fine textured. The range of slope is 0 to 1 percent. The original vegetation consisted of grasses, sedges, rushes, and other

water-tolerant plants. The water table is near the surface most of the time.

Most areas of these soils are on bottom land along the Teton River southwest of Driggs. They are at an elevation of 5,800 to 6,200 feet and receive from 16 to 20 inches of precipitation annually. The mean annual temperature is 39° F., and there are about 78 days between killing frosts.

The surface layer is dark-gray heavy silty clay loam or light silty clay 10 to 16 inches thick. The underlying layer is white to dark-gray light silty clay loam to light silty clay to a depth of 20 to 30 inches or more. This layer is very strongly calcareous. The substratum is stratified, and the predominant texture is medium to moderately fine. The depth to sand and gravel is generally more than 60 inches but is no more than 40 inches in some places. The profile is moderately to very strongly calcareous and mildly to moderately alkaline. Mottling occurs below the surface layer.

Cedron soils are associated with Furniss, Zundell, and Zufelt soils.

Cedron silty clay loam (0 to 1 percent slopes) (Ce).—This soil is inextensive, and most of it is dissected by old stream channels or sloughs. Included in mapping were small areas of somewhat poorly drained, less strongly calcareous soil and small areas of noncalcareous soil.

Representative profile, 370 feet east and 715 feet north of the southwest corner of the NE¼SW¼ sec. 29, T. 4 N., R. 45 E., in a pasture:

A11ca—0 to 3 inches, dark-gray (2.5Y 4/1) heavy silty clay loam or light silty clay, black (2.5Y 2/1) when moist; strong, fine and very fine, granular structure; hard when dry, friable when moist, and sticky and plastic when wet; abundant roots; few pores; strongly calcareous; mildly alkaline (pH 7.7); clear, smooth boundary.

A12ca—3 to 10 inches, dark-gray (2.5Y 4/1) heavy silty clay loam or light silty clay, black (2.5Y 2/1) when moist; strong, fine, granular structure; hard when dry, friable when moist, and sticky and plastic when wet; abundant roots; many worm holes and casts; very few white lime spots, probably brought up by worms or rodents; strongly calcareous; mildly alkaline (pH 7.8); clear, wavy boundary.

C1ca—10 to 18 inches, light-gray (2.5Y 7/1) and dark-gray (2.5Y 4/1) light silty clay, gray (2.5Y 5/1) and black (2.5Y 2/1) when moist; strong, fine, granular structure; hard when dry, friable when moist, and sticky and plastic when wet; plentiful roots; many very fine pores; some white lime spots brought up by worms or rodents; very strongly calcareous; moderately alkaline (pH 7.9); clear, irregular boundary.

C2cag—18 to 24 inches, white (2.5Y 8/1) light silty clay loam, light gray (10YR 7/2) when moist; few, medium, faint, light-gray (5Y 7/1) and pinkish-gray (7.5Y 5.5/2) mottles; massive; very hard when dry, friable when moist, and very sticky and plastic when wet; few roots; very strongly calcareous; moderately alkaline (pH 8.0); clear, smooth boundary.

C3cag—24 to 27 inches, light-gray (2.5Y 7/1) light silty clay loam, grayish brown (2.5Y 5/2) when moist; common to many, medium, faint, gray (5Y 6/1) and olive-gray (5Y 5/2) mottles and few, fine, prominent, yellowish-brown (10YR 5/4) mottles; massive; very hard when dry, friable when moist, and sticky and plastic when wet; few roots; few, very fine, tubular pores; few, semihard $CaCO_3$ concretions 2 or 3 millimeters in diameter; few, black, soft manganese oxide concretions 2 or 3 millimeters in diameter; very strongly calcareous; mildly alkaline (pH 7.8); abrupt, smooth boundary.

IIC4cag—27 to 42 inches, light-gray (2.5Y 7/2) silt loam, gray (2.5Y 5/1) when moist; many, medium and coarse, distinct, pale-yellow (2.5Y 7/3) mottles, light olive brown (2.5Y 5/3) when moist; few, fine, prominent, pale-brown (10YR 6/3) mottles, yellowish brown (10YR 5/4) when moist; many, fine, prominent, very dark gray (10YR 3/1), soft manganese oxide concretions, black (10YR 2/1) when moist; and a few semihard concretions up to 4 millimeters in diameter; massive; hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; few roots; common very fine pores; strongly calcareous; mildly alkaline (pH 7.8); abrupt, smooth boundary.

IIIC5—42 inches, sand and gravel; loose; moderately calcareous.

The A horizon is 20 to 35 percent carbonates. The underlying horizon grades to white or light-gray with depth and is 40 to 80 percent carbonates. Colors associated with wetness are in or immediately below the A1 horizon. The profile is stratified but is dominantly moderately fine textured. In some small areas the C2cag layer contains a discontinuous, cemented hardpan less than 1 inch thick. The depth to gravel is 40 to more than 60 inches.

Drainage is poor. Permeability is slow to moderately slow, except in the gravel, where it is very rapid. Most of the roots are in the surface layer; very few penetrate below a depth of 2 or 3 feet. The available water capacity is very high or high, and the surface layer contains a large amount of organic matter. Stream cutting is a hazard.

Most of the acreage is grazed. Some of it is used for meadow hay. Some areas, if drained, could be used for small grain. (Capability unit Vw–1, dryland; Wet Meadow range site; not in a woodland group)

Dra Series

The Dra series consists of well-drained, moderately fine textured soils underlain by sandstone bedrock at a depth of 20 to 40 inches. These soils formed in residuum from sandstone mixed, in some places, with loess. The original vegetation consisted of bluebunch wheatgrass, Idaho fescue, bitterbrush, snowberry, and sagebrush.

Dra soils generally occupy hilly to steep south slopes on mountain foothills in the southern part of the Area. They are at an elevation of 6,400 to 7,000 feet and receive from 16 to 20 inches of precipitation annually. The mean annual temperature is 38° F., and there are about 70 days between killing frosts.

The surface layer consists of dark grayish-brown loam or silt loam that is gravelly or stony in places. It is 6 to 9 inches thick and is underlain by brown heavy loam or light clay loam to a depth of about 20 inches. The substratum is pale-brown very stony loam that is strongly calcareous. The underlying bedrock is generally fractured in the upper part, and there is a small amount of soil material in the cracks.

Dra soils are associated with calcareous Ridgecrest soils and deep Dranyon soils.

Dra silt loam, 12 to 20 percent slopes (DaE).—This moderately deep soil is on mountain foothills in the southern part of the valley. Included in mapping were small areas of very stony soil and small areas of rock outcrop. Also included were small areas that have a slope of less than 12 percent and some areas that have a slope of more than 20 percent.

Representative profile in the NE¼SE¼SW¼ sec. 1, T. 3 N., R. 45 E., in an area of sagebrush and grass:

A11—0 to 2 inches, dark grayish-brown (10YR 4/2) silt loam that contains a few angular pebbles, cobblestones, and

stones, very dark brown (10YR 2/2) when moist; very weak, medium, platy structure breaking to moderate, very fine and fine, granular structure; slightly hard when dry, very friable when moist, and slightly sticky and slightly plastic when wet; plentiful very fine and fine roots; many, very fine, tubular pores; common to few bleached grains of silt; slightly acid (pH 6.4); abrupt, smooth boundary.

A12—2 to 9 inches, dark grayish-brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) when moist; about 15 percent white (10YR 8/2) angular gravel and a few cobblestones and stones, very weak, very coarse, prismatic structure and moderate, medium and fine, granular structure; hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; plentiful fine roots and a few medium and coarse roots; many, very fine, tubular pores; common bleached grains of silt; neutral (pH 6.8); clear, wavy boundary.

B1t—9 to 12 inches, brown (10YR 5/3) heavy loam or light clay loam, dark brown (10YR 3/3) when moist; about 10 percent angular gravel and a few cobblestones and stones; dark grayish-brown (10YR 4/2 when dry) coatings on blocks; moderate, fine, subangular blocky structure, and weak, medium and fine, granular structure; hard when dry, friable when moist, slightly sticky and slightly plastic when wet; few, fine, medium and coarse roots; many, very fine and microtubular pores; few to common bleached grains of silt; thin, patchy clay films in channels; very few half-inch krotovinas that have the same color and texture as the A12 horizon; neutral (pH 7.0); clear, smooth boundary.

B2t—12 to 21 inches, brown (10YR 5/3) light clay loam that contains a few angular pebbles, cobblestones, and stones; dark brown (10YR 4/3) when moist; weak, medium, prismatic structure breaking to moderate, medium and fine, subangular blocky structure; hard when dry, friable when moist, and sticky and plastic when wet; few very fine, fine, and medium roots; many, very fine, tubular pores; thin, patchy or nearly continuous clay films on peds and in channels; films are brown (10YR 5/3) when dry and dark brown (10YR 3/3) when moist; common bleached grains of silt on peds; few, half-inch, very dark grayish-brown (10YR 3/2 when dry) krotovinas or filled cicada holes; larger rock fragments coated with calcium carbonate on lower side; neutral (pH 7.0); abrupt, wavy boundary.

Cca—21 to 32 inches, pale-brown (10YR 6/3), very stony heavy loam, brown (10YR 5/3) when moist; weak, medium and fine, subangular blocky structure; hard when dry, friable when moist, slightly sticky and slightly plastic when wet; few very fine and fine roots; many, very fine, tubular pores; strongly or moderately calcareous; moderately alkaline (pH 7.9); abrupt, irregular boundary.

R—32 inches, fractured, fine-grained sandstone bedrock; small quantity of soil material in cracks.

The color value of the A1 horizon ranges from 3.5 to 4 (dry). The depth to the Cca horizon, which is more than 15 percent carbonates, ranges from 20 to 30 inches. The depth to sandstone bedrock ranges from 20 to 40 inches.

Natural drainage is good, permeability is moderately slow, and the available water capacity is moderate. Roots penetrate to bedrock. The organic-matter content and natural fertility are high. The erosion hazard is slight if this soil is used for grazing and severe if it is cultivated.

Most of the areas are grazed, either because they are inaccessible or because they are too small or too gravelly and stony for other purposes. Some areas have been cultivated, but most of these have returned to sagebrush and grass. Control of erosion is important because of the moderate depth to bedrock. (Capability unit IVe–4, dryland; Loamy range site, 16-inch to 19-inch precipitation zone; not in a woodland group)

Dra very stony loam, 12 to 20 percent slopes (DeE).—This soil is on mountain foothills in the southeastern part of the valley. The stones interfere with cultivation. Small areas that are only slightly stony were included in mapping.

This soil is used for range and is better suited to range than to other uses. (Capability unit VIs–4, dryland; Stony range site; not in a woodland group)

Dra very stony loam, 30 to 60 percent slopes (DeG).—This soil is on mountain foothills in the southern part of the valley. Small areas of nonstony soil near Horseshoe Creek and small areas of Dranyon soils were included in mapping. The erosion hazard is moderate.

This soil is used for range. (Capability unit VIIs–1, dryland; South Slope range site; not in a woodland group)

Dranyon Series

The Dranyon series consists of well-drained, moderately fine textured soils underlain by sandstone at a depth of 40 to 60 inches. These soils formed in residuum from sandstone and other sedimentary rocks and are stony. In some places the upper part of the profile contains some loess. The original vegetation consisted of aspen, some chokecherry and serviceberry, and an understory of myrtle boxleaf, pinegrass, snowberry, and related plants.

Dranyon soils generally occupy strongly rolling to steep mountain foot slopes in the southern part of the valley. These soils are at an elevation of 6,200 to 7,000 feet and receive from 17 to 22 inches of precipitation annually. The mean annual temperature is 38° F., and there are about 70 days between killing frosts.

The surface layer is dark-brown stony loam 6 to 8 inches thick. It is underlain by brown, stony heavy loam to stony light clay loam. Fine-grained, noncalcareous sandstone is at a depth of 40 to 60 inches. The reaction is strongly acid to slightly acid.

These soils are associated with moderately deep Dra soils and very deep Greys soils.

Dranyon stony loam, 30 to 60 percent slopes (DgG).—This deep soil occupies mountain footslopes in the southwest corner of the Teton Area. The slope range is predominantly 30 to 45 percent. Included in mapping were some areas of cobbly soil, small areas in which the depth to bedrock is less than 40 inches, and small areas that have a slope of less than 30 percent.

Representative profile, 380 feet south and 820 feet east of the northwest corner of the SW¼NW¼ sec. 7, T. 3 N., R. 45 E., in an aspen grove:

O11—2 inches to 1 inch, undecomposed leaves and twigs, primarily from aspen and the understory; strongly acid (pH 5.2); abrupt, wavy boundary.

O12—1 to 0.5 inch, very dark brown (10YR 2/2), partly decomposed, matted leaves and twigs, very dark brown (10YR 2/2) when moist; medium acid (pH 5.6); abrupt, wavy boundary.

O2—0.5 inch to 0, very dark brown (10YR 2/2), well-decomposed organic matter; moderate, very fine, granular structure; plentiful very fine and fine roots; medium acid (pH 6.0); abrupt, wavy boundary.

A11—0 to 3 inches, dark-brown (7.5YR 4/2) stony loam, very dark brown (7.5YR 2/2) when moist; weak, very fine, granular structure; slightly hard when dry, very friable when moist; slightly sticky and slightly plastic when wet; plentiful fine roots and few, medium, coarse and very coarse roots; few bleached grains of silt; slightly acid (pH 6.2); clear, wavy boundary.

A12—3 to 6 inches, dark-brown (7.5YR 4/2) stony loam, very dark brown (7.5YR 2/2) when moist; weak, medium, subangular blocky structure parting to weak, very fine, granular structure; hard when dry, very friable when moist, and slightly sticky and slightly plastic when wet; plentiful fine roots and few medium, coarse, and very coarse roots; common, very fine, tubular pores; few bleached grains of silt; slightly acid (pH 6.2); clear, wavy boundary.

B1t—6 to 16 inches, brown (10YR 5/3) stony heavy loam, dark brown (10YR 3/3) when moist; moderate, fine and medium, blocky structure; very hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; plentiful fine roots and few medium, coarse, and very coarse roots; common, very fine, tubular pores; few manganese concretions less than 1 millimeter in diameter; thin, patchy clay films on peds and in pores; clay films have a faintly redder hue, darker value, and lower chroma than ped interiors; very few bleached grains of silt; medium acid (pH 6.0); clear, wavy boundary.

B21t—16 to 33 inches, brown (10YR 5/3) stony light clay loam, dark brown (10YR 3/3) when moist; very weak prismatic structure parting to moderate, medium and fine, subangular blocky structure; very hard when dry, firm when moist, sticky and plastic when wet; few fine and medium roots; common, very fine, tubular pores; common manganese dioxide concretions 1 millimeter in diameter; medium or thin, nearly continuous clay films on peds and in pores; clay films have a slightly lower chroma than ped interiors; medium acid (pH 6.0); gradual, wavy boundary.

B3t—33 to 47 inches, brown (10YR 5/3) stony heavy loam, dark brown (10YR 4/3) when moist; moderate, fine and very fine, subangular blocky structure; very hard when dry, firm when moist, and sticky and plastic when wet; few fine roots; many, very fine, tubular pores; clay films medium and nearly continuous on vertical ped surfaces, thick and continuous in pores, and thin and patchy on horizontal ped surfaces; clay films slightly darker colored than ped interiors; few fine manganese dioxide concretions; medium acid (pH 6.0); abrupt, broken boundary.

R—47 inches, fractured sandstone bedrock.

The A1 horizon has a color value of 4 to 5 when dry. The reaction is medium acid to slightly acid. The depth to bedrock is 40 to 60 inches. Where this soil merges with Greys soils it has a thin bleached layer at a depth of 6 to 8 inches.

Natural drainage is good. Permeability is moderately slow in the subsoil, but roots penetrate to bedrock. The available water capacity is high, and the organic-matter content is high. Natural fertility is moderate. The erosion hazard is severe or very severe if the natural vegetation is removed.

This soil is used mainly for range, wildlife habitat, and water supply. A small acreage is used for timber. (Capability unit VIIe–1, dryland; Loamy range site (aspen); woodland group 5)

Dranyon stony loam, 20 to 30 percent slopes (DgF).—This soil occurs as small areas on mountain foothills south of Horseshoe Creek in the western part of the valley. Small areas that have a slope range of 12 to 20 percent were included in mapping.

This soil is used for range, forestry, wildlife, and water supply. Most areas are inaccessible and too small for cultivation. (Capability unit VIe–2, dryland; Loamy range site (aspen); woodland group 5)

Driggs Series

The Driggs series consists of well-drained soils underlain by gravel at a depth of 20 to 36 inches. These soils formed in medium-textured alluvium derived mainly from granite, gneiss, sandstone, quartzite, and limestone. They are normally noncalcareous above the gravel. The original vegetation was grass and sagebrush.

Most areas of these soils are on level to gently sloping alluvial fans on the east side of the basin. The elevation ranges from 6,000 to 6,800 feet. The annual precipitation is 14 to 18 inches. The mean annual temperature is 40° F., and there are about 80 days between killing frosts.

The surface layer is dark-brown silt loam, gravelly loam, or cobbly loam to a depth of 6 to 9 inches. This is underlain by brown silt loam and loam that is calcareous a few inches above the gravel in some places. The gravel is generally loose, but some of it is coated with lime and is weakly cemented. The reaction is slightly acid to mildly alkaline.

Driggs soils are associated with deep and very deep Tetonia soils and shallow Wiggleton soils.

Driggs silt loam, 0 to 2 percent slopes (DsA).—This soil occurs as large areas northeast of Driggs. It is moderately deep. In most places the slope is between 1 and 2 percent.

Representative profile, 200 feet north and 75 feet east of the southwest corner of the NW¼NE¼ sec. 19, T. 5 N., R. 46 E., in a cultivated field:

Ap—0 to 5 inches, dark-brown (10YR 4/3) silt loam that contains very few cobblestones, dark brown (10YR 3/3) when moist; weak, medium and fine, granular structure; slightly hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; plentiful roots; common, very fine, tubular pores; neutral (pH 7.1); abrupt, smooth boundary.

A1—5 to 8 inches, dark-brown (10YR 4/3) silt loam that contains very few cobblestones and some gravel, dark brown (10YR 3/3) when moist; weak, fine and medium, subangular blocky structure parting to very weak, fine and medium, granular structure; slightly hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; plentiful roots; abundant worm casts and holes; neutral (pH 6.9); clear, smooth boundary.

B1t—8 to 14 inches, brown (10YR 5/3) silt loam that contains very few cobblestones and a few pebbles, dark brown (10YR 3/3) when moist; very weak, medium, prismatic structure parting to weak, fine or medium, subangular blocky structure; slightly hard when dry, firm when moist, and slightly sticky and slightly plastic when wet; thin, patchy, brown clay films that are dark brown when moist; plentiful roots; many, very fine, tubular pores; neutral (pH 6.6); clear, smooth boundary.

B2t—14 to 22 inches, brown (10YR 5/3) heavy silt loam that contains a few pebbles, dark brown (10YR 4/3) when moist; weak or moderate, medium, prismatic structure parting to weak or moderate, fine, subangular and angular blocky structure; hard when dry, firm when moist, and sticky and plastic when wet; plentiful roots; many, very fine, tubular pores; moderate, continuous, brown clay films in fine pores and root holes; thin, patchy clay films on ped surfaces; clay films are dark brown when moist; slightly acid (pH 6.5); clear, smooth boundary.

B31t—22 to 25 inches, brown (10YR 5/3) loam, dark brown (10YR 4/3) when moist; very weak, medium and fine, prismatic structure parting to weak, fine and medium, subangular blocky structure; slightly hard when dry, firm when moist, and sticky and slightly plastic when wet; plentiful roots; a few pebbles; many, very fine, tubular pores; thin, patchy, brown clay films in fine pores and root holes and on peds; clay films are dark brown when moist; neutral (pH 6.8); clear, smooth boundary.

IIB32t—25 to 29 inches, brown (10YR 5/3) very gravelly coarse sandy loam, dark brown (10YR 4/3) when moist; weak, fine or medium, subangular blocky structure; slightly hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; plentiful roots; many, very fine, tubular pores; slightly darker, thin clay films on peds; pebbles interrupt structure, and some are coated with very dark brown (10YR 2.5/3 when moist) clay films and organic stains; mildly alkaline (pH 7.4); clear, smooth boundary.

IIIC1ca—29 to 35 inches, brown (10YR 5/3) cobbly and very gravelly coarse sand, dark brown (10YR 4/3) when moist; massive; few roots; finer material noncalcareous, except next to limestone sand and pebbles; pebbles lime coated on lower side; mildly alkaline (pH 7.8); gradual, wavy boundary.

IIIC2—35 to 42 inches, light brownish-gray (10YR 6/2) coarse sand mixed with gravel and cobblestones, grayish brown (10YR 5/2) when moist; single grain; loose when dry, nonsticky and nonplastic when wet; slightly calcareous; neutral (pH 7.2).

IIIC3—42 inches, light brownish-gray (10YR 6/2) coarse sand mixed with gravel and cobblestones, grayish brown (10YR 5/2) when moist; gravel consists primarily of granite, granite gneiss, and limestone pebbles and a few sandstone, quartzite, and other gneissic rocks.

The medium-textured B2t horizon is almost a clay loam. The soil is generally noncalcareous above the underlying sand and gravel.

Natural drainage is good. Permeability is moderate in the subsoil and very rapid in the gravel. Roots penetrate about a foot into the underlying gravel. The available water capacity is moderate. Organic-matter content and natural fertility are moderate.

The erosion hazard is slight. Maintaining or improving the structure of the surface layer is important because the surface seals readily and water enters very slowly, especially if crops are irrigated and no organic matter is added.

Most of the acreage is irrigated for alfalfa, wheat, barley, and potatoes. If irrigation water is not available, the acreage is dryfarmed for wheat and barley or used for range. (Capability unit IIIs–1, irrigated, and IVs–4, dryland; Loamy range site, 13-inch to 16-inch precipitation zone; not in a woodland group)

Driggs silt loam, 0 to 2 percent slopes, channeled (DtA).—This soil is dissected by old stream channels and has an irregular surface. The profile is similar to that of Driggs silt loam, 0 to 2 percent slopes. Small areas of gravelly soil and small areas that are not channeled were included in mapping.

This soil is dryfarmed. Extensive leveling is required before it can be irrigated. Because of the moderate depth, care is needed in leveling to avoid exposing the gravel. (Capability unit IVs–4, dryland; Loamy range site, 13-inch to 16-inch precipitation zone; not in a woodland group)

Driggs silt loam, 2 to 4 percent slopes (DsB).—This soil occurs as long, narrow strips along drainageways, mostly in a large area 2 miles northwest of Tetonia. Included with it in mapping were small areas that have a slope of less than 2 percent and small areas in which the depth to sand and gravel is more than 36 inches. The erosion hazard is moderate if this soil is irrigated.

Most of the acreage is irrigated for alfalfa, wheat, barley, and potatoes. Some of the acreage is dryfarmed for wheat and barley or used for range. (Capability unit IIIe–2, irrigated, and IVs–4, dryland; Loamy range site, 13-inch to 16-inch precipitation zone; not in a woodland group)

Driggs silt loam, 4 to 8 percent slopes (DsC).—This soil occurs as large areas on the higher terraces northwest of Tetonia and north of Clawson between Badger Creek and North Fork Leigh Creek. Small areas of gravelly soil were included in mapping. The erosion hazard is severe if this soil is irrigated and moderate if it is dryfarmed.

Most areas are dryfarmed for wheat and barley or used for range. A few areas are irrigated for hay, pasture, grain, and potatoes. (Capability unit IIIe–5, irrigated, and IVe–74, dryland; Loamy range site, 13-inch to 16-inch precipitation zone; not in a woodland group)

Driggs gravelley loam, 0 to 2 percent slopes (DrA).—This soil is only 20 to 28 inches deep over sand, gravel, and cobblestones (fig. 6). The slope is generally between 1 and 2 percent. Small areas of nongravelly soil were included in mapping.

The available water capacity is low to moderate. The gravel aids in controlling runoff and erosion. There is only a slight erosion hazard if this soil is dryfarmed or used for range. The structure of the surface layer can be maintained or improved by adding organic matter.

Most of the acreage is irrigated for wheat, barley, and potatoes and for alfalfa and grass hay. If irrigation water is not available, this soil is generally used for range. (Capability unit IVs–2, irrigated and VIs–4, dryland; Gravelly range site; not in a woodland group)

Driggs gravelley loam, 2 to 4 percent slopes (DrB).—This soil occurs as large areas and as long, narrow strips along drainageways. The depth to sand, gravel, and cobblestones is only 20 to 28 inches. Small areas of soils less than 20 inches deep were included in mapping.

The available water capacity is low to moderate. The erosion hazard is moderate if this soil is irrigated and slight if it is dryfarmed.

Most of the acreage is irrigated for wheat, barley, and potatoes and for alfalfa and grass hay. (Capability unit IVe–1, irrigated, and VIs–4, dryland; Gravelly range site; not in a woodland group)

Driggs gravelly loam, 4 to 12 percent slopes (DrD).—This soil occurs as long, narrow strips along drainageways and terrace breaks. The depth to sand, gravel, and cobblestones is only 20 to 28 inches. Included in mapping were a few small areas in which the slope range is 12 to 20 percent.

The available water capacity is low to medium. The erosion hazard is severe if this soil is irrigated and moderate if it is dryfarmed.

Most of the acreage is range. A few small areas are dryfarmed for crops, and a few are irrigated for hay, pasture, and grain. (Capability unit VIs–4, dryland; Gravelly range site; not in a woodland group)

Driggs cobbly loam, 0 to 2 percent slopes (DoA).—Most of this soil is on the alluvial fan northeast of Driggs. The profile is similar to that of Driggs silt loam, 0 to 2 percent slopes, but the surface layer is cobbly loam and the depth to sand, gravel, and cobblestones is only 20 to 28 inches.

The available water capacity is low.

Most of the acreage is irrigated for wheat, barley, and potatoes and for alfalfa and grass hay. Mechanical potato harvesters are difficult to use in some places, unless cobblestones are removed. If irrigation water is not available, this soil is generally used for range. (Capability unit IVs–

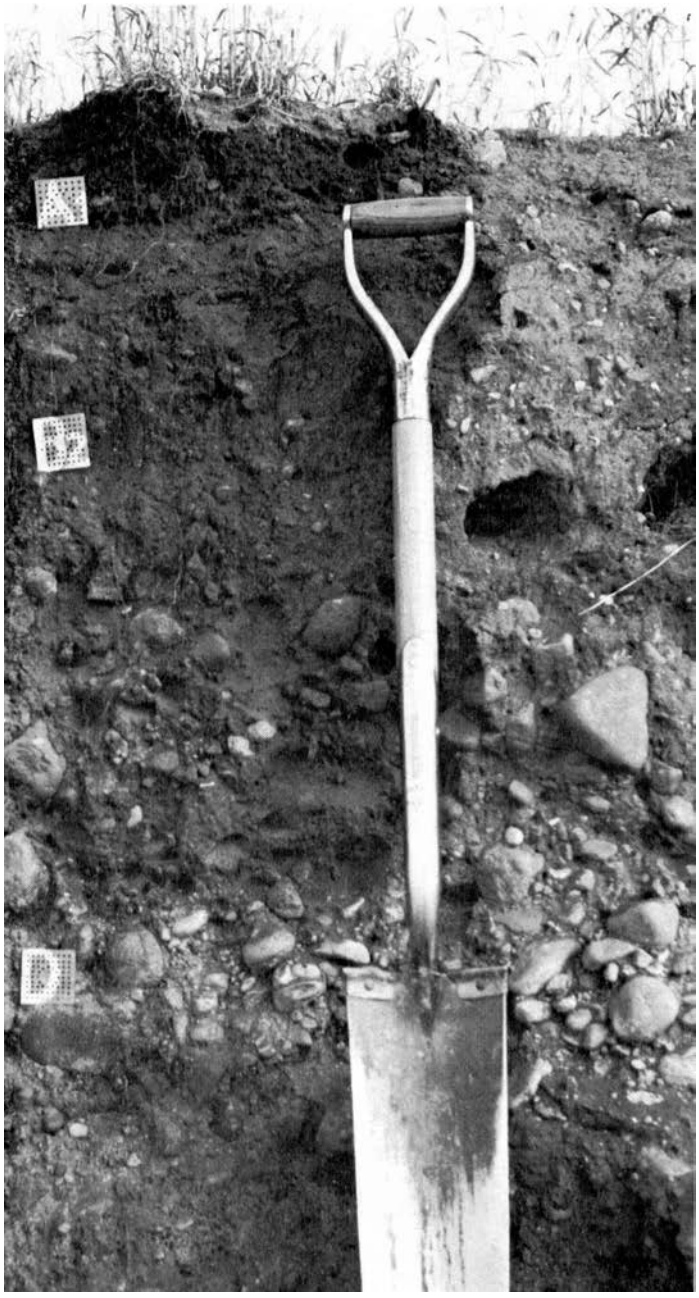

Figure 6.—**Profile of a Driggs gravelly loam. The depth to clean gravel is about 25 inches.**

2, irrigated, and VIs–4, dryland; Gravelly range site; not in a woodland group)

Driggs-Wiggleton gravelly loams, 0 to 2 percent slopes (DwA).—Most of this complex is on the Darby Creek and Fox Creek alluvial fans near State Highway No. 33. From 50 to 75 percent of any given area is Driggs soil, and from 15 to 40 percent is Wiggleton soil. Most areas are dissected by meandering stream channels. Small areas of very gravelly soils and small areas of nongravelly soils were included in mapping.

Most areas are used for range. Irrigation is difficult and costly because of the channeled relief and the shallow, gravelly areas.

If these soils are irrigated, there is a slight erosion hazard. They are flooded occasionally for short periods by runoff. (Capability unit IVs–2, irrigated, and VIs–4, dryland; Gravelly range site; woodland group 7)

Felt Series

The Felt series consists of well-drained, medium-textured soils underlain by gravelly material at a depth of 20 to 40 inches. These soils formed in alluvium derived from granite, gneiss, sandstone, quartzite, rhyolite, limestone, and chert. The original vegetation was grass and sagebrush.

Most areas of these soils are on level to sloping ridges of alluvial fans and stream terraces 3 miles south of Tetonia. They are at an elevation of 5,900 to 6,500 feet and receive from 13 to 15 inches of precipitation annually. The mean annual temperature is 40°F., and there are about 80 days between killing frosts.

The surface layer is grayish-brown loam 3 to 12 inches thick. It is noncalcareous or is slightly calcareous in spots. It is underlain by light-gray, strongly calcareous loam that extends to the gravelly material at a depth of 20 to 40 inches (fig. 7).

Felt soils are associated with deep Feltonia soils.

Felt loam, 0 to 2 percent slopes (FlA).—This soil is 3 miles southwest of Tetonia. It is moderately deep, and most of the slopes are between 1 and 2 percent. Included in mapping were small areas in which the soil is noncalcareous above the gravel and small areas of sandy loam southwest of Felt.

Representative profile on the east side of the road, SW¼NE¼SE¼ sec. 7, T. 5 N., R. 45 E., in a cultivated field:

Ap—0 to 7 inches, grayish-brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) when moist; weak, very fine, granular structure; slightly hard when dry, very friable when moist, and slightly sticky and slightly plastic when wet; plentiful, fine and very fine, fibrous roots; common very fine pores; very few uncoated silt grains; noncalcareous or slightly calcareous in spots; mildly alkaline (pH 7.6); abrupt, smooth boundary.

A1—7 to 12 inches, grayish-brown (10YR 5/2) loam that contains a few pebbles, very dark grayish brown (10YR 3/2) when moist; weak, medium, prismatic structure parting to weak, very fine, granular structure; slightly hard when dry; very friable when moist, and slightly sticky and slightly plastic when wet; plentiful fine roots and few very fine roots; many, very fine, tubular pores and few, microtubular pores; very few uncoated grains of silt; noncalcareous in spots; mildly alkaline (pH 7.5); clear, wavy boundary.

C1ca—12 to 14 inches, light-gray (10YR 7/2) loam, grayish brown (10YR 5/2) when moist; weak, medium, prismatic structure; common 0.5-inch nodules of soil material; slightly hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; plentiful fine roots; many, very fine, tubular pores; strongly calcareous; mildly alkaline (pH 7.7); clear, wavy boundary.

C2ca—14 to 22 inches, light-gray (10YR 7/2) loam, grayish brown (10YR 5/2) when moist; very weak, medium, prismatic structure parting to very weak, medium, subangular blocky structure; common 0.5-inch nodules of soil material; hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; few fine roots; many, very fine, tubular pores; strongly calcareous; many veins of fine calcium car-

Figure 7.—**Profile of a Felt loam, which has a layer of lime concentration below the surface layer. The depth to gravelly material is 20 to 40 inches.**

bonate; mildly alkaline (pH 7.7); clear, wavy boundary.

IIC3ca—22 to 34 inches, light-gray (10YR 7/2) light loam that contains a few pebbles, grayish brown (10YR 5/2) when moist; massive; slightly hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; no roots; many, very fine, tubular pores; strongly calcareous; common fine veins of calcium carbonate; moderately alkaline (pH 8.1); clear, wavy boundary.

IIIC4ca—34 to 39 inches, light-gray (10YR 7/2) very gravelly sandy loam, grayish brown (10YR 5/2) when moist; massive; hard when dry, friable when moist, and slightly sticky and nonplastic when wet; no roots; many, very fine, tubular pores; strongly calcareous; moderately alkaline (pH 8.1); abrupt, wavy boundary.

IVC5ca—39 inches, pale-brown (10YR 6/3) sand and gravel, brown (10YR 5/3) when moist; moderately calcareous; moderately alkaline (pH 8.4); calcium carbonate coating on under side of gravel.

The color value of the A1 horizon ranges from 5 to 6 when the soil is dry. The ca horizon, which begins at a depth of 8 to 15 inches, is more than 15 percent carbonates. The texture is principally loam at a depth between 6 and 20 inches, but layers of sandy loam or silt loam are present in places. Although gravelly material is at a depth of 20 to 40 inches, there is no loose gravel or sandy gravel within 30 inches of the surface. In some places the gravel is very weakly cemented but is permeable to water.

Natural drainage is good. Permeability is moderate above the gravel and very rapid in the gravel. Roots penetrate into the gravelly material. The available water capacity, the organic-matter content, and the natural fertility are moderate. There is a slight erosion hazard.

Most of the acreage is irrigated for alfalfa, wheat, barley, and potatoes. If irrigation water is not available, this soil is dryfarmed for wheat, barley, and pasture. (Capability unit IIIs–1, irrigated, and IVs–4, dryland; Loamy range site, 13-inch to 16-inch precipitation zone; not in a woodland group)

Felt loam, 2 to 4 percent slopes (FlB).—This soil occurs about 3 miles southwest of Tetonia. Included in mapping were small areas in which the slope is less than 2 percent and small areas of gravelly soil. The erosion hazard is moderate if this soil is irrigated and slight if it is dryfarmed or used for grazing.

Most of the acreage is irrigated for alfalfa, wheat, barley, and potatoes. Some of it is dryfarmed for wheat, and some is used for range. (Capability unit IIIe–2, irrigated, and IVs–4, dryland; Loamy range site, 13-inch to 16-inch precipitation zone; not in a woodland group)

Felt loam, 4 to 8 percent slopes (FlC).—This soil occurs as narrow strips on the edge of terraces about 3 miles southwest of Tetonia. It has a darker colored, thinner surface layer than Felt loam, 0 to 2 percent slopes. The surface layer is generally only about 8 inches thick and is slightly gravelly. The depth to gravel ranges from 20 to 25 inches. The erosion hazard is severe if this soil is irrigated and moderate if it is dryfarmed or grazed.

Most of this soil is irrigated for grain and hay. Some of it is dryfarmed for wheat and barley, and some is used for range. (Capability unit IIIe–5, irrigated, and IVe–74, dryland; Loamy range site, 13-inch to 16-inch precipitation zone; not in a woodland group)

Felt loam, 8 to 12 percent slopes (FlD).—This soil occurs as long, narrow strips on the edge of terraces about 2 miles northwest of Tetonia and also 3 miles southwest of Tetonia. It has a darker colored, thinner surface layer than Felt loam, 0 to 2 percent slopes. The surface layer generally is about 8 inches thick and is slightly gravelly. The depth to gravel ranges from 20 to 25 inches. The erosion hazard is very severe if this soil is irrigated and moderate if it is dryfarmed or grazed.

Most of this soil is used for hay, grain, and pasture. Some of it is used for range. It is not suited to row crops, but it can be used for hay and pasture and occasionally for a dryland grain crop. (Capability unit IVe–74, dryland; Loamy range site, 13-inch to 16-inch precipitation zone; not in a woodland group)

Felt gravelly loam, 4 to 12 percent slopes (FeD).—This soil occurs on the edge of terraces about 2 miles southwest of Tetonia. A few small areas of sandy loam were included in mapping. The hazard of erosion is very severe if this soil is irrigated and moderate if it is dryfarmed or used for range.

Most areas are dryfarmed with adjoining soils. (Capability unit VIs–4, dryland; Gravelly range site; not in a woodland group)

Feltonia Series

The Feltonia series consists of well-drained, medium-textured soils underlain by sand or gravel at a depth of 36 to 60 inches. These soils formed in medium-textured alluvium mixed with wind-laid material. The alluvium was derived primarily from granite, gneiss, sandstone, quartzite, rhyolite, and limestone. The original vegetation consisted mostly of bluebunch wheatgrass, bitterbrush, and sagebrush.

Most areas of these soils occupy level to rolling ridges on alluvial fans and stream terraces 2 miles southwest of Tetonia. They are at an elevation of 5,900 to 6,500 feet and receive from 13 to 15 inches of precipitation annually. The mean annual temperature is 40° F., and there are about 80 days between killing frosts.

The surface layer is grayish-brown loam 10 to 14 inches thick. It is underlain by grayish-brown to brown loam that extends to a depth of about 27 inches. This is underlain by a substratum of light-gray, strongly calcareous loam that extends to the lime-coated gravel at a depth of 36 to 60 inches. The reaction is mildly alkaline above the substratum and moderately alkaline below.

Feltonia soils are associated with moderately deep Felt soils.

Feltonia loam, 0 to 2 percent slopes (FnA).—This deep soil occurs in large areas about 2 miles southwest of Tetonia. In most places the slope is between 1 and 2 percent. Included in mapping were small areas of soil that is less than 36 inches deep to gravel and small areas of soil that is noncalcareous above the gravel.

Representative profile, 15 feet west of the farm road and 200 feet south of the northeast corner of the SE¼SW¼ sec. 5, T. 5 N., R. 45 E., in a cultivated field:

Ap—0 to 6 inches, grayish-brown (2.5Y 5/2) loam, very dark grayish brown (10YR 3/2) when moist; weak, very fine, granular structure; slightly hard when dry, very friable when moist, and slightly sticky and slightly plastic when wet; plentiful very fine roots and few fine roots; common very fine pores; mildly alkaline (pH 7.7); abrupt, smooth boundary.

A1—6 to 12 inches, grayish-brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) when moist; very weak, very coarse, prismatic structure parting to weak, very fine, granular structure; slightly hard when dry, very friable when moist, and slightly sticky and slightly plastic when wet; plentiful very fine roots; common, very fine, tubular pores; 3-inch, grayish-brown loam krotovinas; noncalcareous except for a very few calcareous spots (krotovinas); mildly alkaline (pH 7.8); clear, smooth boundary.

B1—12 to 20 inches, dark grayish-brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) when moist; weak, coarse, prismatic structure parting to very weak, coarse, subangular blocky structure, and then to weak, very fine, granular structure; slightly hard when dry, very friable when moist, and slightly sticky and slightly plastic when wet; plentiful very fine roots; few, fine, tubular pores and many, very fine, tubular pores; thin, patchy clay films on vertical ped surfaces and in pores; very few bleached grains of silt; mildly alkaline (pH 7.7); clear, smooth boundary.

B2—20 to 27 inches, brown (10YR 5/3) loam, dark brown (10YR 3/3) when moist; weak, coarse, prismatic structure parting to weak, medium, subangular blocky structure; hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; plentiful very fine roots; common, very fine, tubular pores; very thin, patchy clay films on peds; mildly alkaline (pH 7.8); clear, smooth boundary.

C1ca—27 to 36 inches, light-gray (10YR 7/2) loam, light olive brown (2.5Y 5/3) when moist; massive; hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; few very fine roots; common, very fine, tubular pores; 7-inch, grayish-brown loam krotovinas that contain a few calcareous specks; strongly calcareous; common fine veins of calcium carbonate; moderately alkaline (pH 8.0); abrupt, smooth boundary.

IIC2ca—36 to 49 inches, light-gray (10YR 7/2) very gravelly loam, light olive brown (2.5Y 5/3) when moist; massive; hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; few roots; common, very fine, tubular pores; common fine veins of calcium carbonate; strongly calcareous; moderately alkaline (pH 8.0); abrupt, smooth boundary.

IIC3ca—49 to 58 inches, very gravelly loamy sand; single grain; loose; gravel coated with calcium carbonate, especially on lower side; moderately calcareous; moderately alkaline (pH 8.1).

The thickness of the A1 horizon ranges from 10 to 20 inches. The depth to the ca horizon ranges from 20 to 36 inches, and this horizon is more than 15 percent carbonates. The depth to gravel or sand is generally 36 to 60 inches. A few pebbles occur throughout the profile.

Natural drainage is good. Permeability is moderate above the gravel and very rapid in the gravel. The available water capacity is moderately high. Roots penetrate into the gravel. The organic-matter content is medium, and natural fertility is high. The erosion hazard is slight.

This soil is irrigated for alfalfa, wheat, barley, potatoes, and oats if irrigation water is available. Otherwise, it is dryfarmed for alfalfa, wheat, and barley. (Capability unit IIIc–1, irrigated, and IIIc–4, dryland; not in a range site or woodland group)

Feltonia loam, 2 to 4 percent slopes (FnB).—Most of this soil is about 2 miles south of Tetonia. Included in mapping were small areas of soil that is less than 36 inches in depth to gravel and small areas of sandy loam.

The erosion hazard is moderate if this soil is irrigated and slight if it is dryfarmed.

This soil is irrigated for alfalfa, wheat, barley, potatoes, and oats, and dryfarmed for wheat, barley, and alfalfa. (Capability unit IIIe–1, irrigated, and IIIc–4, dryland; not in a range site or woodland group)

Feltonia loam, sandy substratum, 2 to 4 percent slopes (FoB).—This soil occurs between Tetonia and Badger Creek. It has a profile similar to that of Feltonia loam, 0 to 2 percent slopes, but the substratum is loamy sand or sand instead of gravel. It has a slightly higher available water capacity and needs less frequent irrigation. Small stony areas were included in mapping.

The erosion hazard is moderate if this soil is irrigated but slight if it is dryfarmed.

This soil is irrigated for alfalfa, wheat, barley, potatoes, and oats. It is dryfarmed for wheat, barley, and alfalfa. (Capability unit IIIe–1, irrigated, and IIIc–4, dryland; not in a range site or woodland group)

Feltonia loam, sandy substratum, 4 to 12 percent slopes (FoD).—This soil occurs between Tetonia and Badger Creek. It has a profile similar to that of Feltonia loam, 0 to 2 percent slopes, but the substratum is sand or loamy sand instead of gravel. It has a slightly higher available water capacity. The erosion hazard is moderate.

This soil is dryfarmed for wheat, barley, and alfalfa. (Capability unit IIIe–4, dryland; not in a range site or woodland group)

Foxcreek Series

The Foxcreek series consists of poorly drained, medium-textured soils underlain by gravel at a depth of 20 to 36 inches. These soils formed in alluvium derived from granite, gneiss, sandstone, quartzite, and limestone. The original vegetation consisted mostly of water-tolerant grasses and sedges.

Most areas of these soils are on the upper edge of wet bottom land. There are large areas 2 miles east of Tetonia and 5 miles southeast of Tetonia. The elevation ranges from 5,800 to 6,500 feet, and the annual precipitation is 13 to 18 inches. The mean annual temperature is 40° F., and there are about 70 days between killing frosts.

These soils are somewhat stratified, but the texture above the gravel is generally loam or gravelly loam. The surface layer is grayish-brown loam that is mottled at or near the surface. It is underlain by mottled brown loam that extends to a depth of about 20 inches and by sand and gravel at a depth of 20 to 36 inches. The profile is noncalcareous to a depth of about 20 inches. The reaction is neutral to moderately alkaline.

Foxcreek soils are associated with moderately fine textured Furniss soils and calcareous Zufelt soils.

Foxcreek loam (0 to 1 percent slopes) (Fs).—This soil is in the eastern part of the wet bottom land. It is moderately deep. Included in mapping were small, slightly elevated areas of calcareous soil and small areas of well-drained soil.

Representative profile, 800 feet west and 200 feet north of the southeast corner of sec. 8, T. 5 N., R. 45 E., in a hayfield:

O—2 inches to 0, grayish-brown (10 YR 5/2) light loam in a mat of very fine roots; very dark grayish brown (10YR 3/2) when moist; slightly or moderately calcareous and moderately alkaline (pH 7.9); abrupt, smooth boundary.

A11g—0 to 6 inches, grayish-brown (10YR 5/2) loam containing a few fine pebbles; very dark grayish brown (10YR 3/2) when moist; many, fine and medium, prominent, strong-brown (7.5YR 5/6) mottles that are dark reddish brown (5YR 3/4) when moist; weak, medium and fine, granular structure; hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; abundant very fine and fine roots and few medium roots; many, very fine, tubular pores; neutral (pH 7.0); clear, smooth boundary.

A12g—6 to 13 inches, brown (10YR 5/3) loam that contains a few fine pebbles, very dark grayish brown (10YR 3/2) when moist; common, fine, prominent, strong-brown (7.5YR 5/6) mottles that are dark reddish brown (5YR 3/4) when moist; weak, very fine, subangular blocky structure parting to weak, medium and fine, granular structure; hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; abundant very fine and fine roots and few medium roots; many, very fine, tubular pores and few, medium, tubular pores; neutral (pH 6.8); clear, smooth boundary.

Bg—13 to 19 inches, brown (10YR 5/3) loam that contains a few pebbles, dark brown (10YR 3/3) when moist; many, fine and medium, prominent, strong-brown (7.5YR 5/6) mottles that are dark reddish brown (5YR 3/4) when moist; weak, fine and medium, granular structure; hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; plentiful fine and medium roots; many, very fine, tubular pores; neutral (pH 7.0); clear, smooth boundary.

IIC1cag—19 to 24 inches, light brownish-gray (10YR 6/2) very gravelly loamy sand or coarse sandy loam, dark grayish brown (10YR 4/2) when moist; few, fine, distinct, yellowish-brown (10YR 5/4) mottles; massive; soft when dry, very friable when moist, and slightly sticky and nonplastic when wet; few fine roots; common, very fine, tubular pores; moderately calcareous; moderately alkaline (pH 8.0); clear, smooth boundary.

IIIC2cag—24 inches, light brownish-gray (10YR 6/2) gravel and sand, dark grayish brown (10YR 4/2) when moist; single grain; loose; slightly or moderately calcareous; moderately alkaline (pH 8.0); gravel coated with calcium carbonate on lower side; gravel mostly granite, sandstone, quartzite, gneiss, and limestone.

In cultivated areas the 2-inch root mat is mixed with the rest of the surface layer. The color value of the A1 horizon ranges from 5 to 6 when the soil is dry. At a depth between 6 and 20 inches, the texture is dominantly loam, but in some places it is heavy loam. The depth to loose sand and gravel ranges from 20 to 36 inches.

Drainage is poor. Permeability is moderate in the upper part of the profile and very rapid in the gravel. The available water capacity is moderate. Roots penetrate into the upper part of the gravel and sand. The organic-matter content is high or very high. Although fertility is moderate, plants that are not water tolerant grow poorly because of the high water table. There is no erosion hazard.

This soil is used for meadow hay and for range. It can be used occasionally for a grain crop, just before it is reseeded to grass and legumes. (Capability unit IVw–1, irrigated; Dry Meadow range site; not in a woodland group)

Foxcreek loam, shallow variant (0 to 2 percent slopes) (Ft).—This soil is along stream channels south of Tetonia and west of Felt. Gravel is at a depth of 10 to 20 inches. Included in mapping were small areas of gravelly soil and small areas of soil more than 20 inches deep over gravel and sand.

This soil is used mostly for range. It can be cultivated occasionally for the purpose of reseeding to grass and legumes. (Capability unit IVw–3, dryland; River Bottom range site; woodland group 7)

Foxcreek gravelly loam (0 to 1 percent slopes) (Fr).—This soil is along the eastern edge of the wet bottom land. The gravel in the surface layer interferes with cultivation. The available water capacity is low.

This soil is used for meadow hay and for range. It can be cultivated for the purpose of reseeding to grasses and legumes. (Capability unit IVw–1, irrigated; Dry Meadow range site; not in a woodland group)

Foxcreek gravelly loam, shallow variant (0 to 2 percent slopes) (Fu).—This soil is generally along stream channels on the upper edge of the bottom land. Most of it is about 2 miles southwest of Tetonia. It is somewhat poorly drained to poorly drained and is underlain by gravel at a depth of 6 to 20 inches. The original vegetation consisted of water-tolerant grasses, sedges, willows, and cottonwoods. Included in mapping were small areas of nongravelly soil and small areas in which the soil is more than 20 inches deep over gravel.

Representative profile, 1,320 feet south and 300 feet west of the northeast corner of the NW¼ sec. 6, T. 5 N., R. 45 E., in an area of native grass and cottonwood:

A11g—0 to 2 inches, dark grayish-brown (2.5Y 4/2) loam that is slightly gravelly, very dark grayish brown (10YR 3/2) when moist; few, fine, distinct, yellowish-brown (10YR 5/8) mottles; weak, very fine, granular structure; slightly hard when dry, very friable when moist, and slightly sticky and slightly plastic when wet; abundant very fine and fine roots and few medium roots; slightly micaceous; slightly calcareous; moderately alkaline (pH 8.0); abrupt, smooth boundary.

A12g—2 to 11 inches, grayish-brown (2.5Y 5/2) gravelly loam; very dark grayish brown (10YR 3/2) when moist; common, fine, distinct yellowish-brown (10YR 5/4) mottles, dark yellowish brown (10YR 4/4) when moist; weak, very coarse, subangular blocky structure; slightly hard when dry, very friable when moist, and slightly sticky and slightly plastic when wet; plentiful very fine roots and few fine roots; many micro and very fine, tubular pores and few, fine, tubular pores; moderately micaceous; mildly alkaline (pH 7.6); abrupt, wavy boundary.

IIC1—11 inches, light brownish-gray (10YR 6/2) sand and gravel; grayish brown (10YR 5/2) when moist; single grain; loose when dry or moist, and nonsticky and nonplastic when wet; plentiful very fine roots and few fine roots to a depth of 12 inches; mildly alkaline (pH 7.8).

In some of the deeper areas the lower part of the profile is calcareous.

This soil is flooded and has a high water table during periods of peak runoff, but it is sometimes dry later in the summer. Permeability is moderate in the upper part but very rapid in the underlying gravel. The available water capacity is low. Roots penetrate into the upper part of the gravel and sand. The organic-matter content is high. Although fertility is moderate, plants that are not water tolerant grow poorly because of the flooding and the fluctuating water table.

This soil is used for range and is better suited to this than to other uses. (Capability unit IVw–3, dryland; River Bottom range site; woodland group 7)

Foxcreek silty clay loam, heavy subsoil variant (0 to 1 percent slopes) (Fv).—Most of this soil is on the upper edge of bottom land near Driggs. It is underlain by loose gravel at a depth of 25 to 36 inches.

Permeability is moderately slow in the upper horizons and very rapid in the gravel. The available water capacity is moderate.

This soil is used for range and hay. (Capability unit Vw–1, dryland; Wet Meadow range site; not in a woodland group)

Furniss Series

The Furniss series consists of poorly drained, moderately fine textured soils that formed in deep mixed alluvium on level or slightly concave bottom land. The alluvium was derived from granite, quartzite, limestone, gneiss, and rhyolite. The original vegetation consisted of sedges, rushes, willows, and other water-loving plants.

These soils are at an elevation of 5,800 to 6,800 feet and receive an average of 17 inches of precipitation annually. The mean annual temperature is 39°F., and there are about 65 days between killing frosts.

The surface layer is dark-gray silty clay loam or mucky silty clay loam 7 to 16 inches thick. It is underlain by light-gray and gray silty clay loam to a depth of 30 inches. This layer is stratified in some places but is dominantly moderately fine textured. It is underlain by gravel at a depth of 36 to 60 inches. Mottling occurs at or very near the surface. The reaction is mildly to moderately alkaline.

Furniss soils are associated with medium-textured Foxcreek soils and light-colored Zohner soils.

Furniss silty clay loam (0 to 1 percent slopes) (Fx).—This is a deep soil on wet bottom land near the Teton River. Included with it in mapping were a few small areas of soil that is calcareous throughout and small areas of soil as shallow as 20 inches to gravel.

Representative profile, 900 feet south and 860 feet east of the northwest corner of sec. 9, T. 4 N., R. 45 E., in a wet meadow pasture:

O—2 inches to 0, very dark grayish-brown (10YR 3/2) root mat consisting of decayed, decomposing, and live roots and a small quantity of silt loam; very dark brown (10YR 1/2) when moist; noncalcareous except in the upper part where it is slightly calcareous; mildly alkaline (pH 7.8); clear, wavy boundary.

A11—0 to 6 inches, dark-gray (10YR 4/1) silty clay loam, black (10YR 2/1) when moist; few, fine, prominent strong-brown (7.5YR 5/6) mottles, reddish brown (5YR 4/4) when moist; moderate, very fine and fine, subangular and angular blocky structure parting to weak, fine, granular structure; very hard when dry and firm when moist; abundant very fine and fine roots, plentiful medium roots, and few coarse roots; common, very fine, tubular pores; mildly alkaline (pH 7.8); clear, wavy boundary.

A12—6 to 11 inches, dark-gray (10YR 4/1) silty clay loam, black when moist; few, fine, prominent, strong-brown (7.5YR 5/6) mottles, reddish brown (5YR 4/4) when moist; moderate, very fine and fine, subangular and angular blocky structure parting to weak, fine, granular structure; plentiful very fine and fine roots and few medium roots; few uncoated grains of silt; clear, wavy boundary.

C1g—11 to 16 inches, light-gray (2.5Y 7/2) light silty clay loam, gray (2.5Y 5/2) when moist; many, medium and coarse, faint and distinct, pale-olive (5Y 6/3) mottles, light olive brown (2.5Y 5/4) when moist; few, fine, prominent, light yellowish-brown (10YR 6/4) and yellowish-brown (10YR 5/4) mottles, yellowish brown (10YR 5/4) and dark yellowish brown (10YR 4/4) when moist; very weak, coarse, subangular blocky structure, or massive; very hard when dry and firm when moist; plentiful very fine and fine roots and few medium roots; common, very fine and fine, tubular pores; few to moderately numerous grains of uncoated silt; noncalcareous or very slightly calcareous; moderately alkaline (pH 8.0); abrupt, smooth boundary.

C2g—16 to 26 inches, light-gray (5Y 7/1) silty clay loam, gray (5Y 4/1) when moist; few, fine, prominent, yellowish-brown (10YR 5/6) mottles, dark brown (7.5YR 4/4) when moist; massive; very hard or extremely hard when dry and firm when moist; plentiful very fine and fine roots and few medium roots; few, very fine and fine, tubular pores; moderately alkaline (pH 8.0); abrupt, wavy boundary.

C3g—26 to 30 inches, gray (2.5Y 6/1) silty clay loam, dark gray (2.5Y 4/1) when moist; few, fine, faint, very pale-brown (10YR 7/4) mottles, yellowish brown (10YR 5/4) when moist; massive; very hard when dry, firm when moist, plentiful very fine and fine roots and few medium roots; very few, very fine and fine, tubular pores; very few, very fine magnesium stains; mildly alkaline (pH 7.8); abrupt, smooth boundary.

IIC4g—30 to 35 inches, gray (5Y 6/1) heavy fine sandy loam, dark gray (5Y 4/1) when moist; very few, fine, distinct, strong-brown (7.5YR 5/6) mottles; massive; hard when dry and friable when moist; few, very fine and fine roots; few, very fine, tubular pores; moderately or slightly calcareous; mildly alkaline (pH 7.8); abrupt, wavy boundary. Contains lenses of fine sand.

IIIC5—35 to 40 inches, gray (5Y 6/1) very gravelly coarse sandy loam, dark gray (5Y 4/1) when moist; massive; very friable; few, very fine and fine roots; moderately calcareous; moderately alkaline (pH 8.0); clear, wavy boundary.

IVC6—40 inches, calcareous sand and gravel; loose.

The root mat and the top few inches of the surface layer are slightly calcareous in some areas. The A1 horizon is very dark gray or dark gray and is 7 to 16 inches thick. It is about 6 to 20 percent organic matter. The underlying horizons are somewhat stratified but are dominantly moderately fine textured. The depth to gravel ranges from 36 to more than 60 inches but is generally about 45 inches.

Drainage is poor. Permeability is moderately slow in the upper part of the profile and very rapid in the gravel. The available water capacity is high, and the organic-matter content is very high. Roots can penetrate to the gravel. There is no erosion hazard.

Because of the high water table, this soil is used only for range and hay. The streams, ponds, and vegetation provide a good habitat for waterfowl. (Capability unit Vw–1, dryland; Wet Meadow range site; not in a woodland group)

Furniss mucky silty clay loam (0 to 1 percent slopes) (Fw).—Most of this soil is on wet bottom land west of Driggs. The profile is similar to that of Furniss silty clay loam except that there is a 6-inch to 12-inch organic layer over the mineral soil, and the dark-colored uppermost layer of the mineral soil is less than 7 inches thick. Included with this soil in mapping were small areas that lack an organic layer and small areas of shallow peat.

The available water capacity is very high, and natural fertility is high.

This soil is used for pasture and hay and for waterfowl habitat. (Capability unit Vw–1, dryland; Wet Meadow range site; not in a woodland group)

Greys Series

The Greys series consists of well-drained, medium-textured soils that formed in very deep loess. The original vegetation consisted mostly of aspen, chokecherry, wild rose, and pinegrass.

Greys soils are generally undulating to hilly. They are on uplands in the northern part of the Area, at an elevation of 6,000 to 7,000 feet, and the annual precipitation is 17 to 20 inches. The mean annual temperature is 39°F., and there are about 70 days between killing frosts.

In uncultivated areas these soils have a cover of forest litter 1 to 2 inches thick over grayish-brown silt loam 8 to 14 inches thick. The next layer is brown heavy silt loam that extends to a depth of about 38 inches. The substratum consists of more than 60 inches of brown silt loam.

Greys soils are associated with light-colored Turnerville soils.

Greys silt loam, 4 to 12 percent slopes (GeD).—This soil is very deep. The largest areas of it are on uplands 4 to 5 miles east and northeast of Felt. Included in mapping were small areas that have a light-gray to gray surface layer and other areas that have a dark grayish-brown surface layer. Also included were small slightly stony areas.

Representative profile, 110 feet north and 120 feet west of the southeast corner of the NE¼ sec. 12, T. 6 N., R. 45 E., in an aspen grove:

O11—1.5 to 1.3 inches, undecomposed aspen leaves; medium acid (pH 6.0); abrupt, wavy boundary.

O12—1.3 inches to 0.2 inch, very dark brown (10YR 2/2 when dry and 10YR 1/2 when moist), partly decomposed aspen leaves, twigs, and wood; matted; friable; very abundant roots; slightly acid (pH 6.3); abrupt, wavy boundary.

O2—0.2 inch to 0, very dark gray (10YR 3/1), well-decomposed organic matter, very dark brown (10YR 1/2) when moist; moderate, very fine, granular structure; very abundant roots; slightly acid (pH 6.3); abrupt, wavy boundary.

A11—0 to 1 inch, dark grayish-brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) when moist; weak, very thin, platy structure parting to moderate, very fine, crumb structure, very friable when moist and slightly sticky and slightly plastic when wet; very abundant roots; medium acid (pH 6.0); abrupt, wavy boundary.

A12—1 to 5 inches, grayish-brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) when moist; weak, very fine, crumb structure; friable when moist and slightly sticky and slightly plastic when wet; abundant roots; many, very fine, tubular pores; few to common, very fine, soft, black concretions (less than ½ millimeter); few small pockets of light-gray A2 material and few bleached silt grains; medium acid (pH 6.0); clear, wavy boundary.

A13—5 to 11 inches, grayish-brown (10YR 5/2) silt loam (60 percent by volume), very dark grayish brown (10YR 3/2) when moist; contains moderate number (40 percent by volume) of dark grayish-brown (10YR 4/2 when moist) pockets (up to 1 inch across) of A2 material; very weak, coarse, subangular blocky structure parting to very weak, fine, granular structure; friable when moist and slightly sticky and slightly plastic when wet; abundant roots; common micro and very fine pores and channels up to 3 millimeters in diameter; few concretions like those in A12 horizon; slightly acid (pH 6.3); clear, wavy boundary.

A3&A2—11 to 14 inches, grayish-brown (10YR 5/2) silt loam (70 percent by volume), very dark grayish brown (10YR 3/2) when moist; irregular pockets, spots, and lenses of light brownish-gray (10YR 6/2) A2 material (about 30 percent), dark grayish brown (10YR 4/2) when moist; very weak, very coarse, prismatic structure parting to very weak, coarse, subangular blocky structure; hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; plentiful roots; common very fine and micro pores; thin, patchy clay films in channels and on vertical surfaces of prisms; slightly acid (pH 6.4); clear, smooth boundary.

A&B—14 to 17 inches, similar to A3&A2 except the A2 material is dominant; weak, thin, platy structure; clear, smooth boundary.

B21t—17 to 26 inches, brown (10YR 5/3) heavy silt loam, dark brown (10YR 4/3) when moist; weak or moderate medium, prismatic structure parting to moderate, medium, subangular and angular blocky structure; hard when dry, firm when moist, and sticky and plastic when wet; plentiful roots; moderately dense, but few to common pores; thick, continuous, brown (7.5YR 5/2) clay films on peds and in pores, dark brown (7.5YR 3/2) when moist; thick, light-gray silty coating on vertical surfaces and in pores; silt coatings in cavities and on lenses in upper part, but only slight coating in horizontal cracks; few, black, very fine (less than 1 millimeter) concretions; slightly acid (pH 6.1); gradual, smooth boundary. The upper part appears to be grading to light-gray A2 material.

B22t—26 to 38 inches, brown (10YR 5/3) heavy silt loam, dark brown (10YR 4/3) when moist; weak, medium, prismatic structure parting to weak, medium, subangular blocky structure; firm when moist and sticky and plastic when wet; plentiful roots; common very fine pores; thick, continuous, dark-brown (7.5YR 4/2) clay films on vertical ped surfaces and thin, patchy clay films on horizonal ped surfaces and in pore surfaces, which are dark brown (7.5YR 3/2) when moist; moderate, light-gray silty specking on main vertical surfaces; ½ inch continuous band of clay film, dark brown (7.5YR 3/2) when moist, around all peds; slighty acid (pH 6.3);

gradual, wavy boundary. Badger hole in this horizon and in parts of the B21t horizon.

B3t—38 to 56 inches, pale-brown (10YR 6/3) silt loam, dark brown (10YR 4/3) when moist; weak, medium, prismatic structure parting to weak, coarse, subangular blocky structure; friable when moist and sticky and plastic when wet; plentiful roots; many micro and very fine pores; thin, patchy, brown (10YR 5/3) clay films on peds and in pores, which are dark brown (10YR 4/3) when moist; two ¼-inch bands of dark-brown (7.5YR 3/2) continuous clay film around all peds; the bands are firm to very firm; above the upper band is much light-gray silty specking (A2 material) on peds and in pores; very few, very firm, dark-brown concretions; neutral (pH 6.6); abrupt, smooth boundary.

C1ca—56 to 84 inches, pale-brown (10YR 6/3) silt loam, dark brown (10YR 4/3) when moist; massive; slightly hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; few roots; common fine veins of calcium carbonate; mildly alkaline (pH 7.8); diffuse, smooth boundary.

The organic layer is lacking in cultivated or burned areas. The A1 horizon is 8 to 12 inches thick and is underlain by the slightly lighter colored A2 horizon. The B2t horizon is heavy silt loam or light silty clay loam; it has nearly twice the clay content of the A1 and A2 horizons. A calcareous layer begins at a depth of 55 to 95 inches.

Natural drainage is good. Permeability is moderate in the upper horizons and moderately slow in the more clayey B horizon. The available water capacity is very high. Roots penetrate below a depth of 5 feet. The organic-matter content is high, and natural fertility is moderate. The erosion hazard is slight to moderate.

This soil is used mainly for range. Small acreages have been cleared for wheat, barley, oats, and alfalfa. A few trees are cut for firewood and fenceposts. The natural vegetation provides excellent habitat for wildlife. (Capability unit IIIe–4, dryland; Loamy range site (aspen); woodland group 1)

Greys silt loam, 12 to 20 percent slopes (GeE).—The largest areas of this soil adjoin farmland in the northern part of the survey Area. The erosion hazard is moderate to severe.

This soil is used mainly for range. Small cleared acreages are used for wheat, barley, and oats. A few trees are cut for firewood and fenceposts. The natural vegetation provides excellent habitat for wildlife. (Capability unit IIIe–49, dryland; Loamy range site (aspen); woodland group 1)

Greys silt loam, 20 to 30 percent slopes (GeF).—Most of this soil adjoins farmland in the northern part of the Area. The erosion hazard is severe.

Most of the acreage is grazed. A small acreage is dry-farmed for wheat, barley, and oats. A few trees are cut for fenceposts and firewood. (Capability unit IVe–4, dryland; Loamy range site (aspen); woodland group 1)

Greys silt loam, thick surface variant, 30 to 60 percent slopes (GlG).—This soil occupies small, narrow strips on steep north slopes of uplands in the northern part of the Area and small areas south of Victor in the southeastern part. It has a thicker surface layer than Greys silt loam, 4 to 12 percent slopes. The surface layer is 15 to 25 inches thick. Included in mapping were small areas that have a slope of less than 30 percent and small areas that are slightly stony.

Representative profile, southeast corner SW¼NW¼ sec. 15, T. 6 N., R. 43 E., in an aspen grove:

O11—2.2 to 2 inches, undecomposed pinegrass and leaves of aspen, serviceberry, and snowberry; very strongly acid (pH 4.8).

O12—2 inches to 0.5 inch, very dark gray (10YR 3/1), slightly or moderately decomposed leaves and twigs; matted: abundant fine roots; strongly acid (pH 5.5); abrupt, wavy boundary.

O2—0.5 inch to 0, very dark gray (10YR 3/1), well-decomposed organic matter, very dark brown (10YR 1/2) when moist; moderate, very fine, granular structure; abundant fine and very fine roots; medium acid (pH 5.9); abrupt, wavy boundary.

A11—0 to 9 inches, dark grayish-brown (10YR 4/2) silt loam, very dark brown (7.5YR 2/2) when moist; weak, very fine, granular structure; slightly hard when dry, very friable when moist, and slightly sticky and slightly plastic when wet; abundant fine and very fine roots and few coarse and very coarse roots; many, very fine, tubular pores and common, fine, tubular pores; few, soft, dark-colored, fine concretions; very few or no bleached grains, but many grains appear slightly bleached; strongly acid (pH 5.4); clear, wavy boundary.

A12—9 to 24 inches, dark-brown (10YR 4/3) silt loam, dark brown (10YR 3/3) when moist; very weak, coarse, prismatic structure or very weak, very coarse, subangular blocky structure; hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; abundant fine and very fine roots and few coarse and very coarse roots; many, very fine and few, fine, tubular pores; very few bleached grains, but many partly coated grains; medium acid (pH 5.7); clear, wavy boundary.

A2—24 to 36 inches, brown (10YR 5/3) silt loam, dark brown (10YR 3/3) when moist; very weak, coarse, prismatic structure parting to very weak, coarse, subangular blocky structure; hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; plentiful fine and very fine roots and a few coarse roots; many, very fine and few, fine, tubular pores; thin, pinkish-gray (7.5YR 6/2), bleached coating on peds, dark brown (7.5YR 4/2) when moist; mostly partly coated or moderately bleached grains; strongly acid (pH 5.3); clear, wavy boundary.

B21t—36 to 62 inches, light yellowish-brown (10YR 6/4) heavy silt loam, dark brown (10YR 4/3) when moist; weak or moderate, medium and coarse, prismatic structure parting to weak or moderate, medium and coarse, subangular blocky structure; hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; plentiful fine and very fine roots and few coarse roots; many, very fine, tubular pores; a few, scattered, thin clay films on horizontal ped surfaces; thin, patchy clay films on vertical ped surfaces and pore surfaces; three 0.5-inch, horizontal clayey bands, dark brown (7.5YR 4/2) when dry; thick, bleached, pinkish-gray (7.5YR 6/2) coating of A2 material on peds, dark brown (10YR 4/3) when moist; medium acid (pH 5.6); clear, wavy boundary.

B22t—62 to 68 inches, similar to above horizon but weak, coarse prismatic structure; few fine and coarse roots; thin, patchy or scattered clay films on peds and moderately thick, nearly continuous clay films in some channels; no clayey bands; medium acid (pH 5.7); abrupt, wavy boundary.

IIB23t—68 to 71 inches, light-brown (7.5YR 6/3) stony heavy sandy clay loam, brown (7.5YR 5/4) when moist; some bleached coatings on peds, pink (7.5YR 7/3) when dry and brown (7.5YR 5/3) when moist; moderate, medium, prismatic structure parting to moderate, medium, subangular blocky structure; very hard when dry, firm when moist, and sticky and plastic when wet; few fine roots; few, very fine, tubular pores; thick, continuous clay films in pores and moderately thick or thick, patchy clay films on vertical and horizontal ped surfaces; strongly acid (pH 5.4); abrupt, wavy boundary.

IIR—71 inches, white (N 8/0) and reddish-gray (10R 6/1) tuff, latite, or tuffaceous rhyolite bedrock; very porous; takes water readily, but pores are not visible

with hand lens; rock is coated with clay; medium acid (pH 5.8).

The organic layers are lacking in burned areas. The dark-colored A1 horizon, to a depth of 15 to 24 inches, has a color value of 4 to 5 when the soil is dry. Where the soil is not underlain by bedrock, the profile is calcareous below a depth of about 70 inches.

Natural drainage is good. Permeability is moderate in the upper part of the profile to moderately slow in the more clayey layer just above bedrock. The available water capacity is generally very high. Roots penetrate deeply. The organic-matter content is high, and natural fertility is moderate. The erosion hazard is very severe.

This soil is used mainly for range. It provides excellent habitat for wildlife. Some trees are cut for fenceposts and firewood. (Capability unit VIIe–1, dryland; Loamy range site (aspen); woodland group 1)

Greys-Rin silt loams, 12 to 20 percent slopes (GrE).—From 50 to 75 percent of this complex is Greys soil, and most of the rest is Rin soil.

These soils are used for range. (Greys soil in capability unit IIIe–49, dryland; Loamy range site (aspen); woodland group 1. Rin soil in capability unit IIIe–49, dryland; Loamy range site, 16-inch to 19-inch precipitation zone; not in a woodland group)

Judkins Series

The Judkins series consists of well-drained, medium-textured extremely stony soils that are moderately deep over bedrock. These soils formed in residuum from rhyolite bedrock, mixed with a small amount of loess. The original vegetation was predominantly lodgepole pine, Douglas-fir, and pinegrass.

Most areas are on mountain foothills and on north-facing and east-facing canyon walls in the northern part of the Area. They are at an elevation of 5,800 to 7,000 feet and receive 20 to 25 inches of precipitation annually. The mean annual temperature is 38° F., and there are about 70 days between killing frosts.

These soils have a cover of forest litter about 2 inches thick over brown extremely stony loam about 10 inches thick. Below this is light brownish-gray, extremely stony loam to a depth of about 24 inches, then brown extremely stony heavy loam or light clay loam that extends to bedrock. The profile is strongly acid to neutral.

Judkins soils are associated with deep to very deep Turnerville soils and with Rammel soils, which are on south-facing canyon walls.

Judkins extremely stony loam, 60 to 80 percent slopes (JuH).—This soil occupies north-facing and east-facing canyon walls in the northern part of the Area. Small areas of rock outcrop and small areas that are not extremely stony were included in mapping.

Representative profile, 1,000 feet north and 500 feet west of the southeast corner of the NE¼ sec. 18, T. 7 N., R. 45 E., in an area of lodgepole pine:

O11—2 to 1.7 inches, undecomposed needles, twigs, grass, and cones; medium acid (pH 5.8).

O12—1.7 inches to 1 inch, dark grayish-brown (10YR 4/2), partly decomposed needles, twigs, grass, and cones, very dark brown (10YR 2/2) when moist; somewhat matted; plentiful very fine roots; strongly acid (pH 5.4); abrupt, wavy boundary.

O2—1 inch to 0, very dark brown (10YR 2/2), well-decomposed organic matter, black (10YR 2/1) when moist; moderate, fine and very fine, granular structure; plentiful fine and medium roots; strongly acid (pH 5.4); abrupt, wavy boundary.

A1—0 to 1 inch, dark grayish-brown (10YR 4/2) and grayish-brown (10YR 5/2) extremely stony loam, very dark brown (10YR 2/2) and very dark grayish brown (10YR 3/2) when moist; weak, very fine, granular structure; slightly hard when dry, very friable when moist, and slightly sticky and slightly plastic when wet; abundant fine and very fine roots, plentiful medium roots; and few coarse roots; few bleached silt grains; medium acid (pH 5.6); abrupt, broken boundary.

A2—1 to 9 inches, brown (10YR 5/3) and light brownish-gray (10YR 6/2) extremely stony loam, dark brown (10YR 3/3) when moist; 40 percent consists of soil pockets that are very dark grayish brown (10YR 3/2) when moist; weak, very thin, platy structure parting to weak, very fine, granular structure; slightly hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; abundant fine and very fine roots and few medium and coarse roots; in places roots are matted on top of stones; approximately 50 percent by volume consists of stones and angular gravel coated on the underside with thin clay films; many, very fine, tubular pores; many bleached silt grains; medium acid (pH 5.8); clear, wavy boundary.

A&B—9 to 24 inches, light brownish-gray (10YR 6/2) extremely stony loam, dark grayish brown (10YR 4/2) when moist; few brown (10YR 5/3) splotches; dark brown (10YR 3/3) when moist; weak, medium, subangular blocky structure parting to moderate, fine and very fine, granular structure; slightly hard when dry, very friable when moist, and slightly sticky and slightly plastic when wet; abundant fine and very fine roots and few coarse roots; approximately 75 percent by volume consists of stones and angular gravel; many, very fine, tubular pores; few, thin, horizontal clayey bands; clay is dark brown (10YR 3/3) when moist and accumulates in pockets around rocks and as dark coatings on underside of rocks; soil is mostly A2 material and uncoated or bleached grains; B material appears to be changing to A2 material; few, soft, fine (less than 1 millimeter) concretions; medium acid (pH 5.9); clear, wavy boundary.

B21t—24 to 37 inches, brown (10YR 5/3) extremely stony heavy loam or light clay loam, slightly more clayey than A&B horizon, dark brown (10YR 3/3) when moist; weak or moderate, fine, subangular blocky structure; hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; plentiful fine and very fine roots and few coarse roots; approximately 85 percent stones and angular gravel; clay accumulation as in A&B horizon; few, fine, tubular pores; common bleached silt grains on ped surfaces and in pores and few 0.25-inch pockets; medium acid (pH 6.0); clear, wavy boundary.

B22t—37 to 39 inches, brown (10YR 5/3) extremely stony light clay loam or heavy loam, dark brown (10YR 4/3) when moist; moderate, fine, subangular blocky structure; hard when dry, friable when moist, and sticky and plastic when wet; few fine and very fine roots; approximately 85 percent by volume is stones and angular gravel coated with clay; many, very fine, tubular pores; medium acid (pH 5.9); abrupt, wavy boundary.

R—39 inches, light-gray (5YR 7/1) and pinkish-gray (5YR 6/2), fractured tuffaceous rhyolite or latite bedrock.

Where the surface litter has been burned, the organic horizon is lacking. The A1 horizon also is lacking in some places. The depth to bedrock ranges from 20 to 40 inches.

Natural drainage is good, permeability is moderate, and the available water capacity is low. Roots penetrate to bedrock but tend to form a mat on top of many of the stones. The organic-matter content is low, and natural fertility is low. The erosion hazard is very severe if the vegetation is removed.

This soil is used for forestry and grazing. It provides good habitat for wildlife. (Capability unit VIIs–1, dryland; North Slope range site; woodland group 3)

Judkins extremely stony loam, 12 to 30 percent slopes (JuF).—This soil occupies north-facing and east-facing canyon walls and mountain foothills in the northern part of the Area. The erosion hazard is moderate if the vegetation is removed.

This soil is used for forestry, for range, and for wildlife habitat. (Capability unit VIIs–1, dryland; North Slope range site; woodland group 3)

Judkins extremely stony loam, 30 to 60 percent slopes (JuG).—This soil is on north-facing and east-facing canyon walls in the northern part of the Area. It is used for timber, grazing, and wildlife habitat. The erosion hazard is severe or very severe. (Capability unit VIIs–1, dryland; North Slope range site; woodland group 3)

Karlan Series

The Karlan series consists of well-drained, medium-textured soils underlain by rhyolite or rhyolite tuff bedrock at a depth of 20 to 40 inches. These soils formed in shallow loess deposits overlying and mixed with residuum from the bedrock. The original vegetation was predominantly grass.

These soils generally occupy long, very gentle to steep slopes on the north end of the Big Hole Mountains. They are at an elevation of 6,000 to 7,000 feet and receive from 15 to 18 inches of precipitation annually. The mean annual temperature is 40° F., and there are about 80 days between killing frosts.

The surface layer, to a depth of about 18 inches, is dark grayish-brown silt loam. It is underlain by brown, gravelly heavy silt loam to a depth of about 26 inches. The substratum is pale-brown, strongly calcareous extremely stony loam about 6 inches thick. It is underlain by rhyolite bedrock that is generally fractured in the upper part and has calcareous soil material between the fragments.

Karlan soils are associated with lighter colored Ard soils and shallower Swanner soils.

Karlan silt loam, 4 to 12 percent slopes (KaD).—This soil is on the north end of the Big Hole Mountains, in the northwestern part of the Area. The range of slope is generally 5 to 8 percent. Included in mapping were some areas of stony soil and some of soil that is less than 20 inches deep to bedrock. Also included are drainageways in which the soil has been eroded to bedrock. These eroded areas make up less than 12 percent of the total acreage.

Representative profile, 880 feet west and 650 feet north of the southeast corner of the SW¼ sec. 28, T. 6 N., R. 43 E., in a cultivated field:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam containing a few angular pieces of gravel, very dark brown (10YR 2/2) when moist; weak, fine and very fine, granular structure; slightly hard when dry, very friable when moist, and slightly sticky and slightly plastic when wet; few fine roots; common very fine pores; no bleached silt grains or scattered grains; slightly acid (pH 6.2); abrupt, smooth boundary.

A11—8 to 15 inches, dark grayish-brown (10YR 4/2) silt loam containing a few angular pieces of gravel; very dark brown (10YR 2/2) when moist; weak, coarse, prismatic structure parting to very weak, coarse, subangular blocky structure; slightly hard when dry, very friable when moist, and slightly sticky and slightly plastic when wet; few fine roots; common, very fine, tubular pores; no bleached silt grains, or at most only scattered ones; slightly acid (pH 6.5); clear, smooth boundary.

A12—15 to 18 inches, dark grayish-brown (10YR 4/2) silt loam, very dark brown (10YR 2/3) when moist; a few angular pieces of gravel; slightly more coarse sand and fine gravel than in A12 horizon; weak, coarse, prismatic structure parting to weak, coarse and medium, subangular blocky structure; hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; few fine roots; common, very fine, tubular pores; thin, scattered clay films on vertical and horizontal ped surfaces and in the pores; neutral (pH 6.6); clear, smooth boundary.

B2—18 to 26 inches, brown (10YR 5/3) gravelly heavy silt loam, dark brown (10YR 3/3) when moist; very weak, coarse, prismatic structure parting to weak, coarse, subangular blocky structure; hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; few fine roots; common, very fine, tubular pores and many, micro, interstitial pores; thin, scattered clay films on vertical and horizontal ped surfaces and in pores; neutral (pH 6.7); abrupt, irregular boundary.

Cca—26 to 32 inches, light-gray (10YR 7/2) extremely stony loam, pale brown (10YR 6/3) when moist; weak, medium and fine, granular structure; hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; few, very fine, tubular pores; strongly calcareous; mildly alkaline (pH 7.8); abrupt, irregular boundary. About 85 percent of the mass is lime-coated fragments of rhyolitic tuff.

R—32 inches, light-gray (5YR 7/1) rhyolitic tuff bedrock, gray (5YR 5/1) when moist; absorbs water readily.

When dry, the A1 horizon has a color value of 4 or less. The B2 horizon has thin, scattered clay films but contains less than 3 percent more clay than the A1. The Cca horizon contains less than 15 percent calcium carbonate. The depth to bedrock ranges from 20 to 40 inches.

Natural drainage is good, permeability is moderate, and the available water capacity is moderate. Roots easily penetrate to bedrock. The organic-matter content and the natural fertility are high. The erosion hazard is severe.

Most of this soil is dryfarmed. The principal crops are wheat, barley, and alfalfa. (Capability unit IVe–47, dryland; Loamy range site, 16-inch to 19-inch precipitation zone; not in a woodland group)

Karlan silt loam, 0 to 4 percent slopes (KaB).—This soil is on the northeastern edge of the Big Hole Mountains, about 7 miles west of Tetonia. It has a thicker surface layer than Karlan silt loam, 4 to 12 percent slopes. The erosion hazard is severe.

This soil is dryfarmed for wheat, barley, and alfalfa. (Capability unit IVe–47, dryland; Loamy range site, 16-inch to 19-inch precipitation zone; not in a woodland group)

Karlan silt loam, 12 to 20 percent slopes (KaE).—Most of this soil is on the northeastern edge of the Big Hole Mountains, about 7 miles west of Tetonia. The surface layer is generally a few inches thinner than that of Karlan silt loam, 4 to 12 percent slopes, and there are a few more stones and more gravel throughout the profile. Included in mapping were small areas of rock outcrop and areas that are too stony to cultivate. The erosion hazard is moderate to severe.

This soil is dryfarmed for wheat, barley, and alfalfa. It is suitable for grass and legume hay and pasture and for an occasional grain crop. (Capability unit IVe–4, dryland; Loamy range site, 16-inch to 19-inch precipitation zone; not in a woodland group)

Karlan silt loam, 20 to 40 percent slopes (KaF).—There are large areas of this soil about 2 miles north of Tetonia and others about 6 miles northeast of Tetonia. The surface layer is a few inches thinner than that of Karlan silt loam, 4 to 12 percent slopes, and there are more stones and gravel in the profile. Included in mapping were small areas of rock outcrop and small areas that are too shallow and stony for cultivation. The erosion hazard is very severe.

This soil is used for grazing and is better suited to this than to other uses. (Capability unit VIe–2, dryland; Loamy range site, 16-inch to 19-inch precipitation zone; not in a woodland group)

Lantonia Series

The Lantonia series consists of well-drained, medium-textured soils that formed in very deep deposits of loess. The original vegetation consisted of bunchgrass and some sagebrush.

In most areas these soils are gently undulating to hilly. They are on uplands in the northern part of the Area at an elevation of 5,800 to 7,000 feet, and they receive from 15 to 18 inches of precipitation annually. The mean annual temperature is 40°F., and there are about 80 days between killing frosts.

The surface layer, to a depth of 14 to 18 inches, is dark grayish-brown silt loam. It is underlain by dark grayish-brown and brown silt loam to a depth of about 37 inches. The substratum is strongly calcareous silt loam. The reaction grades from neutral in the surface layer to mildly or moderately alkaline in the substratum.

Lantonia soils are associated with Tetonia and Ririe soils.

Lantonia silt loam, 4 to 12 percent slopes (LaCD).—This soil occupies many of the north slopes west of Badger Creek and the ridgetops and north slopes east of Badger Creek. The slope is commonly between 4 and 8 percent. Included in mapping were small areas in which the surface layer is lighter colored than dark grayish brown. Also included were areas in which lime is at a depth of less than 36 inches and small areas where the slope is between 2 and 4 percent.

Representative profile, 108 feet north and 251 feet west of the southeast corner of sec. 24, T. 7 N., R. 44 E., in a fallow field:

Ap—0 to 6 inches, dark grayish-brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) when moist; weak, very fine, granular structure; hard when dry and friable when moist; abundant fine roots; common very fine pores; neutral (pH 6.9); abrupt, smooth boundary.

A1—6 to 18 inches, dark grayish-brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) when moist; very weak, coarse, prismatic structure parting to very weak, coarse and very coarse, subangular blocky structure; plentiful fine roots; neutral (pH 6.6); clear, smooth boundary.

B1—18 to 24 inches, dark grayish-brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) when moist; moderate, coarse, prismatic structure parting to moderate or weak, medium, subangular blocky structure; hard when dry and firm when moist; plentiful fine roots; common very fine pores; thin, patchy, slightly darker colored clay films on vertical surfaces and in pores; thin, scattered clay films on horizontal surfaces; small amount of light-gray silt specking on vertical surfaces; neutral (pH 6.7); clear, smooth boundary.

B2—24 to 28 inches, brown (10YR 5/3) silt loam, dark grayish brown (10YR 4/2) when moist; weak or moderate, coarse and medium, prismatic structure parting to weak, medium, subangular blocky structure; hard when dry and firm when moist; few fine roots; few very fine pores; thin, patchy clay films on vertical surfaces and in pores; thin, scattered clay films on horizontal surfaces; small amount of light-gray silt specking on vertical surfaces; neutral (pH 6.9); clear, wavy boundary.

B3—28 to 37 inches, brown (10YR 5/3) silt loam, dark grayish brown (10YR 4/2) when moist; very weak or weak, coarse, prismatic structure parting to weak, coarse, subangular blocky structure; hard when dry and friable when moist; few fine roots; common very fine pores; thin, scattered clay films; very small amount of light-gray silt specking on vertical surfaces; mildly alkaline (pH 7.5); abrupt, wavy boundary.

C1ca—37 to 52 inches, light brownish-gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) when moist; very weak, coarse, prismatic structure parting to weak, coarse, subangular blocky structure; hard when dry and friable when moist; very few fine roots; common very fine pores; many veins of calcium carbonate; strongly calcareous; mildly alkaline (pH 7.8); gradual, wavy boundary.

C2ca—52 to 68 inches, light-gray (10YR 7/2) silt loam, brown (10YR 5/3) when moist; massive; hard when dry and friable when moist; very few fine roots; common, very fine, tubular pores; few veins of calcium carbonate; strongly calcareous; moderately alkaline (pH 7.9); gradual, wavy boundary.

C3—68 to 110 inches, pale-brown (10YR 6/3) silt loam, dark brown (10YR 4/3) when moist; massive; hard when dry and friable when moist; no lime veining; strongly calcareous; moderately alkaline (pH 8.0).

The upper horizons, to a depth of more than 20 inches, have a color value as dark as 5 when dry and 3 or less when moist. The B horizon is a structural B or very weak textural B horizon.

Natural drainage is good, permeability is moderate, and the available water capacity is very high. Roots penetrate deeply. The organic-matter content and the natural fertility are high. The erosion hazard is slight to moderate. Tilth is good enough to permit cultivation throughout a wide range of moisture content.

Most of this soil is dryfarmed. The principal crops are wheat, barley, and alfalfa. (Capability unit IIIe–4, dryland; not in a range site or woodland group)

Lantonia silt loam, 0 to 4 percent slopes (LaA).—The largest areas of this soil are about 6 miles southwest of Driggs. The slope is commonly between 2 and 4 percent. The erosion hazard is slight.

This soil is dryfarmed for wheat, barley, and alfalfa. It is suitable for irrigation if water is available. (Capability unit IIIc–4, dryland; not in a range site or woodland group)

Lantonia silt loam, 2 to 4 percent slopes (LaB).—Most of this soil is about 6 miles southwest of Driggs. The erosion hazard is moderate if this soil is irrigated and slight if it is dryfarmed.

Most of the acreage is irrigated for alfalfa, wheat, barley, potatoes, and oats. Some of it is dryfarmed for wheat, barley, and alfalfa. (Capability unit IIIe–1, irrigated, and IIIc–4, dryland; not in a range site or woodland group)

Lantonia silt loam, 4 to 8 percent slopes (LaC).—Most of this soil is near the Idaho State line, about 4 miles northeast of Driggs. The erosion hazard is severe if this soil is irrigated and slight to moderate if it is dryfarmed.

Most of the acreage is irrigated. The principal irrigated

crops are alfalfa, wheat, barley, potatoes, and oats. The dry-farmed crops are wheat, barley, and alfalfa. (Capability unit IIIe–3, irrigated, and IIIe–4, dryland; not in a range site or woodland group)

Lantonia silt loam, 8 to 12 percent slopes (LaD).—This soil is on loess-covered alluvial fans about 6 miles west of Driggs. The erosion hazard is very severe if this soil is irrigated and moderate if it is dryfarmed.

Most of the acreage is irrigated for grass and legume hay and pasture and an occasional grain crop. Some of it is dryfarmed for wheat, barley, and alfalfa. This soil is not suited to row crops. (Capability unit IVe–2, irrigated, and IIIe–4, dryland; not in a range site or woodland group)

Lantonia silt loam, 12 to 20 percent slopes (LaE).—The largest areas of this soil are about 3 miles north of Felt. The erosion hazard is moderate to severe.

This soil is dryfarmed for wheat, barley, and alfalfa. (Capability unit IIIe–49, dryland; not in a range site or woodland group)

Lantonia silt loam, 12 to 20 percent slopes, eroded (LaE2).—The largest acreage of this soil is about 4 miles northeast of Tetonia. The profile is similar to that of Lantonia silt loam, 4 to 12 percent slopes, except that 3 to 6 inches of the surface layer has been removed by erosion. The erosion hazard is severe.

This soil is dryfarmed for wheat, barley, and alfalfa. (Capability unit IIIe–49, dryland; not in a range site or woodland group)

Lantonia silt loam, 20 to 30 percent slopes (LaF).—This soil generally occurs as scattered small areas on north slopes in the northern part of the Area. The erosion hazard is severe.

This soil can be used for grass and legume hay and pasture and, occasionally, for a grain crop. (Capability unit IVe–4, dryland; not in a range site or woodland group)

Lantonia-Rin silt loams, 4 to 12 percent slopes (LrD).—This complex is in the northeastern part of the Area. From 50 to 75 percent of any mapped area is Lantonia silt loam, and most of the rest is Rin silt loam. The Lantonia soil occupies south slopes and ridgetops, and the Rin soil north slopes.

These soils are dryfarmed for wheat and barley. Because of the difference in slope aspect, crops usually mature earlier on the Lantonia soil than on the Rin soil, and this causes a problem in harvesting. (Capability unit IIIe–4, dryland; not in a range site or woodland group)

Lantonia-Rin silt loams, 12 to 20 percent slopes (LrE).—Areas of this complex are widely scattered. One of the larger areas is about 5 miles northeast of Driggs. From 50 to 70 percent of any mapped area is Lantonia silt loam, and most of the rest is Rin silt loam. The Lantonia soil occupies south slopes and ridgetops, and the Rin soil north slopes.

These soils are dryfarmed, mainly for wheat and barley. Because of the difference in slope aspect, crops mature earlier on the Lantonia soil than on the Rin soil, and this causes a problem in harvesting. (Capability unit IIIe–49, dryland; not in a range site or woodland group)

Lantonia-Tetonia silt loams, 0 to 4 percent slopes (LtB).—Most areas of this complex are 5 miles southwest of Driggs. From 50 to 75 percent of any mapped area is Lantonia silt loam, and most of the rest is Tetonia silt loam. The Lantonia soil occupies north slopes, most of the ridgetops, and drainageways. The Tetonia soil occupies south slopes.

These soils are dryfarmed. The principal crops are wheat and barley. Because of the varying slope aspect, crops do not mature evenly, and there is a problem in harvesting. (Capability unit IIIc–4, dryland; not in a range site or woodland group)

Lantonia-Tetonia silt loams, 4 to 8 percent slopes (LtC).—This complex of soils is about 5 miles southwest of Driggs. From 50 to 75 percent of any mapped area is Lantonia silt loam, and the rest is Tetonia silt loam. The Lantonia soil occupies north slopes, and the Tetonia soil south slopes. The erosion hazard is severe under irrigation.

Most of the acreage is irrigated. The principal crops are alfalfa, wheat, barley, and potatoes. (Capability unit IIIe–3, irrigated, and IIIe–4, dryland; not in a range site or woodland group)

Lantonia-Tetonia silt loams, 4 to 12 percent slopes (LtD).—This complex of soils is north and northeast of Felt. From 50 to 75 percent of any mapped area is Lantonia silt loam, and most of the rest is Tetonia silt loam. The Lantonia soil occupies north slopes, and the Tetonia soil south slopes.

These soils are dryfarmed, mainly for wheat and barley. Because of the difference in slope aspect, crops mature earlier on Tetonia soil than on Lantonia soils, and this causes a problem in harvesting. (Capability unit IIIe–4, dryland; not in a range site or woodland group)

Lantonia-Tetonia silt loams, 12 to 20 percent slopes (LtE).—Most of this complex is north and east of Badger Creek. From 50 to 75 percent of any mapped area is Lantonia silt loam, and most of the rest is Tetonia silt loam. The Lantonia soil occupies north slopes and the Tetonia soil south slopes.

These soils are dryfarmed. The principal crops are wheat and barley. Because of the difference in slope aspect, crops mature earlier on Tetonia soils than on Lantonia soils, and there is a problem in harvesting. (Capability unit IIIe–49, dryland; not in a range site or woodland group)

Lantonia-Tetonia silt loams, 12 to 20 percent slopes, eroded (LtE2).—The largest area of this complex is just west of the junction of the North Fork Teton River and Badger Creek. From 50 to 75 percent of any mapped area is Lantonia silt loam, and most of the rest is Tetonia silt loam.

These soils are dryfarmed for wheat and barley. (Capability unit IIIe–49, dryland; not in a range site or woodland group)

Latahco Series, Cold Variant

The Latahco series, cold variant, consists of somewhat poorly drained, moderately fine textured and fine textured soils that are more than 45 inches deep over gravelly loam. These soils formed in stratified alluvium on alluvial fans in the southwestern corner of the valley. The alluvium was derived from fine-grained sedimentary rocks, mainly shale, mudstone, and sandstone but including some limestone. The original vegetation consisted of grass, willows, and silver sagebrush.

These soils are at an elevation of 6,000 to 6,600 feet, and they receive from 18 to 20 inches of precipitation annually.

The mean annual temperature is 40° F., and there are about 70 days between killing frosts.

The surface layer, to a depth of about 23 inches, is dark-gray and gray heavy loam. It is underlain by a subsurface layer of grayish-brown or light-gray heavy loam or heavy silt loam from 2 to 13 inches thick. The subsoil, at a depth of 20 to 52 inches, is gray or light-gray heavy silty clay loam or clay. The substratum, which is at a depth of about 45 to 80 inches, is gravelly loam. The reaction is commonly medium acid to strongly acid.

These soils are associated with calcareous Tonks soils.

Latahco loam, cold variant (0 to 2 percent slopes) (lv).—This very deep soil is in the southwestern corner of the valley, about 3 miles west of Victor. In most places the slope is about 1 percent. Included in mapping were small areas of soil that is less than 20 inches deep to loose gravel and sand and small areas in which the surface layer is silty clay loam.

Representative profile, 100 feet west and 124 feet south of the west gatepost at the northeast corner of the SW¼NE¼ sec. 17, T. 3 N., R. 45 E.:

Ap—0 to 7 inches, dark-gray (10YR 4/1) heavy loam that contains a very few pebbles, very dark brown (10YR 2/2) when moist; weak or moderate, very fine and fine, granular structure; slightly hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; plentiful very fine and fine roots; many, very fine pores; medium acid (pH 5.9); abrupt, smooth boundary.

A11—7 to 13 inches, dark-gray (10YR 4/1) heavy loam that contains a very few pebbles, very dark brown (10YR 2/2) when moist; weak, coarse, subangular blocky structure parting to weak or moderate, very fine and fine, granular structure; slightly hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; plentiful very fine and fine roots; many, micro and very fine, tubular pores; medium acid (pH 5.7); clear, wavy boundary.

A12—13 to 23 inches, gray (10YR 5/1) heavy loam that contains a few fine pebbles, very dark brown (10YR 2/2) when moist; common, fine, distinct, light brownish-gray (10YR 6/2) spots, apparently from next lower layer; very weak, coarse, prismatic structure parting to weak or moderate, fine and very fine, granular structure; slightly hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; plentiful very fine and fine roots; many, fine, very fine, and micro, tubular pores; few bleached grains; medium acid (pH 5.8); clear, wavy boundary.

A21—23 to 29 inches, grayish-brown (10YR 5/2) heavy loam that contains a few fine pebbles, very dark grayish brown (10YR 3/2) when moist; weak, coarse, subangular blocky structure parting to weak, fine, granular structure; slightly hard when dry, friable when moist, slightly sticky and slightly plastic when wet; few very fine and fine roots; many, micro and very fine, tubular pores and a few fine pores; thick, bleached, light-gray (10YR 7/1) silt and very fine sand grains on peds; dark gray (10YR 4/1) when moist; medium acid (pH 5.8); clear, wavy boundary.

IIA22—29 to 34 inches, light-gray (2.5Y 7/1) heavy silt loam, dark gray (2.5Y 4/1) when moist; common, fine and medium, faint, pale-brown (10YR 6/3) and light yellowish-brown (10YR 6/4) mottles inside peds; dark brown (10YR 4/3) and dark yellowish brown (10YR 4/4) when moist; moderate, medium and fine, prismatic structure parting to moderate, medium, angular blocky structure; very hard when dry, firm when moist, and sticky and plastic when wet; few very fine and fine roots; many, very fine, tubular pores in peds and common, very fine, tubular exterior pores; mostly bleached silt grains; moderate light-gray (10YR 7/1) bleached silt grains on vertical surfaces of prisms; dark gray (2.5Y 4/1) when moist; few, very fine, dark concretions; medium acid (pH 5.9); clear, wavy boundary.

IIIB21t—34 to 37 inches, gray (2.5Y 6/1) heavy silty clay loam, dark gray (2.5Y 4/1) when moist; common, fine, distinct, light yellowish-brown (10YR 6/4) and very pale brown (10YR 7/4) mottles in peds; dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/4) when moist; moderate, medium, prismatic structure parting to moderate, coarse and medium, subangular blocky structure; extremely hard when dry, firm when moist, and sticky and plastic when wet; few very fine and fine roots; common, very fine, tubular pores in peds and very few exterior pores; thin, or patchy clay films on vertical and horizontal ped surfaces and medium, nearly continuous ones in channels; thick, bleached, light-gray (2.5Y 7/1) silt coating on vertical prism faces; dark gray (2.5Y 4/1) when moist; few black and reddish-brown concretions less than 1 millimeter in diameter; strongly acid (pH 5.4); abrupt, wavy boundary.

IIIB22t—37 to 39 inches, similar to B21t except gray (2.5Y 6/1) clay; very sticky and very plastic when wet; few, very fine, tubular pores in peds; thin, nearly continuous, gray (10YR 5/1) clay films on prisms; very dark gray (10YR 3/1) when moist; medium, continuous clay films in channels; strongly acid (pH 5.1); abrupt, wavy boundary.

IIIB23t—39 to 52 inches, gray (2.5Y 6/1) silty clay, dark gray (2.5Y 4/1) when moist; common, fine, faint, light yellowish-brown (2.5Y 6/3) mottles, light olive brown (2.5Y 5/3) when moist; very weak, coarse, subangular blocky structure; extremely hard when dry, firm when moist, and very sticky and very plastic when wet; very few very fine and fine roots; common, very fine, tubular pores; thin, patchy clay films on peds and medium, continuous clay films in channels; few 1-millimeter black concretions; strongly acid (pH 5.5); clear, wavy boundary.

IVC—52 to 61 inches, gray (2.5Y 6/1) gravelly loam, dark grayish brown (2.5Y 4/2) when moist; massive; hard when dry, very friable when moist, and slightly sticky and slightly plastic when wet; no roots; many, very fine, interstitial pores; few, fine, dark concretions; slightly acid (pH 6.2).

Mottles occur in the lower part of the A1 horizon in some places. Mottles and iron and manganese concretions generally occur in the A2 and B2t horizons. The profile is noncalcareous.

Drainage is somewhat poor. Permeability is moderate in the heavy loam and slow in the silty clay. The available water capacity is very high. The silty clay impedes but does not stop root penetration. The organic-matter content is high, and the natural fertility is moderately high. Runoff is very slow, and the erosion hazard is slight.

Most of the acreage is dryfarmed. A high water table during part of the growing season restricts the selection of crops to those that are water tolerant. The principal crops are wheat and barley and grasses and legumes for hay. Because of the high water table, alfalfa does not grow well. Some of the acreage is irrigated for wheat and barley. (Capability unit IIIw–1, irrigated, and IIIw–4, dryland; Dry Meadow range site; not in a woodland group)

Marsh

Marsh (Ma) is a land type made up of organic material intermingled with moderately fine textured and fine textured mineral soil material. This land type is along the Teton River about 5 miles southwest of Driggs. It is covered most of the time with water backed up from the river. The vegetation consists of cattails, rushes, sedges, and other water-tolerant plants.

The elevation ranges from 5,800 to 6,100 feet. The mean annual temperature is 38° F., and there are about 70 days between killing frosts.

Marsh is associated with Cedron, Furniss, and Foxcreek soils.

This land type is better suited to wildlife habitat than to other uses, and it is especially well suited to waterfowl habitat (fig. 8). (Capability unit VIIIw–1, dryland; not in a range site or woodland group)

Mikesell Series

The Mikesell series consists of well-drained, moderately fine textured and fine textured soils that are generally stony or very stony. These soils are deep to bedrock. They formed in residuum from fine-grained sandstone and shale. The original vegetation consisted mostly of lodgepole pine, Douglas-fir, alpine fir, and pinegrass.

These soils occupy hilly to steep mountainous areas along Horseshoe Creek about 11 miles west of Driggs. They are at an elevation of 6,000 to 7,000 feet and receive from 22 to 28 inches of precipitation annually. The mean annual temperature is 36° F., and there are about 60 days between killing frosts.

A cover of forest litter about 1½ inches thick overlies the surface layer, which is about 11 inches thick and consists of light brownish-gray stony or very stony silt loam. It is underlain by light yellowish-brown and yellowish-brown cobbly or gravelly heavy loam to light clay to a depth of about 45 inches. Light brownish-gray cobbly clay loam extends from a depth of 45 to 65 inches. This is underlain by light yellowish-brown clay loam and weathering shale or fine-grained sandstone, and then by shale or sandstone bedrock. The reaction grades from strongly acid in the surface layer to neutral in the lower layers.

These soils are associated with dark-colored Dranyon soils and Greys soils.

Mikesell stony silt loam, 20 to 30 percent slopes (MkF).—This soil is in the hilly area along Horseshoe Creek about 11 miles west of Driggs. Included in mapping were small areas of soil that has a brown surface layer and small areas of very stony soil.

Representative profile, 100 feet north and 100 feet east of the southwest corner of the NE¼SE¼ sec. 25, T. 5 N., R. 43 E., in a forested area:

O11—1.5 to 1.2 inches, undecomposed to slightly decomposed needles, cones, and twigs; medium acid (pH 6.0).

O12—1.2 inches to 0.5 inch, dark grayish-brown (10YR 4/2),

Figure 8.—**Fresh-water marsh along the Teton River. The cattails and rushes provide good waterfowl habitat. The Teton Mountains are in the background.**

partly decomposed needles, twigs, leaves, and cones; very dark brown (10YR 2/2) when moist; slightly matted; weak, very fine, crumb structure; strongly acid (pH 5.5); abrupt, wavy boundary.

O2—0.5 inch to 0, dark-gray (10YR 4/1), well decomposed organic matter, very dark brown (10YR 1/2) when moist; weak crumb structure; plentiful very fine, fine, and medium roots; strongly acid (pH 5.3); abrupt, wavy boundary.

A21—0 to 4 inches, light brownish-gray (10YR 6/2) stony silt loam, dark grayish brown (10YR 4/2) when moist; common, fine, faint, pale-brown (10YR 6/3) mottles; dark grayish brown (10YR 4/2) when moist; very weak, thick, platy structure parting to weak, very fine, granular structure; slightly hard when dry, very friable when moist, slightly sticky and slightly plastic when wet; abundant very fine and fine roots and a few medium, coarse, and very coarse roots; common, very fine, tubular pores; mostly bleached or partly coated grains; common, 1-millimeter, soft, black and reddish-brown concretions; medium acid (pH 5.6); abrupt, smooth boundary.

A22—4 to 11 inches, light brownish-gray (10YR 6/2) stony silt loam, dark grayish brown (10YR 4/2) when moist; few, fine, faint, dark-brown mottles (10YR 4/3) when moist; massive or very weak, coarse and very coarse, subangular blocky structure; slightly hard when dry, very friable when moist, and slightly sticky and slightly plastic when wet; plentiful very fine and fine roots and a few medium, coarse, and very coarse roots; common, very fine, tubular pores; mostly bleached or partly uncoated grains; a few, 1-millimeter, soft, black and reddish-brown concretions; medium acid (pH 5.7); a few, very thin, horizontal, brown lenses of B-like material in lower part; abrupt, irregular boundary.

B1t—11 to 15 inches, light yellowish-brown (10YR 6/4) cobbly heavy loam or cobbly light clay loam, dark yellowish brown (10YR 4/4) when moist; some light-gray (10YR 7/2) coatings; fine lenses and spots of A2 material that are grayish brown (10YR 5/2) when moist; weak, medium, prismatic structure parting to moderate, medium and fine, subangular blocky structure; hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; plentiful very fine and fine roots and a few, medium coarse, and very coarse roots; common, very fine, tubular pores; thin, scattered clay films on peds and in pores; fingers or coatings of A2 material, commonly less than 5 millimeters wide, extend about an inch into this horizon; very few 1-millimeter, soft, black concretions; medium acid (pH 5.7); abrupt, wavy boundary.

B21t—15 to 31 inches, yellowish-brown (10YR 5/4) gravelly light clay; dark yellowish brown (10YR 4/4) when moist; few, medium, prominent, strong-brown (7.5YR 5/8) and reddish-brown (2.5YR 4/4, 2.5YR 3/4 when moist) mottles or splotches of weathering rock; weak, medium, prismatic structure parting to strong, medium and fine, subangular and angular blocky structure; very hard when dry, very firm when moist, and sticky and plastic when wet; few very fine and fine roots and very few medium, coarse, and very coarse roots, mostly between peds; few, very fine, tubular pores; thick, continuous, brown (10YR 5/3) and dark grayish-brown (10YR 4/2) clay films, dark brown (10YR 4/3) and very dark grayish brown (10YR 3/2) when moist; medium acid (pH 5.8); clear, wavy boundary.

B22t—31 to 45 inches, light yellowish-brown (2.5Y 6/3) cobbly light clay, olive brown (2.5Y 4/3) when moist; strong, medium and fine, angular blocky structure; very hard when dry, very firm when moist, and sticky and plastic when wet; roots and pores as in B21t; many ped surfaces have very dark brown (10YR 2/2) stains from decayed roots; medium, continuous, brown (10YR 5/3) clay films on peds and in pores, dark brown (10YR 4/3) when moist; slightly acid (pH 6.2); clear, wavy boundary.

B31t—45 to 59 inches, light brownish-gray (2.5Y 6/2) cobbly clay loam, grayish brown (2.5Y 5/2) when moist; strong, fine, angular blocky structure; very hard when dry, firm when moist, and sticky and plastic when wet; very few fine roots; few, very fine, tubular pores; thick or medium, patchy, yellowish-brown (10YR 5/4) clay films on peds and in pores; light olive-brown (2.5Y 5/3) rock fragments, olive brown (2.5Y 4/3) when moist; slightly acid (pH 6.4); clear, wavy boundary.

B32t—59 to 65 inches, light brownish-gray (2.5Y 6/2) and light yellowish-brown (2.5Y 6/3) clay loam and weathering shale or fine-grained sandstone, grayish brown (2.5Y 5/2) and light olive brown (2.5Y 5/3) when moist; strong, very thick, platy structure parting to weak, coarse, angular blocky structure; very hard when dry, firm when moist, and sticky and plastic when wet; no roots or visible pores; few dark-brown coatings on some peds; thin, patchy clay films on peds; neutral (pH 6.8); clear, wavy boundary.

R—65 inches, shale or fine-grained sandstone bedrock.

The organic horizons are lacking in some areas that have been burned. The color value of the A2 horizon ranges from 6 to 7 when the soil is dry. This horizon extends to a depth of 18 inches in places. The B2t horizon ranges from clay to heavy clay loam or heavy silty clay loam, and it is gravelly, cobbly, or stony in places. The profile is noncalcareous throughout. The depth to the sandstone or shale bedrock ranges from 40 to 65 inches.

Natural drainage is good. Permeability is moderate to a depth of about 15 inches and slow from there to bedrock. The available water capacity is high. Roots can penetrate to the weathering bedrock. The organic-matter content is low, and natural fertility is moderately low. The erosion hazard is moderate to severe if the vegetation is removed.

This soil is used for forestry and range. It provides good habitat for wildlife. (Capability unit VIe–3, dryland; North Slope range site; woodland group 6)

Mikesell very stony silt loam, 30 to 50 percent slopes (MvG).—This soil is along Horseshoe Creek about 11 miles west of Driggs. The erosion hazard is very severe if the vegetation is removed.

This soil is used for timber, grazing, and wildlife habitat. (Capability unit VIIs–1, dryland; North Slope range site; woodland group 6)

Packsaddle Series

The Packsaddle series consists of well-drained, deep and very deep, moderately fine textured soils underlain by sand and gravel. These soils formed in alluvium and small amounts of loess. The alluvium was derived from shale, fine-grained sandstone, limestone, and rhyolite. The natural vegetation was grass and sagebrush.

Most areas are on the level to gently sloping alluvial fans and drainageways formed by Horseshoe Creek and Packsaddle Creek west of the Teton River. The elevation ranges from 5,800 to 6,500 feet, and the annual precipitation from 13 to 16 inches. The mean annual temperature is 39° F., and there are about 80 days between killing frosts.

The surface layer is grayish-brown silt loam to a depth of about 8 inches. It is underlain by grayish-brown light silty clay loam to a depth of about 19 inches. The substratum is light brownish-gray, strongly calcareous alluvial material that is commonly stratified. Loose gravel generally occurs at a depth of 36 to 70 inches. The reaction is mildly to moderately alkaline.

Packsaddle soils are associated with moderately deep Driggs soils and with Tetonia and Ririe soils.

Packsaddle silt loam, 0 to 2 percent slopes (PcA).—This deep soil is on the alluvial fan formed by Horseshoe

Creek 7 miles west and 1 mile north of Driggs. Included in mapping were small, slightly elevated areas that have a loam subsoil and small areas of soil that is noncalcareous throughout. Also included were small areas that have a silty clay loam surface layer.

Representative profile, 90 feet north and 10 feet west of the southeast corner of sec. 10, T. 5 N., R. 44 E., in a cultivated field:

Ap—0 to 8 inches, grayish-brown (2.5Y 5/2) silt loam that contains some pebbles, very dark grayish brown (2.5Y 3/2) when moist; moderate, very fine, granular structure; hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; few very fine and fine roots; very few bleached grains or none; mildly alkaline (pH 7.7); abrupt, wavy boundary.

B21t—8 to 15 inches, grayish-brown (2.5Y 5/2) light silty clay loam that contains a few pebbles, very dark grayish brown (2.5Y 3/2) when moist; moderate, medium and fine, prismatic structure parting to moderate, fine, subangular blocky structure; hard when dry, friable when moist, and sticky and slightly plastic when wet; many fine and medium roots; common, very fine, tubular pores; medium or thin, patchy or continuous clay films on peds and in pores; mildly alkaline (pH 7.7); abrupt, wavy boundary.

B22t—15 to 19 inches, grayish-brown (2.5Y 5/2) light silty clay loam that contains a few pebbles; very dark grayish brown (2.5Y 3/2) when moist; moderate, medium and fine, prismatic structure parting to moderate, fine, subangular blocky structure; hard when dry, friable when moist, and sticky and slightly plastic when wet; many fine and medium roots and few very fine roots; common, very fine tubular pores; medium or thin, patchy or nearly continuous clay films on peds and in pores; slightly calcareous; moderately alkaline (pH 8.0); clear, wavy boundary.

C1ca—19 to 36 inches, light brownish-gray (2.5Y 6/2) light silty clay loam that contains a few pebbles, dark grayish brown (2.5Y 4/2) when moist; weak, fine, prismatic structure parting to weak, medium and fine, angular blocky structure; hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; few very fine and fine roots; many micro and very fine pores; strongly calcareous; many veins of calcium carbonate 1 millimeter in diameter; moderately alkaline (pH 8.1); clear, wavy boundary.

IIC2ca—36 to 40 inches, light brownish-gray (2.5Y 6/2) light loam or heavy sandy loam that contains a few pebbles, dark grayish brown (2.5Y 4/2) when moist; massive; hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; no roots; many very fine pores; moderately calcareous; few calcium carbonate veins; moderately alkaline (pH 8.0 to 8.2); abrupt, wavy boundary.

IIIC3—40 inches, light brownish-gray (2.5Y 6/3) sand and gravel, dark grayish brown (2.5Y 4/2) when moist; single grain; loose; slightly calcareous; moderately alkaline (pH 8.0); dominantly sandstone and limestone.

A few pebbles are scattered throughout the profile. The profile is noncalcareous in the upper horizons but is more than 15 percent carbonates below a depth of 15 to 25 inches. The depth to gravel ranges from 36 to 70 inches.

Natural drainage is good. Permeability is moderate in the surface layer, moderately slow in the subsoil, and very rapid in the loose gravel. The available water capacity is high to very high. The organic-matter content and natural fertility are moderate. There is a slight erosion hazard.

Most of the acreage is dryfarmed for wheat, barley, alfalfa, and pasture. A small acreage is irrigated for alfalfa, wheat, barley, and oats. This soil is more susceptible to frost than other soils of the Area. (Capability unit IIIc–1, irrigated, and IVc–1, dryland; Loamy range site, 13-inch to 16-inch precipitation zone; not in a woodland group)

Packsaddle silt loam, 2 to 4 percent slopes (PcB).—The largest area of this soil is about 5 miles west and 1 mile south of Driggs. Included in mapping were small areas in which the surface layer is silty clay loam. The depth to gravel generally ranges from 36 to 65 inches. The erosion hazard is moderate if this soil is irrigated.

Part of the acreage is dryfarmed for wheat, barley, and pasture, and part of it is irrigated for alfalfa, wheat, barley, and oats. (Capability unit IIIe–1, irrigated, and IVc–1, dryland; Loamy range site, 13-inch to 16-inch precipitation zone; not in a woodland group)

Packsaddle loam, 4 to 12 percent slopes (PaD).—This soil occurs about 5 miles west of Tetonia. It is deeper to lime and gravel than Packsaddle silt loam, 0 to 2 percent slopes. The depth to lime is 20 to 25 inches, and the depth to gravel is generally more than 5 feet. The erosion hazard is slight to moderate.

This soil is dryfarmed for grass and legume hay or pasture and for an occasional grain crop. (Capability unit IVe–74, dryland; not in a range site or woodland group)

Rammel Series

The Rammel series consists of well-drained, medium-textured soils that are moderately deep over bedrock. These soils are extremely stony or very stony. They formed in very thin loess and residuum from rhyolite or rhyolitic tuff bedrock. The original vegetation consisted mostly of bluebunch wheatgrass, bitterbrush, and sagebrush.

These soils generally are on steep south-facing and east-facing canyon walls in the northern part of the Area. They are at an elevation of 5,900 to 7,000 feet and receive from 15 to 20 inches of precipitation annually. In areas that receive less precipitation, these soils are on north-facing canyon walls. The mean annual temperature is 39° F., and there are about 80 days between killing frosts.

The surface layer is about 6 inches thick and consists of dark grayish-brown very stony or extremely stony loam. It is underlain by brown very stony heavy loam that extends to a depth of 20 to 35 inches and grades to loam in the lower part. The substratum consists of pale-brown light loam that is calcareous and extremely stony. The reaction grades from neutral in the surface layer and subsoil to moderately alkaline in the substratum.

Rammel soils are associated with lighter colored Judkins soils.

Rammel extremely stony loam, 30 to 60 percent slopes (RaG).—This soil occupies canyon walls in the northern part of the Area. Included with it in mapping were small areas of rock outcrop, small areas that are less stony, and small areas of Judkins extremely stony loam.

Representative profile, 2,400 feet west of the southeast corner sec. 36, T. 7 N., R. 45 E., in an area of grass and sagebrush:

A1—0 to 6 inches, dark grayish-brown (10YR 4/2) extremely stony loam, very dark brown (10 YR 2/2) when moist; moderate, very fine, granular structure; slightly hard when dry, very friable when moist, slightly sticky and slightly plastic when wet; abundant very fine and fine roots and a few large roots; very few uncoated silt grains; neutral (pH 6.6); clear, smooth boundary.

B21t—6 to 15 inches, brown (10YR 5/3) very stony heavy loam, dark brown (7.5YR 3/3) when moist; very weak,

medium, prismatic structure parting to moderate, medium and fine, subangular blocky structure; hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; plentiful very fine and fine roots and a few large roots; many, very fine, tubular pores and few, fine and coarse, tubular pores; thin, patchy clay films on vertical and horizontal surfaces and in pores; few uncoated silt grains; neutral (pH 6.8); clear, smooth boundary.

B22t—15 to 24 inches, brown (10YR 5/3) very stony heavy loam, dark brown (10YR 4/3) when moist; weak, medium, prismatic structure parting to moderate, medium, subangular blocky structure; hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; plentiful very fine and fine roots and a few large roots; common, very fine, tubular pores, and few, coarse, tubular pores; thin, patchy clay films on vertical and horizontal ped and pore surfaces; very few uncoated silt grains or none; neutral (pH 6.9); clear, wavy boundary.

B3t—24 to 33 inches, brown (10YR 5/3) very stony loam, dark brown (10YR 4/3) when moist; very weak, medium, prismatic structure parting to weak, coarse, subangular blocky structure; hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; plentiful very fine and fine roots and a few large roots; common to many, very fine, tubular pores; thin, patchy clay films on ped and pore surfaces; neutral (pH 7.0); abrupt, wavy boundary.

Cca—33 to 39 inches, pale-brown (10YR 6/3) extremely stony light loam, brown (10YR 5/3) when moist; massive; slightly hard when dry, very friable when moist, and slightly sticky and slightly plastic when wet; few very fine and fine roots; many, very fine, tubular pores; common or many lime veins and splotches; moderately calcareous; moderately alkaline (pH 8.3); abrupt, discontinuous boundary.

R—39 inches, fractured rhyolite bedrock, coated with lime; a small amount of soil material similar to Cca in cracks. Rhyolite is gray (10YR 6/1) when dry and gray (10YR 5/1) when moist.

The depth to bedrock ranges from 20 to 40 inches. Where this soil merges with Swanner soils, the calcareous horizon is at a depth of less than 20 inches.

Natural drainage is good, permeability is moderate, and the available water capacity is low to moderate. Roots penetrate to the bedrock. The organic-matter content is high. The erosion hazard is severe or very severe.

This soil is used for range. (Capability unit VIIs–1, dryland; South Slope range site; not in a woodland group)

Rammel extremely stony loam, 12 to 30 percent slopes (RaF).—This soil is in the northern part of the survey Area. The areas are generally small and scattered. The erosion hazard is severe.

All of the acreage is used for range. (Capability unit VIIs–1, dryland; Stony range site; not in a woodland group)

Rammel extremely stony loam, 60 to 80 percent slopes (RaH).—This soil is on south-facing canyon walls in the northern part of the Area. The erosion hazard is very severe.

All of the acreage is used for range. Although very steep, the slopes are short and are accessible for grazing. (Capability unit VIIs–1, dryland; South Slope range site; not in a woodland group)

Rammel very stony loam, 2 to 12 percent slopes (ReD).—Most of this soil is in the northern part of the survey Area. Included in mapping were small areas that are not stony. The erosion hazard is slight to moderate.

This soil is used for range. It can be tilled for reseeding. (Capability unit VIs–4, dryland; Stony range site; not in a woodland group)

Rammel-Swanner extremely stony complex, 60 to 80 percent slopes (RfH).—This complex of loams is on the canyon walls of Badger Creek in the northern part of the Area. From 50 to 75 percent of any given area is Rammel soil, and most of the rest is Swanner soil. The Rammel soil occupies north- and east-facing slopes, and the Swanner soil south- and west-facing slopes.

These soils are used for range. They also provide winter range for deer. (Rammel soil in capability unit VIIs–1, dryland; South Slope range site; not in a woodland group. Swanner soil in capability unit VIIs–1, dryland; Shallow Stony range site; not in a woodland group)

Richvale Series

The Richvale series consists of well-drained, medium-textured soils that formed in stratified alluvium derived mostly from sandstone and limestone. Most of the original vegetation was grass and sagebrush.

These are level to very gently sloping soils on alluvial fans 4 miles west and 2 miles south of Driggs. They are at an elevation of 5,800 to 6,700 feet and receive from 14 to 17 inches of precipitation annually. The mean annual temperature is 40° F., and there are about 80 days between killing frosts.

The surface layer is dark-brown silt loam about 14 inches thick. Underlying it is dark-brown to brown silt loam to a depth of 20 to 30 inches. The substratum is very strongly calcareous, brown silt loam and gravelly loam. A few pebbles are scattered throughout the profile, and the number increases with depth. Gravel occurs at a depth of 36 to 70 inches. The reaction is neutral in the upper part of the profile and mildly alkaline in the lower part.

Richvale soils are associated with Swanner, Driggs, and Packsaddle soils.

Richvale silt loam, 0 to 2 percent slopes (RhA).—This soil is on the alluvial fan 4 miles west and 2 miles south of Driggs. In most places the slope is between 1 and 2 percent. Included with this soil in mapping were small areas that have a gravelly surface layer and small areas of soil that is less than 36 inches deep to gravel.

Representative profile, 300 feet south and 50 feet east of the road corner that is 0.25 mile south of the northwest corner of sec. 6, T. 4 N., R. 45 E., in a cultivated field:

Ap—0 to 7 inches, dark-brown (7.5YR 4/2) silt loam, very dark brown (7.5YR 2/2) when moist; moderate, very fine, granular structure; slightly hard when dry, very friable when moist, and slightly sticky and slightly plastic when wet; few very fine and fine roots; many interstitial pores; very few or no bleached grains; neutral (pH 7.1); abrupt, smooth boundary.

A1—7 to 14 inches, dark-brown (7.5YR 4/2) silt loam that contains a few fine pebbles, very dark brown (7.5YR 2/2) when moist; very weak, medium, prismatic structure parting to weak, medium and fine, subangular blocky structure; hard when dry, very friable when moist, and slightly sticky and slightly plastic when wet; few very fine and fine roots; many, very fine, tubular pores, common, medium, tubular pores; common wormholes and casts; thin, patchy clay films in pores; neutral (pH 7.0); clear, wavy boundary.

B1—14 to 24 inches, dark-brown (7.5YR 4/3) silt loam that contains a few fine pebbles, dark brown (7.5YR 3/3) when moist; moderate, medium, prismatic structure parting to moderate, fine, subangular blocky structure; hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; few very fine and fine roots; many, very fine, tubular pores, few, medium,

tubular pores; thin, patchy, dark-brown (10YR 4/3) clay films on vertical and horizontal ped surfaces and in pores, dark brown (7.5YR 3/2) when moist; very few bleached grains or none; neutral (pH 7.1); clear, smooth boundary.

B2—24 to 28 inches, brown (7.5YR 5/3) silt loam that contains a few fine pebbles, dark brown (7.5YR 3/3) when moist; weak, medium, prismatic structure parting to moderate, fine, subangular blocky structure; hard when dry, friable when moist, and sticky and slightly plastic when wet; few very fine and fine roots; many, very fine, tubular pores, few, medium, tubular pores; thin, nearly continuous clay films in pores and thin, patchy clay films on vertical and horizontal ped surfaces, brown (7.5YR 4/2) when dry and dark brown (7.5YR 3/3) when moist; neutral (pH 7.3); clear, wavy boundary.

C1ca—28 to 38 inches, brown (7.5YR 5/3) silt loam, dark brown (7.5YR 3/3) when moist; weak, medium, subangular blocky structure; hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; very few very fine roots; common to very few, fine, tubular pores; few, very hard, dense nodules of soil material; strongly to very strongly calcareous; common lime splotches and veins; mildly alkaline (pH 7.6); clear, smooth boundary.

IIC2ca—38 to 65 inches, brown (7.5YR 5/3) gravelly loam, dark brown (7.5YR 3/3) when moist; massive or very weak, coarse, subangular blocky structure; hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; very few very fine roots; common, very fine, tubular pores; very strongly calcareous; many fine lime veins; mildly alkaline (pH 7.6); gradual, smooth boundary.

IIIC3ca—65 inches, brown (7.5YR 5/3) very gravelly sandy loam, dark brown (7.5YR 3/3) when moist; massive; slightly hard when dry, very friable when moist, and slightly sticky and slightly plastic when wet; strongly calcareous; mildly alkaline (pH 7.6); pebbles are sandstone and limestone.

The A horizon, to a depth of 6 inches, has a color value of 4 when dry. From a depth of 6 to 20 inches or more, the color value ranges from 4 to 6 when the soil is dry. The B horizon has a chroma of 3 and a hue of 7.5YR or 5YR. It has weak to moderate, prismatic structure parting to subangular blocky structure. The ca horizons begin at a depth of 20 to 30 inches and have more than 15 percent calcium carbonate equivalent. In some places discontinuous lenses of gravel or coarse sand, a few inches thick, occur at any depth.

Natural drainage is good. Permeability is moderate in the upper layers and very rapid in the gravel. The available water capacity is very high. Roots penetrate deeply. The organic-matter content is moderate, and natural fertility is moderately high. The erosion hazard is slight under irrigation.

This soil is dryfarmed for wheat, barley, and alfalfa. It is irrigated for alfalfa, barley, wheat, potatoes, and oats if water is available. (Capability unit IIIc–1, irrigated, and IIIc–4, dryland; not in a range site or woodland group)

Richvale silt loam, 2 to 4 percent slopes (RhB).—Most of this soil is near Mahogany Creek, 5.5 miles west and 3 miles south of Driggs. The erosion hazard is moderate if this soil is irrigated but slight if it is dryfarmed.

This soil is dryfarmed for wheat, barley, and alfalfa. It is irrigated for alfalfa, barley, wheat, potatoes, and oats if water is available. (Capability unit IIIe–1, irrigated, and IIIc–4, dryland; not in a range site or woodland group)

Ridgecrest Series

The Ridgecrest series consists of well-drained, medium-textured stony soils underlain by limestone bedrock at a depth of 20 to 40 inches. These soils formed in material weathered from limestone and other highly calcareous, fine-grained sedimentary rocks, mixed with a small amount of loess. The original vegetation consisted mostly of sagebrush, bitterbrush, and bunchgrasses.

These are gently sloping to steep soils on mountain foot slopes in the southwestern part of the Area. They are at an elevation of 6,200 to 7,000 feet and receive from 17 to 22 inches of precipitation annually. The mean annual temperature is 40° F., and there are about 60 days between killing frosts.

The surface layer is about 13 inches thick and consists of brown stony loam. Underlying it is pale-brown or very pale brown very cobbly loam that extends to bedrock.

Ridgecrest soils are associated with Dra soils.

Ridgecrest stony loam, 30 to 60 percent slopes (RoG).—This soil is on mountain foothills in the southwestern part of the Area. Included with it in mapping were small areas of limestone outcrop, small very stony areas, and small areas of soil that is noncalcareous to bedrock.

Representative profile, 500 feet south and 30 feet east of the northwest corner of the NE¼ sec. 25, T. 4 N., R. 44 E., in an area of sagebrush and grass:

A11—0 to 5 inches, brown (10YR 5/3) stony loam, dark brown (10YR 3/3) when moist; weak, very fine, granular structure; slightly hard when dry, very friable when moist, and slightly sticky and slightly plastic when wet; plentiful very fine and fine roots and few medium and coarse roots; many, very fine, tubular pores; very few bleached silt grains; moderately calcareous; moderately alkaline (pH 8.2); about 40 percent gray (10YR 5/1), angular limestone stones, very dark gray (10YR 3/1) when moist; stones are lime-coated on lower side; clear, smooth boundary.

A12—5 to 13 inches, brown (10YR 5/3) stony loam, dark brown (10YR 3/3) when moist; weak or very weak, very fine and fine, subangular blocky structure parting to weak, fine, granular structure; slightly hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; roots as in A11; many, very fine, tubular pores; no bleached silt grains; moderately calcareous; moderately alkaline (pH 8.4); nearly 50 percent angular pebbles and stones, many of which are lime-coated on lower side; clear, wavy boundary.

C1—13 to 20 inches, pale-brown (10YR 6/3) very cobbly loam that contains a few stones, dark brown (10YR 4/3) when moist; very weak, medium, subangular blocky structure parting to weak, very fine, granular structure; slightly hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; roots as in A11; many, very fine, tubular pores; moderately calcareous; moderately alkaline (pH 8.4); stones have more lime on underside than those in A12 horizon; clear, wavy boundary.

C2—20 to 37 inches, very pale brown (10YR 7/3) very cobbly loam that contains some stones, brown (10YR 5/3) when moist; massive; slightly hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; few very fine and fine roots to a depth of 28 inches, very few below; many, very fine, tubular pores; few lime veins; moderately or strongly calcareous; strongly alkaline (pH 8.5); about 75 percent angular gravel, cobblestones, and stones; abrupt, irregular boundary.

R—37 inches, light-gray (10YR 6/1), fractured, hard limestone bedrock, gray (10YR 5/1) when moist; very small quantity of soil material in cracks.

The color value of the A1 horizon ranges from 4 to 5 when the soil is dry. The profile is generally calcareous. The depth to bedrock ranges from 20 to 40 inches.

Natural drainage is good, and permeability is moderate. The available water capacity is low. Roots penetrate to

bedrock. The organic-matter content and the fertility are moderate. The erosion hazard is severe or very severe.

This soil is used for range. (Capability unit VIIe–1, dryland; South Slope range site; not in a woodland group)

Ridgecrest stony loam, 4 to 30 percent slopes (RoF).—This soil generally is in small, inaccessible areas on mountain foothills in the southwestern part of the survey Area. The erosion hazard is severe.

This soil is used for range. (Capability unit VIe–2, dryland; Stony range site; not in a woodland group)

Rin Series

The Rin series consists of deep and very deep, well-drained, medium-textured soils that formed in loess. The original vegetation was predominantly Idaho fescue and bluebunch wheatgrass.

These soils are in widely scattered, gently undulating to hilly areas at the transition from grassland to forest. They are near the mountains in the southern part of the Area and on uplands in the northeastern part. The elevation ranges from 6,000 to 7,000 feet, and the precipitation ranges from 17 to 20 inches annually. The mean annual temperature is 40° F., and there are about 70 days between killing frosts.

The surface layer is dark grayish-brown silt loam 10 to 20 inches thick. It is underlain by silt loam that grades from brown to pale brown and extends to a depth of about 71 inches. The substratum is also silt loam, and it grades from very pale brown in the upper part to light yellowish brown in the lower part. It generally extends to a depth of more than 60 inches, but in a few small areas, rhyolite bedrock is at a depth of only 36 inches. The reaction is neutral to medium acid to a depth of 60 inches.

Rin soils are associated with Lantonia and Tetonia soils.

Rin silt loam, 4 to 12 percent slopes (RpCD).—The largest areas of this soil are in the southern part of the survey Area. Included in mapping were areas in which rhyolite bedrock is at a depth of only 36 inches.

Representative profile, 250 feet south and 25 feet west of the northeast corner of the NW¼SW¼ sec. 30, T. 4 N., R. 45 E.:

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) when moist; moderate, very fine and fine, granular structure; slightly hard when dry, very friable when moist, and slightly sticky and slightly plastic when wet; plentiful fine roots; common, very fine, tubular pores; few uncoated silt grains; slightly acid (pH 6.3); abrupt, smooth boundary.

A11—9 to 17 inches, dark grayish-brown (10YR 4/2) silt loam, very dark brown (10YR 2/3) when moist; slightly darker colored coatings on peds; very weak, medium and coarse, prismatic structure parting to weak, fine and medium, subangular blocky structure; few, firm, half-inch, elongated nodules of soil material that are very dark brown (10YR 2/2) when moist and denser than the surrounding material; hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; plentiful very fine and fine roots; many, very fine, tubular pores; thin, patchy clay films; few bleached silt grains on peds; medium acid (pH 5.8); clear, wavy boundary.

B1—17 to 24 inches, brown (10YR 5/3) silt loam, dark brown (10YR 3/3) when moist; very weak, medium, prismatic structure parting to moderate, medium, subangular blocky structure; common, half-inch, rounded, dense nodules of soil material; hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; plentiful fine roots; many, very fine, tubular pores; thin, patchy, slightly darker colored clay films on peds and in pores; common to many bleached silt grains on peds; medium acid (pH 6.0); clear, wavy boundary.

B21—24 to 37 inches, brown (10YR 5/3) silt loam, dark brown (10YR 4/3) when moist; weak, medium, prismatic structure parting to moderate, medium, subangular blocky structure; very hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; plentiful fine roots; many, very fine, tubular pores and few, fine, tubular pores; thin, patchy, darker colored clay films on peds and in pores; common to many bleached silt grains on vertical surfaces of peds; half-inch, horizontal, more clayey band in lower part of horizon; slightly acid (pH 6.2); clear, wavy boundary.

B22—37 to 46 inches, pale-brown (10YR 6/3) silt loam, dark brown (10YR 4/3) when moist; structure, consistence, pores, clay films, and bleached coatings as in B21; few very fine and fine roots; very few, quarter-inch, more clayey, horizontal bands; slightly acid (pH 6.4); clear, wavy boundary.

B3—46 to 71 inches, pale-brown (10YR 6/3) silt loam, dark brown (10YR 4/3) when moist; very weak, very coarse, prismatic structure parting to very weak, coarse, subangular blocky structure; hard when dry, very friable when moist, and slightly sticky and slightly plastic when wet; few very fine roots; many, micro, and very fine, tubular pores; thin, patchy clay films; neutral (pH 6.8); abrupt, wavy boundary.

C1ca—71 to 104 inches, very pale brown (10YR 7/3) silt loam, brown (10YR 5/3) when moist; massive; hard when dry, very friable when moist, slightly sticky and slightly plastic when wet; no roots; no discernible pores; lime mostly disseminated, but there are a few lime veins; moderately calcareous; mildly alkaline (pH 7.5).

The A1 horizon is generally dark grayish brown and 10 to 20 inches thick. In some areas where this soil merges with Greys soil, there is a slightly bleached layer in the lower part of the A1 horizon. The B horizon has medium, continuous clay films to thin, patchy clay films. The Cca horizon is generally below a depth of 60 inches.

Natural drainage is good. Permeability is moderate, and the available water capacity is very high. Roots penetrate deeply. The organic-matter content and the natural fertility are high. The erosion hazard is moderate.

Most of the acreage is dryfarmed for wheat, barley, and alfalfa. Some of the acreage is used for range. (Capability unit IIIe–4, dryland; Loamy range site, 16-inch to 19-inch precipitation zone; not in a woodland group)

Rin silt loam, 2 to 4 percent slopes (RpB).—This soil is near the mountains south of Victor. Included in mapping were small gravelly areas and small areas of soil that is less than 36 inches to rhyolite bedrock.

The available water capacity is high. The erosion hazard is moderate if this soil is irrigated and slight if it is dryfarmed or used for range.

Most of the acreage is irrigated for wheat, barley, alfalfa, potatoes, and oats (fig. 9). Some of the acreage is dryfarmed for wheat, barley, and alfalfa, and some is used for range. (Capability unit IIIe–1, irrigated, and IIIe–4, dryland; Loamy range site, 16-inch to 19-inch precipitation zone; not in a woodland group)

Rin silt loam, 4 to 8 percent slopes (RpC).—The largest areas of this soil are in the southwest corner of the survey Area and near Badger Creek in the northern part. The erosion hazard is severe if this soil is irrigated.

Most of the acreage is irrigated for alfalfa, wheat, barley, potatoes, and oats. Some of it is dryfarmed for wheat, barley, and alfalfa. (Capability unit IIIe–3, irrigated, and

Figure 9.—**Wheat harvested on irrigated Rin silt loam, 2 to 4 percent slopes. The Targhee National Forest is in the background.**

IIIe–4, dryland; Loamy range site, 16-inch to 19-inch precipitation zone; not in a woodland group)

Rin silt loam, 8 to 12 percent slopes (RpD).—This soil is about 4 miles west of Victor in the southwestern part of the Area. The erosion hazard is very severe under irrigation.

Most of the acreage is irrigated for grass and legume hay and pasture and for an occasional grain crop. Some of it is dryfarmed for wheat, barley, and alfalfa. (Capability unit IVe–2, irrigated, and IIIe–4, dryland; Loamy range site, 16-inch to 19-inch precipitation zone; not in a woodland group)

Rin silt loam, 12 to 20 percent slopes (RpE).—This soil occurs as small scattered areas, the largest about 4 miles north and 2 miles east of Felt. The erosion hazard is severe.

Some of the acreage is dryfarmed for wheat, barley, and alfalfa, and some is used for range. (Capability unit IIIe–49, dryland; Loamy range site, 16-inch to 19-inch precipitation zone; not in a woodland group)

Rin silt loam, 20 to 30 percent slopes (RpF).—This soil occurs as small, scattered areas. Some of the largest are about 1 mile north and 3 miles east of Tetonia. The erosion hazard is severe.

Some of the acreage is dryfarmed for wheat, barley, and alfalfa, and some is used for range. (Capability unit IVe–4, dryland; Loamy range site, 16-inch to 19-inch precipitation zone; not in a woodland group)

Rin-Greys silt loams, 12 to 20 percent slopes (RrE).—Most of this complex is about 1 mile north and 3 miles east of Felt. From 50 to 75 percent of any given area is Rin soil, and most of the rest is Greys soil. Commonly, the Rin soil occupies south slopes, and the Greys soil north slopes. In some places the Greys soil has been cleared of aspen.

Some of the acreage is dryfarmed for wheat and barley, some of it is used for range, and some of it for woodland. (Rin soil in capability unit IIIe–49, dryland; Loamy range site, 16-inch to 19-inch precipitation zone; not in a woodland group. Greys soil in capability unit IIIe–49, dryland; Loamy range site (aspen); woodland group 1)

Ririe Series

The Ririe series consists of well-drained, medium-textured soils that formed in loess. The original vegetation consisted of bluebunch wheatgrass and some sagebrush.

These soils generally occupy south slopes in the northwestern part of the Area. They are at an elevation of 5,800 to 7,000 feet and receive from 12 to 15 inches of precipitation annually. The mean annual temperature is 42° F., and there are about 85 days between killing frosts.

The surface layer is grayish-brown silt loam 4 to 9 inches thick. The underlying layers are pale-brown and light-

gray, strongly calcareous silt loam to a depth of more than 60 inches.

Ririe soils are associated with shallow Swanner soils and with Tetonia soils.

Ririe silt loam, 4 to 12 percent slopes, eroded (RsD2).—The largest areas of this soil are on south slopes in the northwestern part of the Area.

Included in mapping were some areas of soil that is calcareous in the surface layer, small areas that are slightly or severely eroded, and small areas that have slopes of more than 12 percent.

Representative profile, at the center of the north line of the SW¼SW¼ sec. 28, T. 7 N., R. 43 E.:

Ap—0 to 6 inches, grayish-brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) when moist; weak, very fine, granular structure; slightly hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; abundant roots; common very fine pores; noncalcareous except for a few, small, scattered spots that are calcareous as a result of rodent activity or deep tillage; mildly alkaline (pH 7.8); abrupt, smooth boundary.

A1—6 to 9 inches, grayish-brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) when moist; weak, coarse and very coarse, prismatic structure parting to weak or very weak, very coarse, subangular blocky structure; hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; plentiful roots; common fine and very fine pores; thin, patchy clay films in pores; mildly alkaline (pH 7.7); clear, wavy boundary.

C1ca—9 to 14 inches, pale-brown (10YR 6/3) silt loam, dark grayish brown (10YR 4/2) when moist; weak, medium and coarse, prismatic structure parting to weak, medium, subangular blocky structure; hard when dry, friable when moist, slightly sticky and slightly plastic when wet; plentiful roots; many fine and very fine pores; common lime splotches; strongly calcareous; mildly alkaline (pH 7.8); clear, wavy boundary.

C2ca—14 to 25 inches, light-gray (10YR 7/2) silt loam, brown (10YR 5/3) when moist; moderate or weak, medium and fine, subangular blocky structure; hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; many, very hard and very firm, rounded, ½-inch to ¾-inch nodules or krotovinas of very dense soil material that are less calcareous inside than on the surface; few roots, and none inside the nodules; much lime coating on the ped surfaces, and many lime veins; strongly calcareous; moderately alkaline (pH 7.9); clear, wavy boundary.

C3ca—25 to 35 inches, similar to C2ca, but weak, medium, subangular blocky structure; few to plentiful roots; moderate number of nodules or krotovinas, some about 2 inches long; moderate lime coating; strongly calcareous; moderately alkaline (pH 8.1); gradual, smooth boundary.

C4ca—35 to 49 inches, light-gray (10YR 7/2) silt loam, brown (10YR 5/3) when moist; massive; friable when moist and slightly sticky and slightly plastic when wet; few fine roots; common, very fine, tubular pores; strongly calcareous; few very fine lime veins; strongly alkaline (pH 8.5); gradual, wavy boundary.

C5ca—49 to 65 inches, pale-brown (10YR 6/3) silt loam containing more coarse silt than horizon above; grayish brown (2.5Y 5/2) when moist; massive; soft when dry, very friable when moist, and slightly sticky and slightly plastic when wet; no roots; common micro and very fine pores; lime disseminated; strongly calcareous; strongly alkaline (pH 8.5); gradual, smooth boundary.

C6—65 to 125 inches, similar to C5ca, but moderately calcareous and moderately alkaline (pH 8.0).

The color value of the A1 horizon ranges from 5 to 6. The color value of the ca horizon ranges from 6 to 7 when the soil is dry. This horizon is more than 15 percent carbonates.

Natural drainage is good. Permeability is moderate, and the available water capacity is very high. Roots penetrate deeply. The organic-matter content is moderate to moderately low, and natural fertility is moderately high. The erosion hazard is moderate. Prevailing southwest winds blow much of the snow from this soil and sometimes leave it exposed to frost and blowing. Because of the southern exposure, snow melts early and much moisture is lost through evaporation and runoff.

This soil is dryfarmed for wheat, barley, and alfalfa. (Capability unit IVe–45, dryland; not in a range site or woodland group)

Ririe silt loam, 4 to 12 percent slopes, severely eroded (RsD3).—The largest areas of this soil are in the northwestern part of the Area near the Madison County line. All or nearly all of the original surface layer has been removed by erosion. Most of the plow layer is calcareous as a result of mixture with the strongly calcareous subsoil. The hazard of further erosion is moderate to severe.

This soil is dryfarmed for wheat, barley, and alfalfa. (Capability unit IVe–45, dryland; not in a range site or woodland group)

Ririe silt loam, 12 to 20 percent slopes, eroded (RsE2).—Most of this soil is in the northwestern part of the Area near the Madison County line. The hazard of further erosion is severe.

This soil is dryfarmed for wheat, barley, and alfalfa. (Capability unit IVe–45, dryland; not in a range site or woodland group)

Ririe silt loam, 12 to 20 percent slopes, severely eroded (RsE3).—Most of this soil is in the northwestern part of the Area near the Madison County line. Some of it is about 5 miles west of Tetonia. All or nearly all of the original surface layer has been removed by erosion. The plow layer is low in organic-matter content, and, in most places, is calcareous because it has been mixed with the strongly calcareous subsoil. The hazard of further erosion is very severe.

This soil is dryfarmed for wheat, barley, and alfalfa. (Capability unit VIe–4, dryland; not in a range site or woodland group)

Ririe silt loam, 20 to 30 percent slopes, eroded (RsF2).—The largest areas of this soil are in the extreme northwestern corner of the Area. The hazard of further erosion is severe to very severe.

Some of this soil is dryfarmed for wheat, barley, and alfalfa, and some is used for range. It can be seeded to grasses and legumes. (Capability unit VIe–4, dryland; Loamy range site, 13-inch to 16-inch precipitation zone; not in a woodland group)

Ririe-Tetonia silt loams, 4 to 12 percent slopes (RtD).—Most of this complex is on uplands in the northwestern part of the Area. From 40 to 60 percent of any given area is eroded Ririe soil, and most of the rest is Tetonia soil. Commonly, the Ririe soil occupies south slopes and exposed ridges and spurs, and the Tetonia soil north slopes and broader ridges.

These soils are dryfarmed for wheat and barley. (Capability unit IVe–45, dryland; not in a range site or woodland group)

Ririe-Tetonia silt loams, 12 to 20 percent slopes (RtE).—This complex is on uplands in the northwestern part of the Area. A large acreage is about 11 miles northwest of Tetonia.

From 50 to 70 percent of any given area is Ririe soil, and most of the rest is Tetonia soil. Commonly, the Ririe soil occupies south slopes and exposed ridges and spurs, and the Tetonia soil north slopes and broader ridges.

These soils are dryfarmed for wheat and barley. (Capability unit IVe–45, dryland; not in a range site or woodland group)

Ririe-Tetonia silt loams, 12 to 20 percent slopes, severely eroded (RtE3).—Most of this complex is near the Teton River canyon, about 7 miles northwest of Tetonia. From 50 to 75 percent of any given area is Ririe soil, and most of the rest is Tetonia soil. The slopes are short. The Ririe soil occupies south slopes, and the Tetonia soil north slopes.

These soils are dryfarmed for wheat and barley. (Capability unit VIe–4, dryland; not in a range site or woodland group)

Rock Land

Rock land (Ru) is a land type made up of steep areas in which 50 to 90 percent of the surface consists of rock outcrops and stones. It is at an elevation of 6,000 to 7,000 feet and is associated with the moderately deep Dra soils.

This land type has little value for forestry or grazing. It produces a sparse growth of scrubby trees, and it is inaccessible to livestock. (Capability unit VIIIs–1, dryland; not in a range site or woodland group)

Swanner Series

The Swanner series consists of well-drained, medium-textured, stony soils that are shallow over bedrock. These soils formed in a thin layer of loess and residuum from rhyolite or rhyolitic tuff bedrock. The original vegetation consisted mostly of bluebunch wheatgrass, needle-and-thread, and sagebrush.

Most areas of these soils occupy south slopes on uplands in the southwestern part of the Area. They are at an elevation of 6,000 to 7,000 feet and receive from 12 to 15 inches of precipitation annually. The mean annual temperature is 42° F., and there are about 85 days between killing frosts.

The surface layer is grayish-brown or brown stony, very stony, or extremely stony loam 5 to 11 inches thick. It is underlain by light-gray, extremely stony loam that extends to the light-gray rhyolite or rhyolitic tuff bedrock at a depth of 10 to 20 inches. The reaction grades from neutral in the upper part of the profile to moderately alkaline in the lower part.

These soils are associated with Ririe, Rammel, Karlan, and Ard soils.

Swanner extremely stony loam, 12 to 30 percent slopes (SwF).—This soil generally occurs as long, narrow strips on south slopes in the northwestern part of the Area. Included with it in mapping were small areas of rock outcrop and small areas that are stony or very stony.

Representative profile, 900 feet east of southwest corner of the NW¼NW¼ sec. 15, T. 6 N., R. 43 E., in an area of sagebrush and grass:

A11—0 to 5 inches, grayish-brown (10YR 5/2) extremely stony loam, very dark grayish brown (10YR 3/2) when moist; weak, very fine, granular structure; soft when dry, very friable when moist, and slightly sticky and slightly plastic when wet; plentiful fine roots; many, very fine, tubular pores; neutral (pH 6.8); clear, wavy boundary. About 40 percent of the surface is covered by flagstones, stones, and ¼-inch to ½-inch angular or platy fragments of light-gray (N6 when dry) rhyolite or rhyolitic tuff.

A12—5 to 11 inches, brown (10YR 5/3) extremely stony loam, dark brown (10YR 3/3) when moist; weak, very fine, granular structure; soft when dry, very friable when moist, and slightly sticky and slightly plastic when wet; abundant fine roots matted on top of rock fragments; many, very fine, tubular pores; noncalcareous except for thick lime coating or short stalactites on lower side of rock fragments; mildly alkaline (pH 7.4); about 75 percent flat or platy stones, flagstones, and channery fragments of rhyolitic tuff; abrupt, wavy boundary.

Cca—11 to 15 inches, light-gray (10YR 7/2) extremely stony loam, grayish brown (10YR 5/2) when moist; massive; soft when dry, very friable when moist, and slightly sticky and slightly plastic when wet; few fine roots matted on top of stones; moderately calcareous; moderately alkaline (pH 8.0); about 90 percent fractured and loose stones, flagstones, channery fragments, and angular gravel of rhyolite or rhyolitic tuff; abrupt, irregular boundary.

Rca—15 inches, light-gray (N7) rhyolite or rhyolitic tuff bedrock; gray (N5) when moist. Rock is lightweight and porous. Lime has filled some of the pores.

The depth to bedrock ranges from 10 to 20 inches. Where this soil merges with Rammel soils, the depth to the calcareous horizon is more than 11 inches.

Natural drainage is good, permeability is moderate, and the available water capacity is very low. Roots penetrate to bedrock. The organic-matter content is moderately low. The erosion hazard is moderate to severe.

This soil is used for range. (Capability unit VIIs–1, dryland; Shallow Stony range site; not in a woodland group)

Swanner stony loam, 0 to 12 percent slopes (SeD).—This soil occurs mostly as small, scattered areas at the top of canyon and ravine walls on uplands. The erosion hazard is slight to moderate.

This soil is used for range. The stones interfere with but do not prevent cultivation. Because of the shallowness and the very low available water capacity, however, crop production is impractical. (Capability unit VIs–4, dryland; Shallow Stony range site; not in a woodland group)

Swanner very stony loam, 0 to 12 percent slopes (SvD).—This soil occurs as long, narrow strips along ravines in the northwestern part of the Area. Included in mapping were small areas that are extremely stony and small areas that are steeper than 12 percent. The erosion hazard is slight to moderate.

This soil is used for range. Tillage for crops is impractical, but tillage for reseeding of pasture and range is feasible. (Capability unit VIs–4, dryland; Shallow Stony range site; not in a woodland group)

Swanner extremely stony loam, 30 to 60 percent slopes (SwG).—This soil occurs mostly on ravine and canyon walls in the northwestern part of the Area. The erosion hazard is severe or very severe.

This soil is used for range. (Capability unit VIIs–1, dryland; Shallow South Slope range site; not in a woodland group)

Swanner extremely stony loam, 60 to 80 percent slopes (SwH).—This soil occurs mostly on canyon walls in the northwestern part of the Area. The erosion hazard is very severe.

This soil is used for range, although the slopes are very steep and difficult to graze. (Capability unit VIIs–1, dryland; Shallow South Slope range site; not in a woodland group)

Tepete Series

The Tepete series consists of very poorly drained organic soils that are shallow to moderately deep over sand and gravel. These soils formed in marshes. The vegetation consisted of sedges, rushes, low-growing shrubs, and willows.

Most areas of Tepete soils are on wet bottom land west of Driggs. The range of slope is 0 to 2 percent. The elevation ranges from 5,800 to 6,200 feet, and the annual precipitation is about 17 inches. The mean annual temperature is 38° F., and there are about 65 days between killing frosts.

Very dark brown to black peat extends from the surface to a depth of about 30 inches. It is underlain by dark-gray and gray silty clay loam or clay loam that is mottled and extends to a depth of about 40 inches. The substratum is light brownish-gray gravel and loamy sand. Loose sand and gravel are at a depth of about 60 inches. The reaction is medium acid to neutral in the upper part of the profile and mildly to moderately alkaline in the lower part.

Tepete soils are associated with Furniss, Foxcreek, Zohner, and Cedron soils.

Tepete peat, shallow (0 to 1 percent slopes) (Te).—This organic soil is on wet bottom land west of Driggs. Included in mapping were small areas in which the peat is less than 12 inches thick and small areas in which it is more than 36 inches thick.

Representative profile, 15 feet north of the fence and 500 feet east of the southwest corner of sec. 28, T. 5 N., R. 45 E., in a wet meadow:

O1—0 to 7 inches, very dark brown (10YR 2/2), moderately well decomposed to slightly decomposed peat, dark brown (10YR 4/3) and very dark brown (10YR 1/2) when moist; fine and fibrous; matted; very abundant very fine and fine roots and plentiful medium roots; medium acid (pH 5.6); clear, smooth boundary.

O2—7 to 14 inches, moderately well decomposed peat; similar to above but slightly darker colored; abundant very fine roots and plentiful fine and medium roots; clear, smooth boundary.

O3—14 to 25 inches, black (10YR 2/1) or very dark brown (10YR 1/2), moderately decomposed peat, black (10YR 1.5/1) when moist; few plant remains, mostly sedges and rushes; possibly some sedimentary peat; fibrous or massive; extremely hard and very slowly permeable when dry, very friable when moist, and nonsticky and slightly plastic when wet; few very fine and fine roots; neutral (pH 6.8); clear, smooth boundary.

O4 and IIA1b1—25 to 29 inches, black (10YR 2/1), moderately decomposed peat containing many sedge and rush fibers, black (10YR 1/1) when moist; thin layers of dark-gray (N 4/0) silty clay loam, very dark gray (N 3/0) when moist; massive; extremely hard when dry, very friable when moist, and slightly sticky and slightly plastic when wet; neutral (pH 6.8); clear, smooth boundary.

IIA1gb2—29 to 34 inches, dark-gray (2.5Y 4/0.5) silty clay loam, black (2.5Y 1.5/0.5) when moist; contains a moderate amount of partly decomposed plant remains; massive; extremely hard when dry, firm when moist, and sticky and plastic when wet; common, very fine, tubular pores; neutral (pH 6.8); clear, smooth boundary.

IIC1g—34 to 43 inches, gray (5Y 6/1) silty clay loam, dark gray (5Y 4/1) when moist; contains moderate amount of partly decomposed plant remains; common, fine, prominent, black (10YR 2/1) stains and few, fine, distinct, very dark grayish-brown (10YR 3/2) stains around roots and channels; massive; very hard when dry, friable when moist, and sticky and plastic when wet; few, very fine, tubular pores; mildly alkaline (pH 7.6); clear, wavy boundary. Lower part contains pockets of very fine sand and silt having common, large, distinct, brownish-yellow (10YR 6/6) mottles that are yellowish brown (10YR 5/6) when moist.

IIIC2g—43 to 58 inches, light brownish-gray (2.5Y 6/2) gravel and loamy sand, grayish brown (2.5Y 5/2) when moist; single grain; loose when dry and nonsticky and nonplastic when wet; noncalcareous except for limestone pebbles; moderately alkaline (pH 8.0); gravel is granite and some sandstone, quartzite, and limestone.

IIIC3—58 inches, loose sand and gravel.

The profile is noncalcareous. It is medium acid to moderately alkaline. The uppermost layer of mineral soil is generally moderately fine textured. There is no layer of marl, diatomaceous earth, or other impermeable material. In some places the lower part of the organic material is stratified with thin layers of mineral soil, and the mineral layers are stratified with thin layers of organic material. The depth to mineral soil ranges from 12 to 36 inches, and the depth to gravel from 36 to 60 inches.

Natural drainage is very poor. Permeability is rapid in the peat and moderately slow in the underlying mineral soil. The available water capacity is very high. Roots penetrate to the loose sand and gravel. The natural fertility is moderately low.

Most of the acreage is range (fig. 10). A small acreage is used for hay. There are good feeding and nesting areas for waterfowl. (Capability unit Vw–1, dryland; Wet Meadow range site; not in a woodland group)

Tepete peat (0 to 1 percent slopes) (Ta).—This soil is on wet bottom land west of Driggs. The layer of peat is generally from 36 to 56 inches thick.

This soil is used mainly for pasture, hay, and waterfowl habitat. It might have more value as a commercial source of peat. (Capability unit Vw–1, dryland; Wet Meadow range site; not in a woodland group)

Tetonia Series

The Tetonia series consists of very deep, well-drained, medium-textured, gently undulating to hilly soils that formed in loess. The native vegetation consisted mostly of bluebunch wheatgrass, Sandberg bluegrass, Idaho fescue, and scattered sagebrush.

These soils occur mostly on uplands in the northern part of the Area. They are at an elevation of 6,000 to 7,000 feet and receive from 13 to 16 inches of precipitation annually. The mean annual temperature is 40°F., and there are about 80 days between killing frosts.

The surface layer is dark grayish-brown to grayish-brown silt loam 10 to 15 inches thick. It is underlain by dark grayish-brown to brown silt loam that extends to a depth of about 24 inches. The substratum is light-gray or light brownish-gray, strongly calcareous silt loam that extends to a depth of more than 60 inches.

Tetonia soils are associated with Ririe and Lantonia soils.

Tetonia silt loam, 0 to 4 percent slopes (TkAB).—This soil is on broad ridgetops on uplands in the northern part of the Area. The slope is commonly between 2 and 4 percent. Included in mapping were small areas in which the

Figure 10.—**Tepete peat, shallow, used for range. The roughness of the surface is caused by trampling. There is some water on the surface.**

surface layer is slightly lighter colored and the depth to lime is less than 20 inches. Also included were small areas in which the slope range is 4 to 12 percent.

Representative profile, 0.2 mile south and 100 feet west of the northeast corner of sec. 36, T. 7 N., R. 43 E., in a cultivated field:

Ap—0 to 6.5 inches, grayish-brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) when moist; weak, very fine, granular structure; hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; very abundant roots; common very fine pores; noncalcareous except for a few spots of lime; mildly alkaline (pH 7.7); abrupt, smooth boundary.

A11—6.5 to 9 inches, dark grayish-brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) when moist; vertical cracks form weak prisms, 2 to 4 inches across, which part to weak, very fine, granular structure; firm when moist, slightly sticky and slightly plastic when wet; plentiful fine roots; many micro and very fine pores; some rodent holes partly filled with limy material; mildly alkaline (pH 7.7); clear, smooth boundary.

A12—9 to 13 inches, similar to A11 but about 1.2 percent more clay; friable when moist; common micro and very fine pores; mildly alkaline (pH 7.6); clear, smooth boundary.

B1—13 to 18 inches, dark grayish-brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) when moist; weak, medium, prismatic structure parting to weak, coarse and medium, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; plentiful fine roots; slightly dense, but common to few fine and very fine pores; thin, patchy clay films in pores and very few thin clay films on vertical and horizontal surfaces; clay coatings are slightly darker colored than matrix; mildly alkaline (pH 7.6); clear, wavy boundary.

B2—18 to 24 inches, brown (10YR 5/3) silt loam, dark brown (10YR 3/3) when moist; weak, medium and coarse, prismatic structure parting to moderate, fine and medium, subangular blocky structure; firm when moist and slightly sticky and slightly plastic when wet; plentiful fine roots; slightly dense, but common to few, fine, and very fine pores and few ⅛-inch to ⅛-inch channels; thin, patchy, grayish-brown (10YR 5/2) clay films on vertical and horizontal surfaces and in pores, dark brown (10YR 3/3) when moist; faint, light-gray silt specking on vertical surfaces; mildly alkaline (pH 7.6); abrupt, wavy boundary.

B3ca—24 to 27 inches, light brownish-gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) when moist; moderate, coarse and medium, subangular blocky structure; very hard when dry, firm when moist, and slightly sticky and slightly plastic when wet; moderate number of very firm, dense, rounded, ¾-inch to 1-inch nodules of soil material that are less calcareous on inside than on outside; few roots, and none in nodules; thin, very sparse dark-brown clay films in places; moderately dense, but few very fine pores; common lime veins and splotches; moderately calcareous; mildly alkaline (pH 7.7); clear, wavy boundary.

C1ca—27 to 35 inches, light-gray (10YR 7/2) silt loam, brown (10YR 5/3) when moist; moderate, fine and medium, subangular blocky structure; very hard when dry, firm when moist, and sticky and plastic when wet; many, extremely hard, rounded, ½-inch nodules of soil material that are very dense and less calcareous inside than outside; few roots between nodules; no evident clay films; many lime veins and coatings; strongly calcareous; mildly alkaline (pH 7.7); gradual, wavy boundary.

C2ca—35 to 42 inches, light brownish-gray (10YR 6/2) silt loam, grayish brown (10YR 5/2) when moist; weak, medium and fine, subangular and angular blocky structure; hard when dry, firm or very firm when moist, and slightly sticky and slightly plastic when wet; few roots; many lime coatings and some lime veins; many (somewhat more numerous than in horizons above), extremely hard, rounded, ¾-inch to 1-inch nodules of soil material that are very dense and are less calcareous inside than outside; strongly calcareous; moderately alkaline (pH 8.0); gradual, wavy boundary.

C3ca—42 to 50 inches, light-gray (10YR 7/2) silt loam, light olive brown (2.5Y 5/3) when moist; very weak, medium, subangular blocky structure; hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; very few roots; common very fine pores; few lime veins; few, firm, dense nodules up to 1.5 inches in diameter; strongly calcareous; moderately alkaline (pH 8.0); gradual, wavy boundary.

IIC4ca—50 to 70 inches, light-gray (10YR 7/2) silt loam, brown (10YR 5/3) when moist; much coarse silt; massive; hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; very few roots; common very fine pores; few lime veins; strongly calcareous; moderately alkaline (pH 8.2); gradual, wavy boundary.

IIC5ca—70 to 95 inches, pale-brown (10YR 6/3) silt loam, dark brown (10YR 4/3) when moist; much coarse silt; mas-

sive; hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; no roots; few very fine pores; strongly calcareous but no carbonate segregations; few, small, firm lumps; moderately alkaline (pH 8.3).

The depth to calcareous material ranges from 20 to 30 inches.

This soil has good tilth and is easy to work. Natural drainage is good, permeability is moderate, and the available water capacity is very high. Roots easily penetrate to a depth of more than 60 inches. The organic-matter content is moderate, and the natural fertility is high. The erosion hazard is slight.

Most of the acreage is dryfarmed. The main crops are wheat, barley, and alfalfa. (Capability unit IIIc–4, dryland; not in a range site or woodland group)

Tetonia silt loam, 0 to 2 percent slopes (TkA).—The slope of this soil is commonly between 1 and 2 percent.

Most of the acreage is irrigated for alfalfa, wheat, barley, potatoes, and oats. The main dryfarmed crops are wheat, barley, and alfalfa. (Capability unit IIIc–1, irrigated, and IIIc–4, dryland; not in a range site or woodland group)

Tetonia silt loam, 2 to 4 percent slopes (TkB).—This soil occurs in scattered areas. A large acreage is about 6 miles west of Driggs. The erosion hazard is moderate if this soil is irrigated and slight if it is dryfarmed.

Most of the acreage is irrigated for alfalfa, wheat, barley, potatoes, and oats. Some of it is dryfarmed for wheat, barley, and alfalfa. (Capability unit IIIe–1, irrigated, and IIIc–4, dryland; not in a range site or woodland group)

Tetonia silt loam, 4 to 8 percent slopes (TkC).—Most of this soil is about 4 miles west and 4 miles south of Driggs. The erosion hazard is severe if this soil is irrigated and moderate if it is dryfarmed.

Most of the acreage is irrigated for alfalfa, wheat, barley, potatoes, and oats. Some of it is dryfarmed for wheat, barley, and alfalfa. (Capability unit IIIe–3, irrigated, and IIIe–4, dryland; not in a range site or woodland group)

Tetonia silt loam, 4 to 12 percent slopes (TkCD).—Most areas of this soil are on uplands northwest of Tetonia. The slope is commonly between 4 and 8 percent. The erosion hazard is moderate.

This soil is dryfarmed for wheat, barley, and alfalfa. (Capability unit IIIe–4, dryland; not in a range site or woodland group)

Tetonia silt loam, 8 to 12 percent slopes (TkD).—This soil is in widely scattered areas on loess-covered alluvial fans. One area of it is about 2½ miles east and 3½ miles north of Driggs. The erosion hazard is very severe if this soil is irrigated and moderate if it is dryfarmed.

Most of the acreage is irrigated for wheat, barley, alfalfa, and oats. Some of it is dryfarmed for wheat, barley, and alfalfa. Grass and legumes are also suitable, and a grain crop can be grown occasionally. The slopes are too steep for row crops. (Capability unit IVe–2, irrigated, and IIIe–4, dryland; not in a range site or woodland group)

Tetonia silt loam, 12 to 20 percent slopes (TkE).—The largest areas of this soil are north of Felt. The erosion hazard is moderate to severe.

This soil is dryfarmed for wheat, barley, and alfalfa. (Capability unit IIIe–49, dryland; not in a range site or woodland group)

Tetonia-Lantonia silt loams, 4 to 12 percent slopes (TlD).—This complex of soils is just north of Felt. From 50 to 75 percent of any given area is Tetonia silt loam, and most of the rest is Lantonia silt loam. Commonly, the Tetonia soil occupies ridgetops and south slopes and the Lantonia soil drainageways and north slopes.

These soils are dryfarmed for wheat and barley. Because of the difference in slope aspect, crops generally mature earlier on Tetonia soils than on Lantonia soils, and this causes a problem in harvesting. (Capability unit IIIe–4, dryland; not in a range site or woodland group)

Tetonia-Lantonia silt loams, 12 to 20 percent slopes (TlE).—Most of this complex is just north of Felt. From 50 to 75 percent of any given area is Tetonia silt loam, and most of the rest is Lantonia silt loam. Commonly, the Tetonia soil occupies ridgetops and south slopes and the Lantonia soil drainageways and north slopes.

These soils are dryfarmed for wheat and barley. Because of the difference in slope aspect, crops mature earlier on the Tetonia soils than on the Lantonia soils, and this causes a problem in harvesting. (Capability unit IIIe–49, dryland; not in a range site or woodland group)

Tetonia-Ririe silt loams, 4 to 12 percent slopes (TnD).—This complex is on uplands in the northwestern part of the Area. From 50 to 75 percent of any given area is Tetonia silt loam, and most of the rest is eroded Ririe silt loam. The Tetonia soil is on ridgetops and north slopes, and the Ririe soil is on south slopes.

These soils are dryfarmed for wheat and barley. (Capability unit IIIe–4, dryland; not in a range site or woodland group)

Tetonia-Ririe silt loams, 12 to 20 percent slopes (TnE).—Most of this complex is in the northwestern part of the survey Area. From 50 to 75 percent of any given area is Tetonia silt loam, and most of the rest is eroded Ririe silt loam. Commonly, the Tetonia soil occupies ridgetops, north slopes, and minor drainageways and the Ririe soil south slopes and knobs and spurs of ridges.

These soils are dryfarmed for wheat and barley. (Capability unit IIIe–49, dryland; not in a range site or woodland group)

Tonks Series

The Tonks series consists of somewhat poorly drained, moderately fine textured soils. These soils formed in mixed alluvium derived from granite, gneiss, quartzite, sandstone, limestone, and rhyolite. The natural vegetation consisted predominantly of water-tolerant grasses.

Most areas of Tonks soils are on slightly elevated wet bottom land south of Driggs. The elevation ranges from 5,800 to 7,000 feet, and the annual precipitation from 15 to 18 inches. The mean annual temperature is 39° F., and there are about 70 days between killing frosts.

The surface layer is 8 to 20 inches thick and consists of dark-gray light silty clay loam and grayish-brown silty clay loam. It is underlain by mottled grayish-brown clay loam or silty clay loam. Below a depth of 30 inches in places, the substratum consists of stratified light-gray and gray loam, sandy loam, or sand and gravel. In most places, loose sand and gravel are at a depth of 36 to 84 inches. The reaction is mildly to moderately alkaline.

Tonks soils are associated with moderately deep Foxcreek soils and poorly drained Furniss soils.

Tonks silty clay loam (0 to 2 percent slopes) (To).—Most of this soil is on the upper part of wet bottom land

between Driggs and Victor. Included in mapping were small areas of noncalcareous soil and small areas of soil that has a strongly calcareous subsoil.

Representative profile, 180 feet west of the southwest corner of the SE¼ sec. 34, T. 5 N., R. 45 E., in a hayfield:

A11—0 to 2 inches, dark-gray (10YR 4/1) light silty clay loam that contains a few pebbles, black (10YR 2/1) when moist; moderate, fine and medium, granular structure; hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; abundant fine roots (nearly a mat); many, very fine pores; noncalcareous or very slightly calcareous; mildly alkaline (pH 7.6); clear, smooth boundary.

A12—2 to 13 inches, similar to A11 horizon, but plentiful very fine and fine roots and a few medium roots; many, very fine, tubular pores; a few bleached sand grains; mildly alkaline (pH 7.6); abrupt, wavy boundary.

A13ca—13 to 17 inches, grayish-brown (2.5Y 5/2) silty clay loam, very dark grayish brown (10YR 3/2) when moist; few, coarse, faint, brown (10YR 5/3) mottles, dark brown (10YR 4/3) when moist; few, fine, prominent, strong-brown (7.5YR 5/6) mottles, dark brown (10YR 4/6) when moist; weak, medium, prismatic structure parting to weak, medium and coarse, granular structure; very hard when dry, friable when moist, and sticky and plastic when wet; plentiful fine and very fine roots and few medium roots; many, very fine, tubular pores and common, fine and medium, tubular pores; few black krotovinas, wormholes, and worm casts, 3 to 5 millimeters in diameter; slightly to moderately calcareous; mildly alkaline (pH 7.5); abrupt, wavy boundary.

C1cag—17 to 30 inches, grayish-brown (2.5Y 5/2) clay loam or silty clay loam, dark grayish brown (2.5Y 4/2) when moist; many, medium and coarse, prominent, yellowish-brown (10YR 5/4 and 5/6) mottles, dark yellowish brown (10YR 4/4) when moist; massive or weak, very fine, subangular blocky structure; very hard when dry, friable when moist, and sticky and plastic when wet; few fine and very fine roots; common, very fine, tubular pores and few, fine, tubular pores; few wormholes and worm casts; one large dark-colored krotovina; common, soft, fine, yellowish-brown concretions; many white lime mycelia and splotches; moderately calcareous; mildly alkaline (pH 7.8); clear, wavy boundary. Underlain by 0.25-inch sand layer.

C2cag—30 to 41 inches, similar to C1cag but few, fine, prominent, strong-brown (7.5YR 5/6) mottles; common fine veins of carbonates; slightly less calcareous than C1 horizon; mildly alkaline (pH 7.7); abrupt, smooth boundary.

IIC3cag—41 to 49 inches, gray (2.5Y 6/1) heavy loam or silt loam, dark gray (2.5Y 4/1) when moist; many, medium and fine, prominent, light yellowish-brown (10YR 6/4) mottles, yellowish brown (10YR 5/4) when moist; massive; very hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; no roots; common, very fine, tubular pores; very few, soft, yellowish-brown concretions; few mycelia lime veins; moderately calcareous; mildly alkaline (pH 7.7); abrupt, smooth boundary.

IIC4g—49 to 58 inches, similar to IIC3cag, but loam or fine sandy loam, gray (2.5Y 5/1) when moist; common mottles; few, fine, tubular pores; mildly alkaline (pH 7.7); abrupt, smooth boundary.

IIIC5g—58 to 78 inches, gray (2.5Y 5/1) light coarse sandy loam, very dark gray (2.5Y 3/1) when moist; few, coarse, faint, grayish-brown (2.5Y 5/2) mottles, very dark grayish brown (2.5Y 3/2) when moist; few, fine, prominent, light yellowish-brown (10YR 6/4) mottles, yellowish brown (10YR 5/4) when moist; massive; hard when dry, very friable when moist, and slightly sticky and nonplastic when wet; no roots; many, very fine, interstitial pores; mildly alkaline (pH 7.7).

The A1 horizon has a color value of 4 to 5 when dry. Color associated with wetness is in or immediately below the A1 horizon. The profile is generally calcareous throughout, but none of the horizons are more than 15 percent carbonates. The horizon of carbonate concentration is weak in some places. The depth to the underlying coarse sand and gravel ranges from 36 to 84 inches. The substratum is generally stratified.

This soil is fairly easily worked and can be worked throughout a fairly wide range of moisture content. It is somewhat poorly drained and has a fluctuating water table. Consequently, plants that are not water tolerant grow poorly. In some places the water table has been raised by excessive irrigation. Permeability is moderately slow. The organic-matter content is high, and the fertility is high. There is no erosion hazard.

Although the water table is moderately high during part of the year, most of the acreage has to be irrigated if used for pasture and hay. It can be cultivated occasionally for the purpose of reestablishing stands of grass and legumes. (Capability unit IVw–2, irrigated; Dry Meadow range site; not in a woodland group)

Tonks-Cedron silty clay loams (0 to 2 percent slopes) (Tr).—This complex is on slightly elevated parts of wet bottom lands west of Tetonia. From 50 to 75 percent of any given area is Tonks soil, and most of the rest is Cedron soil.

These soils are irrigated for hay and pasture. (Tonks soil in capability unit IVw–2, irrigated; Dry Meadow range site; not in a woodland group. Cedron soil in capability unit IVw–2, irrigated; Wet Meadow range site; not in a woodland group)

Tonks silt loam, strongly calcareous variant, 2 to 4 percent slopes (TsB).—This soil is on the lower part of alluvial fans west of the Teton River about 4 miles southwest of Driggs. Included in mapping were small areas that are noncalcareous in the surface layer and small areas that are poorly drained and have wet meadow vegetation.

Representative profile, on the north side of the road at the southeast corner of the SW¼SE¼ sec. 8, T. 4 N., R. 45 E., in an uncultivated area:

A11ca—0 to 7 inches, gray (10YR 5/1) silt loam, very dark gray (10YR 3/1) when moist; moderate, very fine, granular structure in uppermost 2 inches; moderate, thin and very thin, platy structure parting to strong, very fine and fine, granular structure in lower part; slightly hard when dry, very friable when moist, and slightly sticky and slightly plastic when wet; abundant very fine and fine roots; many, very fine, tubular pores; strongly or very strongly calcareous; mildly alkaline (pH 7.8), in uppermost 2 inches, and moderately alkaline (pH 8.1) in lower 5 inches; clear, smooth boundary.

A12ca—7 to 16 inches, gray (10YR 5/1) heavy silt loam; very dark gray (10YR 3/1) when moist; very weak, coarse, prismatic structure parting to very weak, thin, platy structure, then to moderate, very fine, granular structure; hard when dry, very friable when moist, and slightly sticky and slightly plastic when wet; plentiful fine roots; many, very fine, tubular pores; strongly calcareous; moderately alkaline (pH 8.1); clear, smooth boundary.

C1ca—16 to 28 inches, gray (10YR 6/1) heavy silt loam, dark gray (10YR 4/1) when moist; very weak, very coarse, subangular blocky structure parting to very weak, thin, platy structure, then to weak, very fine, granular structure; hard when dry, very friable when moist, and slightly sticky and slightly plastic when wet; plentiful fine roots; many, very fine, and common, fine, tubular pores; strongly or very strongly calcareous; moderately alkaline (pH 8.0); clear, wavy boundary.

C2cag—28 to 47 inches, light-gray (10YR 7/2) heavy silt loam, grayish brown (10YR 5/2) when moist; few, fine, faint, yellowish-brown (10YR 5/4) mottles; very weak,

very coarse, subangular blocky structure, or massive; hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; few fine roots; many, very fine, tubular pores; common krotovinas of same color and texture as A12ca horizon; strongly calcareous; moderately alkaline (pH 8.0); clear, wavy boundary.

C3cag—47 to 56 inches, light-gray (10YR 7/2) silt loam, brown (10YR 5/3) when moist; few, fine, distinct, strong-brown (7.5YR 5/6) mottles, reddish brown (5YR 4/4) when moist; massive; very hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; few fine roots; common, very fine, tubular pores; few, 2- to 3-millimeter, white snail shells; many (15 to 20 percent of mass), irregular-shaped, indurated, calcium carbonate nodules 0.5 to 1 inch in diameter; strongly calcareous; moderately alkaline (pH 7.9); clear, wavy boundary.

C4cag—56 to 68 inches, light-gray (2.5Y 7/1) silt loam, gray (2.5Y 5/1) when moist; many, coarse, distinct, very pale brown (10YR 7/4) mottles, yellowish brown (10YR 5/4) when moist; common, medium, prominent, strong-brown (7.5YR 5/6) mottles, reddish brown (5YR 4/4) when moist; common, fine, distinct, very dark gray (10YR 3/1) manganese oxide stains, black when moist; massive; very hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; very few fine roots; few, very fine, tubular pores; moderately or strongly calcareous; mildly alkaline (pH 7.7); gradual, smooth boundary.

C5g—68 to 80 inches, similar to C4cag but less mottled, moderately calcareous; mildly alkaline (pH 7.6).

This soil has good tilth and can be cultivated throughout a wide range of moisture content. Drainage is somewhat poor, permeability is moderate, and the available water capacity is very high. Roots penetrate deeply. The organic-matter content is high, and natural fertility is moderate. The erosion hazard is slight if the soil is dryfarmed, moderate if irrigated.

Most of the acreage is dryfarmed for wheat, barley, and oats and for alfalfa, clover, and grass hay and pasture. Some of the acreage is irrigated for wheat and barley. Because the water table fluctuates, alfalfa does not grow well. (Capability unit IIIw–1, irrigated, and IIIw–4, dryland; Dry Meadow range site; not in a woodland group)

Tonks silt loam, strongly calcareous variant, 0 to 2 percent slopes (TsA).—This soil is on the lower part of the alluvial fans about 4 miles southwest of Driggs. Included with it in mapping were small areas of soil that is noncalcareous in the surface layer. The erosion hazard is moderate if this soil is irrigated and slight if it is dryfarmed.

Most of the acreage is either grazed or is dryfarmed for wheat, barley, alfalfa, and oats. Some of the acreage is irrigated for wheat and barley. (Capability unit, IIIw–1 irrigated, and IIIw–4, dryland; Dry Meadow range site; not in a woodland group)

Turnerville Series

The Turnerville series consists of medium-textured and moderately fine textured, well-drained soils that formed in loess. These soils are deep or very deep over bedrock. The natural vegetation consisted predominantly of lodgepole pine, Douglas-fir, and pinegrass (fig. 11).

Most areas of these soils are on uplands in the northeastern part of the Area. They are at an elevation of 6,500 to 7,000 feet and receive from 20 to 28 inches of precipitation annually. The mean annual temperature is 36° F., and there are about 60 days between killing frosts.

In uncultivated areas a 1-inch to 3-inch covering of forest litter is on the surface. Below this, light-gray to light brownish-gray silt loam extends to a depth of 7 to 18 inches. It is underlain by yellowish-brown and brown heavy silt loam and light silty clay loam to a depth of about 80 inches. The substratum is yellowish-brown, calcareous silt loam. The reaction is strongly acid to mildly alkaline.

Turnerville soils are associated with Greys soils and stony Rammel soils.

Turnerville silt loam, 4 to 12 percent slopes (TuD).—Most of this soil is in the northeastern corner of the survey Area. Included in mapping were small areas that have slopes as steep as 20 percent.

Representative profile, 140 feet south and 30 feet west of the intersection of road and State line in the SE¼ sec. 8, T. 6 N., R. 46 E., in an area of lodgepole pine:

O11—2.3 to 2 inches, undecomposed to very slightly decomposed pine needles, twigs, and cones; slightly acid (pH 6.3).

O12—2 inches to 0.3 inch, very dark grayish-brown (10 YR 3/2) partly decomposed pine needles, twigs, leaves, and cones, very dark brown (10YR 1/2) when moist; slightly matted; strongly acid (pH 5.4); white fungi in spots.

O2—0.3 inch to 0, dark-gray (10YR 4/1) silt loam, very dark brown (10YR 2/2) when moist; strong, very fine, crumb structure; very abundant roots, many of which run horizontally; strongly acid (pH 5.4); abrupt, irregular boundary.

A1&A2—0 to 0.3 inch, dark-gray (10YR 4/1) silt loam, very dark brown (10YR 2/2) when moist; moderate, very fine, crumb structure; slightly hard when dry, very friable when moist, slightly sticky and slightly plastic when wet; very abundant roots; medium acid (pH 5.7); A1 material mainly in pockets. In much of the area, there is a light-gray A2 horizon a few millimeters thick and no A1; abrupt, broken boundary.

A22—0.3 inch to 1.5 inches, dominantly light-gray to gray (10YR 6/1) silt loam, dark grayish brown (10YR 4/2) and dark brown (10YR 3/3) when moist; many, medium, faint or distinct, light brownish-gray (10YR 6/2) and grayish-brown (10YR 5/2) mottles; very weak, medium and thin, platy structure parting to moderate, very fine, crumb structure; slightly hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; abundant roots; common fine and very fine pores; many, yellowish-brown, soft concretions 1 to 2 millimeters thick, and common, black, soft and semihard concretions 0.5 millimeter thick or less; small quantity of carbon from burned roots and wood; medium acid (pH 5.9); clear, irregular boundary.

A23—1.5 to 7 inches, similar to A22 but light-gray to light brownish-gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) when moist; many, coarse, faint, light brownish-gray (10YR 6/2) mottles, dark brown (10YR 3/3) when moist; massive to weak, very fine, crumb structure; few very fine pores; few tongues of A21 extending down; some badger holes filled with browner material; the light-gray patches consist mostly of bleached silt grains; the brown patches have a slight coating between the grains but contain considerable number of bleached grains; slightly acid (pH 6.1); clear, wavy boundary.

A24—7 to 11 inches, similar to A22, except more light brownish gray and less light gray; very weak, very coarse, subangular blocky structure; abundant roots; moderate, fine and very fine, soft, black and very dark brown concretions; very few, semihard, 1-millimeter concretions; medium acid (pH 5.9); abrupt, wavy boundary.

A&B—11 to 12 inches, light brownish-gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) when moist; many, coarse, faint, pale-brown (10YR 6/3) mottles, dark brown (10YR 4/3) when moist; the mottled ma-

Figure 11.—**Lodgepole pine growing on Turnerville soils. The understory is mostly pinegrass.**

terial is also in fine horizontal streaks; weak, coarse, subangular blocky structure parting to very weak, thick, platy structure; slightly hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; very abundant roots; common fine and very fine pores; concretions as in A23 plus some black ones 2 millimeters thick; thin, patchy clay films in pores and a few thin clay films on brown part; medium acid (pH 5.8); abrupt, wavy boundary.

B&A—12 to 15 inches, light-gray (10YR 7/2) and brown (10YR 5/3) silt loam (more than twice as much clay as in A&B), dark grayish brown (10YR 4/2) and dark brown (10YR 4/3) when moist; weak, coarse, prismatic structure breaking to moderate, medium, subangular blocky structure; prisms have a grayish-brown (10YR 5/2) coating, dark brown (7.5YR 4/2) when moist; hard when dry, firm when moist, and sticky and plastic when wet; abundant roots; the upper part has much light-gray bleached silt in pores, cracks, channels, and horizontal lenses mixed with the browner, finer textured material; the light-gray material decreases in amount with increase in depth, and in the lower part occurs mainly as specking on the vertical surfaces; thick, continuous clay films on the browner part; few, black, 1- to 2-millimeter concretions; strongly acid (pH 5.5); clear, wavy boundary.

B21t—15 to 29 inches, yellowish-brown (10YR 5/4)- heavy silt loam, dark brown to brown (10YR 4/3) when moist; weak, medium, prismatic structure parting to moderate to strong, medium and coarse, subangular and angular blocky structure; thick, continuous, brown (10YR 5/3) clay films on ped surfaces, dark grayish brown when moist; light-gray (10YR 7/2) bleached silty coating on peds; hard when dry, very firm when moist, and sticky and plastic when wet; plentiful roots, more roots in vertical cracks than in horizon above; dense; few fine and very fine pores; the upper part contains a moderate quantity of light-gray silty A2 material, in lenses, pores, and vertical cracks, which decreases to a very small quantity in the lower part; few, soft, black manganese oxide concretions about 2 millimeters in diameter; very few fingers of A2 material extend 5 inches into this horizon; medium acid (pH 5.6); clear, wavy boundary.

B22t—29 to 52 inches, similar to B21t, but light silty clay loam; moderate, medium, subangular blocky structure; firm when moist; moderate amount of light-gray silt specking on vertical surfaces; medium acid (pH 5.7); gradual, wavy boundary. 8 to 25 inches thick.

B31t—52 to 70 inches, brown (10YR 5/3) heavy silt loam, dark brown (10YR 4/3) when moist; weak or very weak, coarse, prismatic structure parting to weak, medium to coarse, subangular blocky structure; hard when dry, friable when moist, and sticky and plastic when wet; plentiful roots; common to many fine pores; medium, continuous, dark-brown clay films in pores; thin or medium, continuous clay films on vertical surfaces and thin, patchy clay films on horizontal surfaces; small amount of light-gray silt specking on vertical surfaces; slightly acid (pH 6.1); gradual, wavy boundary.

B32t—70 to 82 inches, similar to B31t, except yellowish-brown (10YR 5/4); very few pebbles; weak or very weak, coarse, prismatic structure parting to weak, medium and fine, subangular blocky structure; thin, patchy clay films on vertical ped and pore surfaces, but a few thin clay films on horizontal surfaces; neutral (pH 6.6); clear, wavy boundary.

C1ca—82 to 86 inches, yellowish-brown (10YR 5/4) silt loam, dark brown (10YR 4/3) when moist; few fine pebbles; weak or very weak, medium, subangular blocky structure; hard when dry, friable when moist, and sticky and plastic when wet; few roots; common fine pores; moderately calcareous; many lime veins; mildly alkaline (pH 7.4); abrupt, wavy boundary.

IIR1—86 to 90 inches, partly weathered rhyolite with lime on fragments.

IIR2—90 inches, rhyolite bedrock.

In cultivated or burned areas, the organic layer is lacking. The B horizon ranges from light silty clay loam to heavy silt loam; it is 26 to 30 percent clay. Where this soil merges with Greys soils there are a few inches of grayish-brown silt loam at the surface in some places.

Natural drainage is good. Permeability is moderate in the upper horizons and moderately slow in the subsoil. The available water capacity is very high. Roots penetrate deeply. The organic-matter content and the natural fertility are low. The erosion hazard is moderate.

Most of the acreage is used for timber, range, and watershed. A few acres are dryfarmed for barley. (Capability unit IVe-93, dryland; North Slope range site; woodland group 2)

Turnerville silt loam, 12 to 20 percent slopes (TuE).—Most of this soil is in the northeastern corner of the survey Area. The erosion hazard is severe.

This soil is used for timber, range, and water supply. (Capability unit VIe-3, dryland; North Slope range site; woodland group 2)

Turnerville silt loam, 20 to 30 percent slopes (TuF).—This soil is in the northeastern corner of the survey Area. The erosion hazard is severe. All of the acreage is used for timber and range. (Capability unit VIe-3, dryland; North Slope range site; woodland group 2)

Turnerville silt loam, 30 to 45 percent slopes (TuG).—This soil occurs mostly in the northeastern part of the Area. Small, slightly stony areas were included in mapping. The erosion hazard is very severe.

This soil is used for timber, range, and water supply. (Capability unit VIIe-1, dryland; North Slope range site; woodland group 2)

Wiggleton Series

The Wiggleton series consists of somewhat excessively drained, medium-textured soils underlain by loose gravel and sand at a depth of 5 to 20 inches (fig. 12). These soils formed in alluvium derived from sandstone, limestone, quartzite, granite, and gneiss. The natural vegetation consists of sagebrush, cottonwoods, and grass.

Most areas of these soils are along recent stream channels in alluvial fans and on bottom land. The elevation ranges from 6,000 to 6,500 feet, and the precipitation from 13 to 18 inches annually. The mean annual temperature is 40°F., and there are about 75 days between killing frosts.

The profile consists of dark grayish-brown and brown loam, gravelly loam, or very gravelly loam underlain by gravel at a depth of about 14 inches. The gravel has a lime coating on the underside in some places. The reaction is moderately alkaline, and the profile is noncalcareous above the gravel.

Figure 12.—**Profile of a Wiggleton soil. The depth to gravel is about 18 inches.**

Wiggleton soils are associated with moderately deep Driggs and Badgerton soils.

Wiggleton gravelly loam (0 to 8 percent slopes) (We).—This soil is in slightly elevated areas along recent stream channels that dissect alluvial fans and bottom land near Driggs. Included in mapping were small areas that are very gravelly and cobbly and small areas where the depth to gravel is more than 20 inches. Also included were some areas that are calcareous above the gravel and sand.

Representative profile, 870 feet east and 540 feet north

of fence corner on east side of highway at the southwest corner of the NE¼ sec. 35, T. 4 N., R. 45 E.:

A11—0 to 7 inches, dark grayish-brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) when moist; weak, medium and fine, subangular blocky structure parting to very weak, fine, granular structure; slightly hard when dry, very friable when moist, and slightly sticky and slightly plastic when wet; abundant fine roots and few medium roots; few, very fine, tubular pores; noncalcareous; moderately alkaline (pH 8.0); clear, smooth boundary. Uppermost inch is thin platy, breaking to weak, fine, granular structure.

IIA12—7 to 14 inches, brown (10YR 5/3) very gravelly loam, dark brown (10YR 3/3) when moist; massive or very weak, medium, subangular blocky structure; hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; plentiful fine roots and few medium and large roots; common, very fine, tubular pores; noncalcareous, except larger pebbles have moderate lime coatings on lower side; moderately alkaline (pH 8.0); abrupt, smooth boundary.

IIIC—14 inches, light brownish-gray (10YR 6/2) gravel and a small amount of sand, dark grayish brown (10YR 4/2) when moist; massive; nonsticky and nonplastic when wet; plentiful fine roots to a depth of 25 inches, and few fine and very fine roots to a depth of 48 inches; moderately calcareous; lime coating on lower side of pebbles; moderately alkaline (pH 8.0). About 50 percent of the gravel is limestone; the rest is mostly quartzite and sandstone.

The depth to gravel ranges from 5 to 20 inches.

This soil is somewhat excessively drained. It has a low available water capacity. It is moderately permeable above the gravel and very rapidly permeable in the gravel. Roots penetrate into the gravel and sand. The organic-matter content is moderate. Fertility is low. Some areas are subject to flooding for a short time in the spring, but they dry out rapidly. The hazard of erosion is slight to severe if this soil is irrigated and slight to moderate if it is dryfarmed.

Some of the acreage is irrigated for wheat and barley and for grass and legume hay and pasture. Irrigation is difficult because of the channeled relief, and leveling is difficult because of the shallowness to gravel. Some of the acreage is in dryland hay and pasture. The cottonwoods are cut for firewood and fence posts. (Capability unit IVs–1, irrigated, and VIs–4, dryland; Gravelly range site; woodland group 7)

Wiggleton very gravelly loam (Wo).—This soil is near recent stream channels that cut through alluvial fans near Driggs and Victor. It is used for range. (Capability unit VIs–4, dryland; Gravelly range site; woodland group 7)

Wiggleton loam (0 to 2 percent slopes) (Wg).—Most of this soil is along recent stream channels. A fairly large acreage is along Badger Creek about 2 miles northwest of Felt. The depth to gravel generally ranges from 15 to 20 inches. The hazard of erosion is slight.

This soil is irrigated for wheat and barley and for grass and legume hay and pasture. Some cottonwoods are cut for firewood and fenceposts. (Capability unit IVs–1, irrigated; Gravelly range site; woodland group 7)

Wiggleton-Badgerton gravelly loams (Wt).—This complex of soils occurs along recent stream channels. A fairly large area is along Badger Creek east of Felt. From 50 to 75 percent of any given area is Wiggleton soil, and most of the rest is Badgerton soil that has a slope range of 0 to 2 percent.

Most of the acreage is used for range, and these soils are better suited to range than to other uses. (Wiggleton soil in capability unit IVs–1, irrigated, and VIs–4, dryland; Gravelly range site; woodland group 7. Badgerton soil in capability unit IVw–3, dryland; River Bottom range site; woodland group 7)

Zohner Series

The Zohner series consists of poorly drained, moderately fine textured soils that formed in mixed alluvium derived mostly from limestone, granite, quartzite, gneiss, and sandstone. The original vegetation consisted of sedges, rushes, shrubby cinquefoil, willows, and other water-tolerant plants.

These soils are on level wet bottom land west of Driggs (fig. 13). They are at an elevation of 5,800 to 6,400 feet and receive 16 to 18 inches of precipitation annually. The mean annual temperature is 39° F., and there are about 60 days between killing frosts.

A root mat 1 or 2 inches thick generally covers the surface. It is underlain by 2 inches of dark-gray and gray, peaty silty clay loam, and then by light-gray silty clay loam to a depth of about 18 inches. This is underlain by clay loam. The substratum is light-gray gravelly coarse sandy loam. Very gravelly material or gravel and sand are common below a depth of 36 to 72 inches. The reaction is mildly to moderately alkaline. The calcium carbonate content is 50 to 85 percent in the upper part of the profile and decreases to 10 to 15 percent in the lower part.

Zohner soils are associated with Zundell soils and Furniss soils.

Zohner silty clay loam (0 to 1 percent slopes) (Zc).—This deep soil is on wet bottom land west of Driggs. Included in mapping were small areas of shallow peat and small areas of soil that is noncalcareous.

Representative profile, 93 feet south of the fence and 45 feet east of the gatepost in the NE¼NW¼ sec. 34, T. 5 N., R. 45 E., in a wet meadow pasture:

A11ca—0 to 2 inches, dark-gray (10YR 4/1) and gray (10YR 5/1), peaty silty clay loam, black (10YR 2/1) and very dark grayish brown (10YR 3/2) when moist; strong, very fine, granular structure, held together by a mat of roots; soft when dry, very friable when moist, and nonsticky and slightly plastic when wet; very strongly calcareous; mildly alkaline (pH 7.5); abrupt, wavy boundary.

A12ca—2 to 5 inches, light-gray (2.5Y 6/1) silty clay loam, dark gray (2.5Y 4/1) when moist; few, fine, distinct, light yellowish-brown (10YR 6/4) mottles, dark yellowish brown (10YR 4/4) when moist; weak, thin, platy structure parting to weak or moderate, very fine, granular structure; slightly hard when dry, firm when moist, and slightly sticky and slightly plastic when wet; very abundant roots; common very fine pores; extremely calcareous; moderately alkaline (pH 8.0); clear, smooth boundary.

C1ca—5 to 10 inches, light-gray (2.5Y 6/1) silty clay loam, dark gray (2.5Y 4/1) when moist; few, fine, distinct mottles as in A12ca; very weak, thin, platy structure parting to weak, fine, granular structure; hard when dry, firm when moist, slightly sticky and plastic when wet; very abundant roots; common very fine pores and few medium root channels; extremely calcareous; moderately alkaline (pH 8.0); abrupt, wavy boundary.

C2ca—10 to 13 inches, white (2.5Y 8/1) silty clay loam, light gray (5Y 6/1) when moist; in places, many, fine, prominent, light yellowish-brown (10YR 6/4) mottles around root channels, dark yellowish brown (10YR

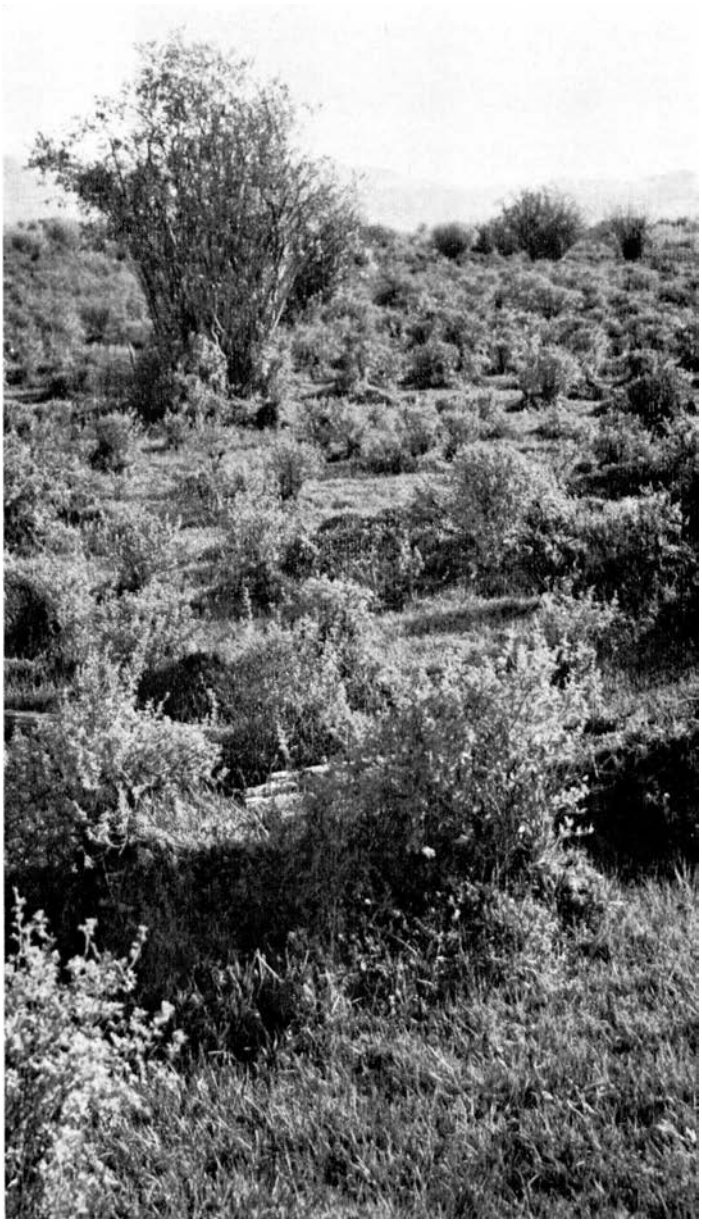

Figure 13.—**Landscape of Zohner soils. The hummocks around the shrubby cinquefoil plants are the result of livestock trampling.**

4/4) when moist; very weak, thin, platy structure parting to weak, very fine, granular structure; very hard or extremely hard when dry, firm when moist, and slightly sticky and plastic when wet; abundant roots; few very fine pores and medium root channels; extremely calcareous; moderately alkaline (pH 8.1); clear, irregular boundary.

C3cag—13 to 18 inches, light-gray (2.5Y 7/1) silty clay loam, dark gray (N 4/0) when moist; in places, few, fine, faint, olive-gray (5Y 4/2) mottles; very weak, very fine, angular blocky structure parting to weak, fine, granular structure; very hard when dry, firm when moist, and sticky and plastic when wet; abundant roots; few very fine pores; very strongly calcareous; mildly alkaline (pH 7.7); abrupt, wavy boundary.

C4cag—18 to 27 inches, clay loam; upper 3 inches light-gray (2.5Y 7/1) when dry and gray (N 5/0) when moist; rest of layer has many, medium, distinct, light yellowish-brown (2.5Y 6/4) and olive-yellow (2.5Y 6/6) mottles, and common, medium, prominent, yellowish-brown (10YR 5/6) mottles, olive brown (2.5Y 4/4) when moist; massive; very hard when dry, firm when moist, and sticky and plastic when wet; plentiful roots; dense; few, 2- to 5-millimeter, strongly cemented concretions of calcium carbonate; strongly calcareous; moderately alkaline (pH 7.9); few pebbles in lower part; clear, wavy boundary.

IIC5cag—27 to 39 inches, light-gray (5Y 6/1) gravelly coarse sandy loam, dark gray (5Y 4/1) when moist; many, large, faint, light olive-gray (5Y 6/2) mottles, gray to greenish-gray (10YR 5/1) when moist; common, medium, distinct, light yellowish-brown (2.5Y 6/4 when dry) mottles; common, medium, distinct, dark-brown (10YR 3/3 when moist) staining around roots; massive; very hard when dry, friable when moist, and sticky and plastic when wet; plentiful dead and few live roots; strongly calcareous; moderately alkaline (pH 7.9); clear, smooth boundary. Some granite pebbles are well decomposed.

IIIC6g—39 to 45 inches, light-gray (2.5Y 7/1) very gravelly loamy coarse sand, dark gray (2.5Y 4/1) when moist; single grain; loose when dry and when moist and nonsticky and nonplastic when wet; few roots; no lime coating on gravel; moderately calcareous; mildly alkaline (pH 7.8); some granite pebbles are well decomposed.

IVC7—45 inches, gravel and sand; single grain; loose when dry and when moist, nonsticky and nonplastic when wet; moderately calcareous.

In some places there are a few inches of organic material at the surface. Colors associated with wetness begin at a depth of less than 20 inches. The material below the A horizon is predominantly moderately fine textured. The carbonate content is extremely high in the upper part of the profile but decreases with depth. Gravel generally occurs at a depth of 36 to 72 inches.

This soil is poorly drained. It has moderately slow permeability in the silty clay loam horizons and very rapid permeability in the gravel. The available water capacity is high. The water table is at a depth of 1 to 2 feet most of the year, and it limits the growth of roots. The organic-matter content is very high. There is no erosion hazard.

Because of the high water table, this soil is used only for pasture and hay and for wildlife habitat. The streams and ponds provide feeding and nesting areas for waterfowl. (Capability unit Vw–1, dryland; Wet Meadow range site; not in a woodland group)

Zohner silty clay loam, moderately deep variant (0 to 1 percent slopes) (Zd).—This soil is on wet bottom land west of Driggs. It has a profile similar to that of Zohner silty clay loam, except that it is less than 36 inches in depth to loose gravel and sand.

This soil is used for pasture, hay, and waterfowl habitat. It can be drained more easily than Zohner silty clay loam. (Capability unit Vw–1, dryland; Wet Meadow range site; not in a woodland group)

Zufelt Series

The Zufelt series consists of somewhat poorly drained and poorly drained, medium-textured soils that formed in alluvium derived from granite, quartzite, gneiss, sandstone, and limestone material. The natural vegetation consisted of wiregrass, sedges, foxtail, willows, and other water-tolerant plants.

These soils occur as slight ridges and low knolls on the upper part of bottom land west of Tetonia. They are at an elevation of 5,800 to 6,200 feet and receive from 13 to 18

inches of precipitation annually. The mean annual temperature is 40° F., and there are about 65 days between killing frosts.

The surface layer is gray loam about 14 inches thick. It is underlain by light-gray loam to a depth of about 30 inches and then by a thin layer of white loam. Loose sand and gravel occur below the loam. The reaction is mildly to moderately alkaline.

Zufelt soils are associated with Furniss and Foxcreek soils.

Zufelt loam (0 to 2 percent slopes) (Ze).—Most of this soil is west of Tetonia. Included in mapping were small areas of soil that is moderately well drained, small areas of soil that is noncalcareous to a depth of 20 inches or more, and small areas of soil that has a fine sandy loam surface layer.

Representative profile, 100 feet south and 30 feet east of the northwest corner of the NE¼ sec. 30, T. 6 N., R. 45 E., in a pasture:

Ap—0 to 7 inches, gray (2.5Y 5/1) loam with very few, very fine pebbles, very dark gray (2.5Y 3/1) when moist; few to common, fine, distinct, light yellowish-brown (10YR 6/4) mottles (mostly around roots), brown to dark brown (10YR 4/3) when moist; weak, medium and thin, platy structure parting to weak, fine, granular structure; hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; plentiful fine and medium roots; common, very fine, tubular pores; slightly calcareous; mildly alkaline (pH 7.7); abrupt, smooth boundary.

A1—7 to 14 inches, gray (2.5Y 5/1) loam that contains a very few very fine pebbles, very dark gray (2.5Y 3/1) when moist; mottles similar to those in Ap; weak, medium and fine, subangular blocky structure parting to weak, very fine, granular structure; hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; plentiful fine and medium roots; many, very fine, tubular pores; very slightly calcareous; mildly alkaline (pH 7.6); clear, smooth boundary.

C1cag—14 to 22 inches, light-gray (2.5Y 7/1) loam, grayish brown (2.5Y 5/2) when moist; few, medium, distinct, yellowish-brown (10YR 5/6) mottles; weak, medium, subangular blocky structure parting to weak, thin and medium, platy structure; hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; plentiful fine roots and few medium roots; many, very fine, tubular pores; many lime splotches and veins; few firm nodules; strongly calcareous; mildly alkaline (pH 7.7); clear, smooth boundary.

C2cag—22 to 29 inches, light-gray (2.5Y 7/2) loam; grayish brown (2.5Y 5/2) when moist; few, medium, distinct, light yellowish-brown (10YR 6/4) mottles, dark yellowish brown (10YR 4/4) when moist; massive; hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; many, very fine, tubular pores; many lime veins and splotches; strongly calcareous; mildly alkaline (pH 7.7); clear, smooth boundary.

C3cag—29 to 33 inches, white (10YR 8/2) loam that contains some gravel, light brownish gray (2.5Y 6/2) when moist; common, coarse, prominent, light yellowish-brown (10YR 6/4) mottles, yellowish brown (10YR 5/6) when moist; massive; hard when dry, friable when moist, and slightly sticky and slightly plastic when wet; strongly calcareous; moderately alkaline (pH 7.9); clear, smooth boundary.

IIC4—33 inches, light yellowish-brown (2.5Y 6/3) sand and gravel, olive brown (2.5Y 4/3) when moist; single grain; loose when dry and nonsticky and nonplastic when wet; pebbles lime-coated on underside; moderately calcareous; moderately alkaline (pH 7.9).

A few pebbles occur throughout the profile. The depth to sand and gravel ranges from 30 to 48 inches.

This soil is somewhat poorly drained to poorly drained and has a fluctuating water table. It is moderately permeable above the gravel and very rapidly permeable in the gravel. The available water capacity is high. Roots can penetrate deeply, but the growth is limited by the water table. The organic-matter content is moderate, and natural fertility is moderate. There is no erosion hazard.

This soil is used mostly for pasture and hay. It can be cultivated occasionally for the purpose of establishing a new seeding of grasses and legumes. Because of the fluctuating water table, alfalfa does not grow well. (Capability unit IVw–1, irrigated; Dry Meadow range site; not in a woodland group)

Zufelt-Foxcreek loams (0 to 2 percent slopes) (Zf).—The largest areas of this complex are about 3 miles west of Tetonia. From 50 to 75 percent of any given area is Zufelt soil, and most of the rest is Foxcreek soil. The Zufelt soil is on very slight ridges and knolls, and the Foxcreek soil is in drainageways and swales.

These soils are used for pasture and hay. (Capability unit IVw–1, irrigated; Dry Meadow range site; not in a woodland group)

Zundell Series

The Zundell series consists of somewhat poorly drained, moderately fine textured soils that formed in alluvium from granite, gneiss, quartzite, limestone, sandstone, and other material. These soils are deep and moderately deep over sand and gravel. The natural vegetation consisted of sedges, rushes, foxtail, saltgrass, shrubby cinquefoil, and other water-tolerant plants.

These soils are on terraces or high bottom land. The largest areas are about 3 miles west of Driggs. The elevation ranges from 5,800 to 6,500 feet, and the annual precipitation ranges from 16 to 18 inches. The mean annual temperature is 39°F., and there are about 65 days between killing frosts.

Light-gray heavy silty clay loam extends from the surface to a depth of about 12 inches. This is underlain by light-gray silty clay loam that extends to a depth of about 30 inches and grades to white in the lower part. The substratum is commonly stratified gravelly silt loam. It is underlain by loose gravel and sand below a depth of 40 to 60 inches. The reaction is strongly alkaline in the upper 6 inches and moderately alkaline in the rest of the profile. The calcium carbonate content is 50 to 60 percent in the upper 24 inches and decreases with depth.

Zundell soils are associated with Zohner and Furniss soils.

Zundell silty clay loam (0 to 2 percent slopes) (Zu).—Most areas of this soil are about 3 miles west of Driggs. Included in mapping were small areas of soil that has a hardpan in the gravel layer and small areas of soil that is noncalcareous and poorly drained.

Representative profile, 40 feet west and 30 feet south of the fence corner at the northeast corner of the SE¼NE¼ sec. 30, T. 5 N., R. 45 E.:

Apca—0 to 6 inches, light-gray (2.5Y 7/1) heavy silty clay loam; gray (2.5Y 5/1) when moist; moderate, thin, platy structure parting to moderate, fine and very fine, granular structure; hard when dry, friable when moist, and sticky and slightly plastic when wet; abundant roots; very few pebbles; common fine pores;

very strongly calcareous; strongly alkaline (pH 8.6); clear, smooth boundary.

C1ca—6 to 12 inches, light-gray (2.5Y 7/2) heavy silty clay loam, grayish brown (2.5Y 5/2) when moist; very weak, thin and medium, platy structure parting to moderate, fine, granular structure; hard when dry, friable when moist, and sticky and plastic when wet; plentiful roots; very few pebbles; many fine and very fine pores; common medium root channels; very strongly calcareous; moderately alkaline (pH 8.2); clear, smooth boundary.

C2ca—12 to 17 inches, light-gray (2.5Y 7/1) silty clay loam, grayish brown (2.5Y 5/2) when moist; very weak, thick, platy structure parting to moderate, fine and very fine, granular structure; hard when dry, friable when moist, and sticky and plastic when wet; few roots; very few pebbles; many fine and very fine pores; common root channels; very strongly calcareous; moderately alkaline (pH 8.1); clear, smooth boundary.

C3ca—17 to 27 inches, white (2.5Y 8/1) silty clay loam, light brownish gray (2.5Y 6/2) when moist; very weak, coarse, prismatic structure parting to very weak, thick, platy structure, then to moderate, fine and very fine, granular structure; slightly hard when dry, friable when moist, and sticky and plastic when wet; few fine roots; very few pebbles in upper part and few in lower part; many fine and very fine pores and common medium pores; very strongly calcareous; moderately alkaline (pH 8.1); abrupt, wavy boundary.

IIC4ca—27 to 37 inches, light-gray (2.5Y 7/2) gravelly silt loam, grayish brown (2.5Y 5/2) when moist; weak, fine, granular structure; hard when dry, and friable when moist; few roots; common fine and very fine pores; many, very irregularly shaped, indurated lime nodules; strongly calcareous; moderately alkaline (pH 8.0); clear, wavy boundary.

IIC5cag—37 to 42 inches, pale-yellow (2.5Y 7/3) gravelly silt loam, light olive brown (2.5Y 5/3) when moist; many, coarse, faint, yellowish-brown (10YR 5/4) mottles and few, coarse, faint, dark grayish-brown (10YR 4/2) mottles; massive; very hard when dry, firm when moist, and slightly sticky and slightly plastic when wet; very few roots; common fine and very fine pores; strongly calcareous; moderately alkaline (pH 8.0); abrupt, broken boundary.

IIIC6ca—42 to 62 inches, pale-brown (10YR 6/3) very gravelly loamy coarse sand, dark brown (10YR 4/3) when moist; massive; soft when dry, very friable when moist, and nonsticky and nonplastic when wet; no roots; strongly calcareous; moderately alkaline (pH 8.1).

The Apca horizon has a color value of 5.5 to 7 when dry. The layers between a depth of 6 and 30 inches are mostly moderately fine textured. Mottles or other evidences of wetness are not present above a depth of 20 inches but are common from a depth of 20 to 42 inches. The profile is very strongly calcareous to strongly calcareous. The carbonate content of the upper horizons is as much as 50 to 60 percent. The depth to sand and gravel generally ranges from 40 to 60 inches.

This soil is somewhat poorly drained. It has moderately slow permeability in the upper part and very rapid permeability in the underlying sand and gravel. The water table is generally below a depth of 30 inches. The available water capacity is high. Roots can penetrate deeply, but the growth of some roots is limited by the water table. The organic-matter content is high. There is no erosion hazard.

Most areas are used for hay and pasture. Small areas are used for grain. (Capability unit IVw–2, irrigated; Dry Meadow range site; not in a woodland group)

Management of the Soils for Crops

In this section the soils are grouped according to their suitability for crops. The system of capability grouping is explained and outlined. The capability units are then described, and suggestions are given for the management of the soils.

Following the capability unit descriptions, estimated yields of the principal crops are given for two levels of management.

Capability Groups of Soils

Capability classification is the grouping of soils to show, in a general way, their suitability for most kinds of farming. It is a practical classification based on limitations of the soils, the risk of damage when they are used, and the way they respond to treatment. The classification does not apply to soils used for most horticultural crops, for rice, or for other crops that have special requirements. The soils are classified according to degree and kind of permanent limitation, but without consideration of major and generally expensive land-forming that would change the slope, depth, or other characteristics of the soils, and without consideration of possible but unlikely major reclamation projects.

In the capability system, all kinds of soils are grouped at three levels, the capability class, the subclass, and the unit.

Capability Classes, the broadest grouping, 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 that have few limitations that restrict their use. (No class I soils in the Teton Area.)

Class II. Soils that have some limitations that reduce the choice of plants or require moderate conservation practices. (No class II soils in the Teton Area.)

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

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

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

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

Class VII. Soils that have very severe limitations that make them unsuitable for cultivation and that restrict their use largely to grazing, woodland, or wildlife.

Class VIII. Soils and landforms that have limitations that preclude their use for commercial plant 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, IIIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is too cold or too dry.

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

CAPABILITY UNITS are soil groups within the subclass. 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. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIIe–1 or IVe–4. 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 the subclass.

In the Teton Area, both dryfarming and irrigated farming are practiced, and the capability units are designated as irrigated or dryland. Soils that are both irrigated and used as dryland are placed in two capability units. For example, Felt loam, 0 to 2 percent slopes, is in capability unit IIIs–1, irrigated, and IVs–4, dryland.

Capability units are generally identified by numbers assigned locally and are part of a statewide, or larger, system. Because the soils of the Teton Area are not representative of all the units in the system used by Idaho and Wyoming, the capability units in this survey are not numbered consecutively.

Capability unit IIIe–1, irrigated

This capability unit consists of very gently sloping, well-drained, deep and very deep soils that are loam or silt loam in texture and are moderately susceptible to erosion if irrigated.

These soils are easy to cultivate. They have a high or very high available water capacity and moderate to high natural fertility. Permeability generally is moderate but is moderately slow in some areas.

There are 70 to 80 days between killing frosts.

Alfalfa and grass hay, small grains, potatoes, and peas are the main crops grown on these soils. Most of the potatoes are grown for seed because the growing season usually is not long enough for them to mature.

These soils are irrigated by the corrugation, furrow, or sprinkler method or by controlled flooding. Some leveling or smoothing is generally necessary. In most places the slopes are not uniform enough to permit leveling for border irrigation. Deep cuts can be made without long time harmful effects if large amounts of barnyard manure and phosphorus are applied where the calcareous subsoil is exposed. Careful attention to the length and direction of irrigation runs is needed. Field ditches ought to have a nonerosive grade.

Capability unit IIIe–2, irrigated

This capability unit consists of very gently sloping, well-drained, moderately deep soils that are silt loam or loam in texture and are moderately susceptible to erosion if irrigated. Because sand and gravel are at a depth of only 20 to 40 inches, leaching is a hazard.

These soils are easy to work and can be cultivated throughout a fairly wide range of moisture content. The available water capacity and natural fertility are moderate. Permeability is moderate.

There are about 80 days between killing frosts.

Wheat, barley, potatoes, and peas and alfalfa and grass hay are the main crops. Potatoes are grown for seed because the growing season is often not long enough for them to mature.

Hay and grain crops are irrigated by controlled flooding or by the corrugation or sprinkler method. Row crops are irrigated by the furrow or sprinkler method. Because of the hazards of erosion and leaching, it is important to plan the length and direction of irrigation runs and the length of time irrigation water remains on the field. If leveling or smoothing is necessary, only shallow cuts are advisable, because gravel and sand are so near the surface. The slopes are generally not uniform enough to permit leveling for border irrigation.

Capability unit IIIe–3, irrigated

This capability unit consists of gently sloping, well-drained, very deep soils that are silt loam in texture and are severely susceptible to erosion.

These soils are easy to cultivate and can be worked throughout a fairly wide range of moisture content. They have a high available water capacity and high natural fertility and are moderately permeable.

There are 70 to 80 days between killing frosts.

Alfalfa and grass hay, small grains, and potatoes are the principal crops grown. Potatoes are generally grown for seed because the growing season is not long enough for them to mature.

Close-growing crops can be irrigated by the corrugation method or by controlled flooding. Proper spacing and grading of irrigation ditches are necessary for uniform application of water and for control of erosion. The slopes are generally too steep and irregular to be leveled, but some smoothing may facilitate irrigation. If the furrow system is used, laying out the furrows on the contour helps to control erosion. Sprinkler irrigation is suitable.

Growing grasses, legumes, and other soil-improving crops at least half the time, making use of all crop residue, and adding barnyard manure are means of maintaining the organic-matter content and maintaining or improving soil structure.

Alfalfa generally responds to phosphorus. Nonleguminous crops respond to nitrogen if alfalfa has not been

grown regularly in the cropping system or a heavy grain stubble has been plowed under.

Capability unit IIIe–4, dryland

This capability unit consists of well-drained, undulating and rolling soils that are deep or very deep and have a loam or silt loam texture. These soils are moderately susceptible to erosion.

The available water capacity is high, and natural fertility is high. The organic-matter content is moderate to high. The water intake rate and permeability are moderate.

The annual precipitation ranges from 13 to 18 inches. There are about 80 days between killing frosts.

Winter wheat, in a grain-fallow cropping system, is the principal crop. Some spring wheat and barley are grown after fallow, and small amounts of alfalfa and grass are also grown. The alfalfa is used mainly for hay, and the grass for seed or pasture.

Soil structure can be maintained and moisture conserved by keeping tillage to the minimum necessary to control weeds and to prepare a seedbed. Alfalfa, sweetclover, vetch, and many grasses can be grown in rotation with grain to improve soil structure and to supply organic matter. Stubble mulching, chiseling, subsoiling, and tilling on the contour or across the slope are means of controlling erosion.

Capability unit IIIe–5, irrigated

This capability unit consists of gently sloping, well-drained, moderately deep soils that are silt loam or loam in texture. These soils are underlain by gravel at a depth of 20 to 40 inches. The erosion hazard is very severe if they are irrigated.

The available water capacity and permeability are moderate. Natural fertility and the organic-matter content are moderate.

There are about 80 days between killing frosts.

Alfalfa and grass hay, small grains, and potatoes are the main crops. The potatoes are generally grown for seed because the growing season often is not long enough for them to mature.

Sprinkler irrigation is suitable if the fields are large enough. Close-growing crops can be irrigated by the corrugation method or by controlled flooding. Contour furrow irrigation is suitable for row crops because it is not so erosive as other systems. Some smoothing would facilitate irrigation, but the slopes are generally too steep and irregular to be leveled for border irrigation. Care is needed to avoid cutting into the underlying gravel. Field ditches ought to be spaced and graded for uniform application of water and for control of erosion. Excessive irrigation leaches plant nutrients from these soils.

Fertility, soil structure, and organic-matter content can be maintained by growing grass and legume hay and pasture one-half or two-thirds of the time, by applying barnyard manure, and by returning crop residue to the soil.

Alfalfa generally responds to phosphorus, and nonleguminous crops respond to nitrogen, especially if alfalfa has not been grown regularly or if heavy grain stubble has been plowed under.

Capability unit IIIe–49, dryland

This capability unit consists of strongly sloping, well-drained, very deep and deep silt loams. The erosion hazard is moderate to severe.

Permeability is moderate, the available water capacity is very high, and the organic-matter content is moderate to high. The natural fertility is high.

The annual precipitation ranges from 13 to 18 inches, and there are about 80 days between killing frosts.

These soils are used mostly for winter wheat in a grain-fallow cropping system. Some spring wheat and barley are grown following fallow, and some alfalfa and grass are grown for hay and pasture.

Growing alfalfa, sweetclover, vetch, grass, and other soil-improving crops in rotation with grain and fallow maintains fertility, improves soil structure, and supplies organic matter. Keeping tillage to the minimum required to prepare a seedbed and control weeds conserves moisture and maintains soil structure. Stubble mulching supplies organic matter and helps to control erosion. Constructing water diversions, tilling on the contour, and chiseling or rotary subsoiling also are means of controlling erosion. Most of the slopes are too short for stripcropping.

Crops grown on these soils have shown no significant response to fertilizer, but application of nitrogen may increase the protein content of crops.

Capability unit IIIw–1, irrigated

This capability unit consists of deep and very deep, somewhat poorly drained loams and silt loams that have a fluctuating water table.

These soils are easy to cultivate. They have a high available water capacity and moderate to slow permeability. The organic-matter content is high, and the natural fertility is moderate to moderately high. The erosion hazard is generally slight but is moderate on the steeper slopes.

There are about 70 days between killing frosts.

Small grains and grass and clover hay are the main crops. Because of the seasonal high water table, alfalfa does not grow well on these soils.

Hay and grain crops are generally irrigated by the corrugation method or by controlled or wild flooding.

Growing legumes, grasses, and other soil-building crops at least half of the time, making use of crop residue, and applying barnyard manure are means of controlling erosion, maintaining organic-matter content, and maintaining soil structure.

Carefully planned drainage and irrigation help to control the water table on these soils.

Capability unit IIIw–4, dryland

This capability unit consists of somewhat poorly drained, deep and very deep soils of silt loam and loam texture. These soils have a fluctuating water table. The hazard of erosion is slight.

The available water capacity is high, and fertility is moderate or moderately high. Permeability is moderate to slow. The organic-matter content is high.

The annual precipitation ranges from 15 to 20 inches, and there are about 70 days between killing frosts.

These soils are used chiefly for hay, pasture, and small grains. They are suited to several improved varieties of

grasses and legumes. Because of the high water table, alfalfa generally does not grow well and is short lived.

Possibly the water table can be controlled, so that crops that require better drainage can be grown.

Capability unit IIIs–1, irrigated

This capability unit consists of nearly level, moderately deep, well-drained soils of silt loam or loam texture. Sand and gravel are at a depth of 20 to 40 inches. The erosion hazard is slight.

These soils are easy to cultivate and can be worked throughout a wide range of moisture content. They have moderate available water capacity and moderate permeability, and they contain a moderate amount of organic matter. Natural fertility is moderate.

There are about 80 days between killing frosts.

Alfalfa and grass, small grains, potatoes, and peas are the main crops. Alfalfa and grass are grown primarily for hay. Most of the potatoes are grown for seed. The growing season is not long enough for them to mature.

Frequent irrigation is required, and the system should have small heads and short runs. On irregular slopes hay and grain are irrigated by wild flooding, by controlled flooding, or by the sprinkler or corrugation method. On uniform slopes hay and grain are irrigated by the border system. Wild flooding generally wastes water and does not wet the soil uniformly. The length of runs should be planned so that the field will be wet to a uniform depth. Leveling or smoothing is necessary to prepare some fields, and leveling is necessary for border irrigation. Shallow cuts are advisable to avoid cutting into the sand and gravel. Leaching is a hazard if irrigation is excessive.

The organic-matter content can be maintained, erosion controlled, and soil structure maintained by growing legumes, grasses, and other soil-improving crops at least half the time, by making use of crop residue, and by applying barnyard manure.

Alfalfa generally responds to phosphorus, and nonleguminous crops respond to nitrogen, especially if alfalfa has not been grown regularly or a heavy grain stubble has been plowed under.

Capability unit IIIc–1, irrigated

This capability unit consists of nearly level, well-drained, deep and very deep soils that are silt loam or loam in texture and are slightly susceptible to erosion.

These soils are easy to cultivate. They are high in available water capacity and are moderate to high in natural fertility. Organic-matter content is moderate. Permeability is generally moderate but is moderately slow in some places.

There are about 80 days between killing frosts.

Alfalfa and grass hay, small grains, potatoes, and peas are the main crops grown. The potatoes are generally grown for seed because the growing season often is not long enough for them to mature.

Row crops are generally irrigated by the furrow method. Hay and grain crops on irregular slopes are irrigated by the corrugation or sprinkler method or by wild flooding or controlled flooding. Wild flooding generally wastes water and does not wet the field evenly. Hay and grain crops on uniform slopes are irrigated by the border method. The length of irrigation runs should be planned so that the field will be wet to a uniform depth. Leveling or smoothing is necessary to prepare some fields for irrigation, and leveling is required for border irrigation. Care should be taken to avoid cutting into the calcareous layer. If this layer is exposed, heavy applications of barnyard manure and phosphate are needed to maintain normal production. Leaching is a hazard if the shallower soils are excessively irrigated.

Growing legumes, grasses, and other soil-building crops at least half the time, making use of crop residue, and applying barnyard manure are means of controlling erosion and of maintaining organic-matter content and soil structure.

Alfalfa generally responds to phosphorus. Nonleguminous crops respond to nitrogen, especially if alfalfa has not been grown regularly in the cropping system or a heavy grain stubble has been plowed under.

Capability unit IIIc–4, dryland

This capability unit consists of level to gently undulating, well-drained soils that are deep or very deep and have a silt loam or loam texture. The hazard of erosion is slight.

These soils have moderate permeability and water intake rate. The available water capacity is high or very high. The organic-matter content is moderate to high, and natural fertility is moderately high or high.

The annual precipitation ranges from 13 to 18 inches, and there are about 80 days between killing frosts.

Winter wheat in a grain-fallow cropping system is the main crop. Some spring wheat and barley are grown after fallow, and small amounts of alfalfa and grass are grown. The alfalfa is grown mainly for hay, and the grass for seed or pasture.

Stubble mulching supplies organic matter and helps to control erosion. Keeping tillage to the minimum required to prepare a seedbed and control weeds is a way of conserving moisture and maintaining soil structure. Tilling on the contour and fall chiseling or rotary subsoiling to a depth of 8 to 10 inches in the stubble are means of conserving moisture and controlling erosion. Growing alfalfa, sweetclover, vetch, grass, and other soil-improving crops in rotation with grain and fallow improves soil structure and supplies organic matter.

Crops have shown no significant response to fertilizer, except in years of high precipitation, but they generally have shown an increase in protein content after application of nitrogen.

Capability unit IVe–1, irrigated

Driggs gravelly loam, 2 to 4 percent slopes, is the only soil in this capability unit. It is a well-drained soil underlain by sand and gravel at a depth of 20 to 28 inches. The surface layer is about 25 percent gravel. The gravel interferes with cultivation and harvesting, and the erosion hazard is moderate.

The available water capacity is low to moderate, and permeability is moderate. Fertility and the organic-matter content are moderate.

There are about 80 days between killing frosts.

Alfalfa and grass hay and small grains are the main crops. Small grains can be grown about one-fourth of the

time. Although most row crops are not suitable, potatoes and peas can be grown if an adequate sprinkler system is established.

This soil can be irrigated by the corrugation or sprinkler method or by controlled flooding. It is not suited to border or furrow irrigation. Field ditches ought to be properly spaced and graded for uniform application of water.

Alfalfa responds to phosphorus, and nonleguminous crops respond to nitrogen if alfalfa has not been grown regularly or a heavy grain stubble has been plowed down.

Capability unit IVe–2, irrigated

This capability unit consists of strongly sloping, well-drained, deep or very deep silt loams. The erosion hazard is very severe.

The available water capacity is very high, and natural fertility is high. The organic-matter content is moderate to high. Permeability is moderate.

There are 70 to 80 days between killing frosts.

Alfalfa and grass hay and small grains are the main crops. Small grains can be grown about one-fourth of the time. Most row crops are not suitable, although potatoes and peas can be grown if an adequate sprinkler system is established.

These soils can be irrigated by the corrugation or sprinkler method or by controlled flooding. They are not suited to border or furrow irrigation. Proper spacing and grading of field ditches are necessary for uniform application of water.

There is a phosphorus deficiency in these soils, and there is a nitrogen deficiency for nonlegumes if alfalfa has not been grown regularly or a heavy grain stubble has been plowed down.

Capability unit IVe–4, dryland

This capability unit consists of strongly sloping to hilly, well-drained, moderately deep to very deep silt loams. The hazard of erosion is severe.

The available water capacity is moderate to very high. The organic-matter content and natural fertility are high. Permeability is moderate or moderately slow.

The annual precipitation ranges from 15 to 20 inches, and there are 70 to 80 days between killing frosts.

Most of the areas are used for wheat in a grain-fallow system. Some are used for spring wheat and barley after fallow, and small areas are used for alfalfa and grass hay, seed, or pasture. A few areas are in native vegetation and are used for range.

Soil structure can be maintained and moisture conserved by keeping tillage to the minimum necessary to prepare a seedbed and control weeds. Soil structure and organic-matter content can also be maintained by growing alfalfa, sweetclover, vetch, grass, and other soil-improving crops. Stubble mulching supplies organic matter and helps to control erosion.

Capability unit IVe–45, dryland

This capability unit consists of undulating to strongly rolling, well-drained, deep and very deep silt loams. The erosion hazard is moderate to severe because these soils are subject to early thawing while they are still frozen below the surface.

The available water capacity is high or very high, permeability is moderate, and the organic-matter content is moderate or moderately low. Natural fertility is moderately high or high.

The annual precipitation ranges from 12 to 16 inches, and there are about 80 to 85 days between killing frosts.

Winter wheat in a grain-fallow system is the main crop. Spring wheat and barley and a small acreage of alfalfa and grass are also grown. The alfalfa is used mainly for hay, and the grass for seed and pasture. These soils are suited to grass and legumes for hay and pasture and to an occasional grain crop.

Stubble mulching, tilling on the contour, and fall chiseling or rotary subsoiling are ways of controlling erosion. In addition, erosion can be controlled, soil structure maintained, and moisture conserved by keeping tillage to the minimum necessary to prepare a seedbed and control weeds.

Capability unit IVe–47, dryland

This capability unit consists of level to rolling, well-drained, moderately deep silt loams. These soils are underlain by bedrock at a depth of 20 to 40 inches. The hazard of erosion is severe.

The available water capacity and permeability are moderate. The organic-matter content is moderate to high, and natural fertility is high.

The annual precipitation ranges from 12 to 18 inches, and there are about 80 days between killing frosts.

Winter wheat in a grain-fallow system is the main crop. Spring wheat and barley are grown following fallow. Small acreages of alfalfa and grass are grown—the alfalfa mainly for hay and the grass for seed or pasture.

Most of the slopes are long and gentle and are suited to stripcropping, which helps to control erosion (fig. 14). Chiseling, fall seeding, and tilling on the contour also are means of controlling erosion. Stubble mulching supplies organic matter and helps to control erosion. Keeping tillage to the minimum required to prepare a seedbed and control weeds conserves moisture and maintains soil structure. Growing alfalfa, sweetclover, vetch, and grass in rotation with grain and fallow improves soil structure and supplies organic matter.

Crops grown on these soils show no significant response to fertilizer, but they generally show an increase in protein content after application of nitrogen.

Capability unit IVe–74, dryland

This capability unit consists of gently sloping to moderately sloping, well-drained soils of silt loam or loam texture. These soils are generally underlain by gravel at a depth of 20 to 40 inches, but there is a small acreage in which gravel is at a depth of more than 5 feet. The hazard of erosion is moderate.

Permeability is moderate or moderately slow in the subsoil and very rapid in the gravel. The available water capacity is moderate to very high. The organic-matter content and fertility are moderate. Good tilth is easy to maintain.

The annual precipitation ranges from 13 to 18 inches, and there are about 80 days between killing frosts.

These soils are used mostly for pasture or for winter wheat in a grain-fallow cropping system. Some spring wheat and barley are grown following fallow.

Keeping tillage to the minimum necessary to prepare a seedbed and control weeds conserves moisture and main-

Figure 14.—**Stripcropping on Ard and Karlan silt loams. These soils have a slope range of 0 to 12 percent and are in capability unit IVe–47.**

tains soil structure. Stubble mulching supplies organic matter and helps to control erosion. Fall chiseling or rotary subsoiling and tilling on the contour or across the slope are also means of conserving moisture and controlling erosion.

Capability unit IVe–93, dryland

Turnerville silt loam, 4 to 12 percent slopes, is the only soil in this capability unit. This soil is very deep, has a silty clay loam subsoil, and is well drained. It is moderately susceptible to erosion if cultivated.

The organic-matter content and natural fertility are low. The available water capacity is very high. Permeability is moderate in the surface layer and moderately slow in the subsoil.

The annual precipitation ranges from 20 to 28 inches, and there are about 60 days between killing frosts.

Most of the acreage is range and woodland. A small acreage is used for barley. This soil is suitable for grass and legume hay and pasture and for an occasional grain crop. It is also suitable for timber and range.

Stubble mulching, tilling on the contour, and fall chiseling or rotary subsoiling are ways of controlling erosion.

Crops respond to nitrogen and phosphorus.

Capability unit IVw–1, irrigated

This capability unit consists of somewhat poorly drained to poorly drained, moderately deep to deep soils that are loam or gravelly loam in texture and have a fluctuating water table. The erosion hazard is none or only slight.

There are 65 to 70 days between killing frosts.

These soils are planted mostly to grass for hay and pasture. They are suited to a number of grasses and legumes, except alfalfa, and are productive of the improved varieties. Alfalfa grows poorly and is short lived. A grain crop, generally oats, is grown occasionally for a year or 2 to condition the soils for reseeding to pasture.

Possibly the water table can be controlled in some places so that other crops can be grown.

These soils are irrigated only part of the year.

Capability unit IVw–2, irrigated

This capability unit consists of moderately deep to very deep, somewhat poorly drained to poorly drained silty clay loams that have a fluctuating water table. The hazard of erosion is none to slight.

The available water capacity, fertility, and organic-matter content are high. Permeability is moderately slow.

There are 65 to 70 days between killing frosts.

These soils are used mostly for hay and pasture. They are suited to a number of improved grasses and clovers that provide better forage than the native grasses. Because of the high water table, alfalfa does not grow well. Areas that are high in lime content are better suited to salt-tolerant grasses and legumes. Some areas are planted to grain occasionally to prepare for the reseeding of grasses and legumes.

Because these soils are moderately fine textured, they are difficult to cultivate and prepare for seeding. They dry out slowly in spring. The time of cultivation must be carefully selected to avoid puddling and clodding. Possibly some areas can be drained.

These soils are generally irrigated only part of the year. The irrigation must be carefully managed to conserve water and improve the yields and quality of forage.

Capability unit IVw–3, dryland

This capability unit consists of shallow to deep, well-drained to poorly drained soils of loam and gravelly loam texture. These soils are subject to flooding for short periods in spring and early in summer. The range of slope is 0 to 4 percent. The erosion hazard is slight under native vegetation but severe or very severe if the vegetation is removed.

Permeability is moderate. The available water capacity is low to high, and fertility is moderately low or moderate. The organic-matter content is moderate to high.

The annual precipitation ranges from 13 to 22 inches. There are 70 to 80 days between killing frosts.

These soils are used for grazing and, to some extent, for woodland. They provide habitat and seasonal migration lanes for big game animals. Some of the areas that are least likely to be flooded are used for hay. A grain crop is grown occasionally, before an area is seeded to grass and legumes.

These soils are generally dry during the summer and fall, but they are channeled and cannot be irrigated successfully without considerable leveling. If the floodwaters could be diverted or controlled, these soils could be leveled and irrigated.

Capability unit IVs–1, irrigated

This capability unit consists of somewhat excessively drained, nearly level, channeled soils of loam and gravelly loam texture. These soils are underlain by gravel at a depth of 5 to 20 inches. There is a slight to severe hazard of erosion.

The available water capacity is low, and fertility is moderately low. The organic-matter content is moderate. Permeability is moderate in the soil but very rapid in the underlying gravel.

There are about 75 days between killing frosts.

These soils are suited to legumes and grasses for hay and pasture and to an occasional grain crop.

Because of the limited depth to gravel, frequent light irrigation is necessary to conserve water and avoid leaching. Most areas are irrigated by flooding. Some of the level areas are irrigated by the corrugation method. Uniform application of water is generally difficult. If row crops are grown, furrow irrigation is used. Sprinklers are suitable if they are economically feasible. In most places the surface is uneven, and care is needed in leveling to avoid cutting into the underlying gravel.

Crops generally respond to light applications of nitrogen and phosphorus.

Capability unit IVs–2, irrigated

This capability unit consists of nearly level, well-drained, moderately deep soils of gravelly and cobbly loam texture. These soils are slightly susceptible to erosion. They are underlain by layers of sand and gravel at a depth of 20 to 28 inches.

The available water capacity is low to moderate. The organic-matter content, fertility, and permeability are moderate.

There are about 80 days between killing frosts.

Alfalfa and grass, small grains, and potatoes are the main crops. The alfalfa and grass are grown primarily for hay. Most of the potatoes are grown for seed because the growing season usually is not long enough for them to mature.

If the slopes are irregular, hay and grain crops are irrigated by wild or controlled flooding or by the sprinkler or corrugation method. Wild flooding generally wastes water and does not wet the fields uniformly. If the slopes are regular, these crops are irrigated by the border method. Row crops are generally irrigated by the furrow method.

The length of irrigation runs must be planned so that fields will be wet to a uniform depth. Leveling or smoothing may be needed, and leveling is necessary for border irrigation. Care should be taken to avoid cutting into the underlying gravel. Excessive irrigation leaches plant nutrients from these soils, especially from the shallower ones.

Growing legumes, grasses, and other soil-improving crops for hay and pasture and making use of crop residue and barnyard manure are ways of supplying organic matter and maintaining soil structure.

The gravel and cobblestones interfere with cultivation. In some places they prohibit the use of mechanical potato harvesters.

Alfalfa generally responds to phosphorus. Nonleguminous crops respond to nitrogen, especially if alfalfa has not been grown regularly or a heavy grain stubble has been plowed under.

Capability unit IVs–4, dryland

This capability unit consists of well-drained, level to very gently sloping, moderately deep soils of silt loam or loam texture. They are underlain by gravel at a depth of 20 to 40 inches. The erosion hazard is slight.

These soils are easy to cultivate. They have a moderate available water capacity. They are moderately permeable in the subsoil and very rapidly permeable in the gravel. The organic-matter content and fertility are moderate.

The annual precipitation ranges from 13 to 18 inches, and there are about 80 days between killing frosts.

Winter wheat in a grain-fallow system is the main crop. Some spring wheat and barley are grown after fallow, and a small amount of alfalfa and grass is grown for hay and pasture. These soils are suited to grass and legumes for hay and pasture and to an occasional grain crop.

Keeping tillage to the minimum necessary to control weeds and prepare a seedbed is a means of maintaining soil structure and conserving moisture. Fall chiseling or rotary subsoiling in the stubble also conserves moisture and helps to control erosion. Stubble mulching supplies organic matter and helps to control erosion.

Crops grown on these soils show no significant response to fertilizer.

Capability unit IVc–1, dryland

This capability unit consists of well-drained, level and very gently sloping, deep and very deep silt loams that have a silty clay loam subsoil. These soils have a higher clay content than other cultivated soils of the Area, and they are also susceptible to frost. The hazard of erosion is slight.

Permeability is moderately slow in the subsoil and very rapid in the gravel. The available water capacity is high or very high, and the organic-matter content and natural fertility are moderate.

The annual precipitation ranges from 13 to 16 inches. There are about 80 days between killing frosts.

Winter wheat in a grain-fallow system is the main crop. Some spring wheat and barley are grown following fallow, and a small amount of alfalfa and grass is grown for hay and pasture.

These soils dry out slowly and tend to clod if worked when wet. Working them at the proper moisture content is necessary to maintain good tilth. Stubble mulching supplies organic matter, helps to control erosion, and increases the water intake rate and the available water capacity. Fall chiseling or rotary subsoiling in the stubble is a way of conserving moisture and controlling erosion. All tillage should be on the contour or across the slope.

Capability unit Vw–1, dryland

This capability unit consists of poorly drained and very poorly drained, nearly level soils that have a water table at or near the surface most of the time. Most of these soils are silty clay loams, but peat and muck soils are included. There is little or no erosion hazard.

The available water capacity is moderate to very high, and fertility is moderately low to high. Permeability is slow or moderately slow. Very few roots penetrate below a depth of 36 inches. The organic-matter content is high or very high.

The annual precipitation ranges from 13 to 20 inches, and there are 60 to 80 days between killing frosts.

These soils are used for native pasture and hay. Introducing improved grasses improves the quality of hay and pasture. Controlling the water table may be feasible in some areas. Crops respond to nitrogen.

Capability unit VIe–2, dryland

This capability unit consists of well-drained, gently sloping to steep silt loams and stony loams. These soils are moderately deep and deep. The hazard of erosion is severe to very severe.

Permeability is moderate or moderately slow. The available water capacity, natural fertility, and organic-matter content are moderate to high.

The annual precipitation ranges from 12 to 22 inches, and there are 60 to 80 days between killing frosts.

These soils are used for range, forestry, wildlife habitat, and water supply. They are suitable for reseeding, fertilizing, and other practices that increase forage production.

Capability unit VIe–3, dryland

This unit consists of well-drained, strongly sloping to moderately steep silt loams that are deep or very deep and are stony in places. These soils have a fine textured or moderately fine textured subsoil. The hazard of erosion is severe.

Permeability is slow or moderately slow. The available water capacity is high, and the natural fertility is moderately low or low. The organic-matter content is low.

The annual precipitation ranges from 20 to 28 inches, and there are only about 60 days between killing frosts.

These soils are used for forestry, range, and wildlife habitat. They are suitable for reseeding, fertilization, and other practices that increase forage production.

Capability unit VIe–4, dryland

This unit consists of deep and very deep, strongly sloping and moderately steep soils that are eroded to severely eroded. The hazard of further erosion is very severe.

These soils are moderately permeable and have a high available water capacity. They are low or moderately low in organic-matter content.

The annual precipitation is 12 to 15 inches, and there are about 85 days between killing frosts.

Most of the acreage is used for grazing. Some of it is used for wheat and barley. These soils are suitable for reseeding, fertilizing, and other practices that increase forage production.

Capability unit VIs–4, dryland

This capability unit consists of moderately well drained to somewhat excessively drained, level to strongly sloping loams that are gravelly, cobbly, or stony. These soils are underlain by gravel or bedrock at a depth of 5 to 40 inches. The hazard of erosion is slight to severe.

The permeability is moderate, and the available water capacity is moderate to very low. The natural fertility is moderately low to moderate. The organic-matter content is moderately low to high.

The annual precipitation ranges from 12 to 22 inches, and there are about 75 to 85 days between killing frosts.

These soils are used mainly for grazing, although small areas are dryfarmed with adjoining soils. Reseeding, fertilizing, and other practices can be used to increase forage production.

Capability unit VIIe–1, dryland

This capability unit consists of well-drained, steep and very steep silt loams and stony loams. These soils are underlain by bedrock at a depth of 20 inches to more than 60 inches. The erosion hazard is moderate to very severe.

Permeability is slow to moderate. The available water capacity is very low to very high, and natural fertility is moderately low to high. The organic-matter content is low to high.

The annual precipitation ranges from 12 to 28 inches, and there are 60 to 85 days between killing frosts.

These soils are used for range and woodland and for wildlife habitat. Reseeding, brush clearing, and other range management practices are impractical.

Capability unit VIIs–1, dryland

This capability unit consists of well-drained, strongly sloping to very steep, very stony and extremely stony soils that are mostly loam in texture. These soils are underlain by bedrock at a depth of 10 to 60 inches. The hazard of erosion is moderate to very severe.

Permeability is moderate to slow, and the available water capacity is very low to high. The organic-matter content is low to high, and natural fertility is low to high.

The annual precipitation ranges from 12 to 25 inches, and there are 60 to 85 days between killing frost.

These soils are used for range and woodland and for wildlife habitat. They are not suitable for reseeding, brush clearing, and other range management practices.

Capability unit VIIIw–1, dryland

This capability unit consists only of Marsh, a land type that is covered with water most of the time. It can be used as a habitat for wildlife.

Capability unit VIIIs–1, dryland

This capability unit consists only of Rock land, a steep, stony, rocky land type that is suitable mainly for recreation purposes or for wildlife habitat.

Estimated Yields

Table 2 gives estimates of yields of the principal crops, irrigated and dryfarmed, that can be obtained under two levels of management. These estimates are based on observations of soil scientists who surveyed the Area and on information from farmers and from the county agricultural extension agent, as well as on data from the Tetonia Branch Experiment Station, from the Agricultural Conservation and Stabilization Service, and from the 1959 U.S. Census of Agriculture. Soils that generally are not used for or suited to crops are not included in the table.

The yields of irrigated crops in columns A are estimated on the basis of management most common in the Area. Under this level of management, no regular cropping system is followed. Alfalfa hay is generally grown for 8 to 10 years and allowed to return to grass. Potatoes and grain are alternated for 3 to 5 years. Little or no fertilizer is used. Irrigation water is generally inadequate after the first or second week in July. Hay is irrigated twice by wild flooding, once early in the season and again about July 1. Grain is irrigated twice, generally by wild flooding. Potatoes are generally irrigated as they need water. The length of the irrigation run is variable.

Some farmers obtain higher yields of irrigated crops, as shown in columns B. To obtain these yields, a systematic cropping system is followed. Alfalfa and grass or some other hay crop is grown for 3 or 4 years, potatoes or another row crop for 1 year, grain for 1 year, then potatoes another year, followed by grain and a new seeding of alfalfa and grass. Fertilizer is applied according to needs determined by soil tests. For potatoes, generally 70 to 80 pounds of available nitrogen is applied, and 35 to 40 pounds of available phosphorus. If barnyard manure is applied, applications of commercial fertilizer are reduced accordingly. Fields are smoothed or leveled for irrigation, and the length of run is controlled to get uniform wetting of the fields. Although irrigation water generally is inadequate after the first or second week of July, alfalfa and grain are irrigated twice by the border or corrugation system or by controlled flooding. Potatoes are irrigated whenever they need water. Irrigation ditches are on the contour. Weeds are controlled.

About the same varieties of irrigated crops are grown under both levels of management. Ranger, Vernal, and Lahontan are the most common varieties of alfalfa grown, and Lemhi 53 is the most common variety of wheat. Gem is the most common variety of barley. Most of the potatoes are Russets. Meadow hay is improved mostly by renovation of wild hayland, seeding of improved grasses and legumes, application of nitrogen, and better management of water. Meadow foxtail, creeping meadow foxtail, timothy, and reed canarygrass are the improved grasses most commonly used, and alsike clover and red clover are the improved legumes.

The yields of dryfarmed crops in columns A are estimated on the basis of management most common in the Area. This management generally consists of a grain-fallow cropping system, stubble-mulch tillage during the fallow year, and seeding of winter wheat early in September.

Yields of dryfarmed crops shown in columns B are also obtained by use of a grain-fallow cropping system and by stubble-mulch tillage during the fallow year. The stubble fields are chiselled or rotary subsoiled to a depth of 8 to 10 inches. Fields are tilled during the fallow year only enough to control weeds, and all tillage is on the contour or across the slope if possible. Ard, Karlan, and other soils that have long enough slopes are stripcropped. Winter wheat is seeded about the end of the third week in August. Alfalfa is rotary subsoiled in the fall, and the mounds caused by this operation are smoothed out in the spring.

About the same varieties of dryfarmed crops are grown under both levels of management. Itana, Tendoy, and Columbia are the most common varieties of winter wheat. Komar is the most common variety of spring wheat, and Gem the most common variety of barley. Ladak is the alfalfa variety generally grown for dryfarming; Grimm, Ranger, and some common varieties are also grown.

Management of the Soils for Range[2]

About 31,000 acres of the Teton Area is range, and an additional 26,000 acres is dual-use range and woodland. Most of the range consists of small tracts that adjoin grainfields and are grazed after the grain has been harvested in the fall. A few larger tracts of mixed woodland and range in the northeastern part of the Area are fenced from the cultivated fields and grazed separately.

Most of the privately owned range is grazed in spring and fall. Several livestock operators have permits for summer grazing in the adjoining Targhee National Forest, but many of the smaller operators do not have summer grazing permits and use their range during spring, summer, and fall. In addition, much of the wet meadowland, all privately owned, is used for summer and fall grazing.

Range Sites

Range sites are groupings of soils according to their potential for producing native vegetation. Each site is capable of producing a given kind and amount of vegetation that differs from the vegetation produced by any other range site. Each site is given a descriptive name, such as Loamy range site, 13-inch to 16-inch precipitation zone.

[2] WALTER B. RUMSEY, range conservationist, SCS, assisted in the preparation of this section.

TABLE 2.—*Estimated average yields per acre under two levels of management*

[Yields in columns A can be expected under prevailing management; those in columns B can be expected under improved management; absence of yield indicates the soil is not suited to the crop or the crop is seldom grown at the level of management specified]

Soil name	Wheat				Barley				Oats				Alfalfa				Potatoes		Meadow hay	
	Irrigated		Dry-farmed		Irrigated		Dry-farmed		Irrigated		Dry-farmed		Irrigated		Dry-farmed		Irrigated		Dry-farmed	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Cwt.*	*Cwt.*	*Tons*	*Tons*
Ard silt loam, 4 to 12 percent slopes			21	23			21	23								1.0				
Ard silt loam, 0 to 4 percent slopes			21	23			21	23								1.0				
Ard silt loam, 20 to 35 percent slopes																				
Cedron silty clay loam																			1.0	2.0
Driggs silt loam, 0 to 2 percent slopes	30	40	15	20	30	40	15	20					1.5	2.5			125	175		
Driggs silt loam, 0 to 2 percent slopes, channeled			12	15			12	15												
Driggs silt loam, 2 to 4 percent slopes	28	38	15	20	28	38	15	20					1.2	2.2			125	175		
Driggs silt loam, 4 to 8 percent slopes	20	30	13	18	20	30	13	18					1.2	2.2			100	150		
Driggs gravelly loam, 0 to 2 percent slopes	25	35			25	35							1.0	1.5			100	150		
Driggs gravelly loam, 2 to 4 percent slopes	23	30			23	30							1.0	1.5			100	150		
Driggs cobbly loam, 0 to 2 percent slopes	25	35			25	35							1.0	1.5			100	150		
Felt loam, 0 to 2 percent slopes	28	38	12	15	30	40	12	15					1.5	2.5			125	200		
Felt loam, 2 to 4 percent slopes	25	35	12	15	27	38	12	15					1.2	2.2			100	175		
Felt loam, 4 to 8 percent slopes	20	30	12	15	20	30	12	15					1.2	2.2			75	150		
Felt loam, 8 to 12 percent slopes			12	15			12	15												
Feltonia loam, 0 to 2 percent slopes	35	45	20	22	40	50	20	22	50	60			2.0	3.0	1.5	1.7	150	180		
Feltonia loam, 2 to 4 percent slopes	30	40	20	22	35	45	20	22	50	60			2.0	3.0	1.5	1.7	135	180		
Feltonia loam, sandy substratum, 2 to 4 percent slopes	30	40	20	22	35	45	20	22	50	60			2.0	3.0	1.5	1.7	135	180		
Feltonia loam, sandy substratum, 4 to 12 percent slopes			21	23			21	23							1.5	1.7				
Foxcreek loam																			1.0	2.0
Foxcreek gravelly loam																			1.0	2.0
Foxcreek silty clay loam, heavy subsoil variant																			.75	2.0
Furniss silty clay loam																			1.0	2.0
Furniss mucky silty clay loam																			1.0	2.0
Greys silt loam, 4 to 12 percent slopes			20	23			25	28			35	38			2.0	2.2				
Greys silt loam, 12 to 20 percent slopes			20	23			25	28			35	38								
Greys silt loam, 20 to 30 percent slopes			20	23			25	28			35	38								
Karlan silt loam, 4 to 12 percent slopes			25	27			25	27							1.0	1.2				
Karlan silt loam, 0 to 4 percent slopes			25	27			25	27							1.0	1.2				
Karlan silt loam, 12 to 20 percent slopes			25	27			25	27							1.0	1.2				
Lantonia silt loam, 4 to 12 percent slopes			30	35			30	35							2.0	2.2				
Lantonia silt loam, 0 to 4 percent slopes			30	35			30	35							2.0	2.2				
Lantonia silt loam, 2 to 4 percent slopes	45	60	30	35	55	65	30	35	60	70			2.5	3.0	2.0	2.2	150	200		

TABLE 2.—*Estimated average yields per acre under two levels of management*—Continued

Soil name	Wheat				Barley				Oats				Alfalfa				Potatoes		Meadow hay	
	Irrigated		Dry-farmed		Irrigated		Dry-farmed		Irrigated		Dry-farmed		Irrigated		Dry-farmed		Irrigated		Dry-farmed	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Cwt.*	*Cwt.*	*Tons*	*Tons*
Lantonia silt loam, 4 to 8 percent slopes	45	55	30	35	55	60	30	35	50	60	----	----	2. 0	2. 5	2. 0	2. 2	125	175	----	----
Lantonia silt loam, 8 to 12 percent slopes	35	45	30	35	45	55	40	45	50	60	----	----	2. 0	2. 5	2. 0	2. 2	----	----	----	----
Lantonia silt loam, 12 to 20 percent slopes	----	----	30	35	----	----	40	45	----	----	----	----	----	----	2. 0	2. 2	----	----	----	----
Lantonia silt loam, 12 to 20 percent slopes, eroded	----	----	28	35	----	----	35	45	----	----	----	----	----	----	2. 0	2. 2	----	----	----	----
Lantonia silt loam, 20 to 30 percent slopes	----	----	30	35	----	----	40	45	----	----	----	----	----	----	2. 0	2. 2	----	----	----	----
Latahco loam, cold variant	25	35	20	25	25	35	20	25	----	----	----	----	----	----	----	----	----	----	1. 0	2. 0
Packsaddle silt loam, 0 to 2 percent slopes	25	35	12	15	30	40	12	15	35	50	----	----	1. 5	2. 5	. 75	. 75	----	----	----	----
Packsaddle silt loam, 2 to 4 percent slopes	25	35	12	15	25	45	12	15	35	45	----	----	1. 5	2. 5	----	----	----	----	----	----
Packsaddle loam, 4 to 12 percent slopes	----	----	12	15	----	----	12	15	----	----	----	----	----	----	----	----	----	----	----	----
Richvale silt loam, 0 to 2 percent slopes	40	50	25	30	40	50	25	30	50	60	----	----	2.	2. 5	1. 5	1. 7	150	180	----	----
Richvale silt loam, 2 to 4 percent slopes	40	50	25	30	40	50	25	30	50	60	----	----	2.	2. 5	1. 5	1. 7	150	180	----	----
Rin silt loam, 4 to 12 percent slopes	----	----	30	35	----	----	30	35	----	----	----	----	----	----	2. 0	2. 2	----	----	----	----
Rin silt loam, 2 to 4 percent slopes	45	55	30	35	45	55	30	35	50	60	----	----	2. 5	3. 0	2. 0	2. 2	150	200	----	----
Rin silt loam, 4 to 8 percent slopes	45	55	30	35	45	55	30	35	50	60	----	----	2. 0	2. 5	2. 0	2. 2	125	175	----	----
Rin silt loam, 8 to 12 percent slopes	35	45	30	35	40	50	35	40	45	55	----	----	2. 0	2. 5	2. 0	2. 2	----	----	----	----
Rin silt loam, 12 to 20 percent slopes	----	----	30	35	----	----	40	45	----	----	----	----	----	----	2. 0	2. 2	----	----	----	----
Rin silt loam, 20 to 30 percent slopes	----	----	30	35	----	----	40	45	----	----	----	----	----	----	2. 0	2. 2	----	----	----	----
Ririe silt loam, 4 to 12 percent slopes, eroded	----	----	12	15	----	----	12	15	----	----	----	----	----	----	. 5	. 75	----	----	----	----
Ririe silt loam, 4 to 12 percent slopes, severely eroded	----	----	12	15	----	----	12	15	----	----	----	----	----	----	. 5	. 75	----	----	----	----
Ririe silt loam, 12 to 20 percent slopes, eroded	----	----	12	15	----	----	12	15	----	----	----	----	----	----	. 5	. 75	----	----	----	----
Tetonia silt loam, 0 to 4 percent slopes	----	----	23	25	----	----	25	30	----	----	----	----	----	----	1. 5	1. 7	----	----	----	----
Tetonia silt loam, 0 to 2 percent slopes	40	50	23	25	45	55	25	30	50	60	----	----	2. 0	2. 5	1. 5	1. 7	150	180	----	----
Tetonia silt loam, 2 to 4 percent slopes	40	50	23	25	45	55	25	30	50	60	----	----	2. 0	2. 5	1. 5	1. 7	150	180	----	----
Tetonia silt loam, 4 to 8 percent slopes	35	45	23	25	40	50	25	30	45	55	----	----	2. 0	2. 5	1. 5	1. 7	125	150	----	----
Tetonia silt loam, 4 to 12 percent slopes	----	----	23	25	----	----	25	30	----	----	----	----	----	----	1. 5	1. 7	----	----	----	----
Tetonia silt loam, 8 to 12 percent slopes	30	45	23	25	40	55	25	30	40	55	----	----	1. 5	2. 0	1. 5	1. 7	----	----	----	----
Tetonia silt loam, 12 to 20 percent slopes	----	----	23	25	----	----	25	30	----	----	----	----	----	----	1. 5	1. 7	----	----	----	----
Tonks silt loam, strongly calcareous variant, 2 to 4 percent slopes	25	35	20	25	25	35	20	25	----	----	35	45	----	----	----	----	----	----	1. 0	2. 0
Tonks silt loam, strongly calcareous variant, 0 to 2 percent slopes	25	35	20	25	25	35	20	25	----	----	35	45	----	----	----	----	----	----	1. 0	2. 0
Wiggleton gravelly loam	15	20	----	----	15	20	----	----	20	25	----	----	----	----	----	----	----	----	----	----
Wiggleton loam	15	20	----	----	15	20	----	----	20	25	----	----	----	----	----	----	----	----	----	----
Zohner silty clay loam	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	. 75	2. 0
Zohner silty clay loam, moderately deep variant	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	. 75	2. 0
Zundell silty clay loam	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1. 0	2. 0

Range Condition Classes

Range condition is determined by comparing the composition and yield of the present vegetation with that of the native vegetation that the site would produce if it were undisturbed. For purposes of evaluating vegetation, plants are designated as decreasers, increasers, or invaders. Decreasers are the most desirable forage plants of the potential native plant community. They decrease if the site is overgrazed. Increasers are the less desirable forage plants. They increase if the site is overgrazed, but in time, if overgrazing continues, they also decrease. Invaders are not members of the potential native plant community. They move in and occupy the space left by the decreasers and increasers.

There are four classes of range condition, depending upon the percentage of potential native vegetation in the present plant cover. The condition is excellent if the percentage ranges from 76 to 100 percent; good if it is 51 to 75 percent; fair if it is 26 to 50 percent; and poor if it is 0 to 25 percent.

Range Management Practices

Although range sites differ, certain principles of management apply to all sites.

Proper range use.—Range plants live and grow on the food manufactured in their leaves, and a healthy plant makes more leaves or twigs than it needs to carry on its life processes. This extra top growth is forage. Proper range use means using only this extra top growth and leaving the rest so the plant can maintain itself.

In general, no more than 50 percent of the current year's growth of the dominant decreaser plant should be grazed if the range is in good or excellent condition, and no more than 40 percent if the range is in fair condition. If the range is in poor condition, an increaser plant becomes dominant, and no more than 40 percent of its current year's growth should be grazed.

Shallowness of soils and steepness of slope also affect range management. For example, if the range is in excellent condition and the slope is no more than 30 percent, as much as 50 percent of the current year's growth can be grazed; but this percentage decreases as the slope increases, and on a slope of 60 percent no more than 20 percent should be grazed. A slope of 70 percent generally is too steep for grazing, except for a limited amount by sheep.

Rotation-deferred grazing.—This is a system of grazing in which pastures are rested at planned intervals. Generally, a pasture is not grazed more than half of any growing season or at the same time in successive years. For best results, the range generally should be divided into three or more units of nearly equal forage production. On summer ranges, two units are enough. Fencing may be required on cattle ranges. Natural barriers and herding may be sufficient on sheep ranges. A rotation-deferred grazing system is flexible and can be adapted to almost any field size and condition. It can be designed to take advantage of existing or easily developed subdivisions.

In a system of rotation-deferred grazing, a range site is ready for sheep when the dominant decreaser is 3 to 4 inches high, and for cattle when the dominant decreaser is 4 to 5 inches high.

Livestock distribution.—Livestock must be evenly distributed so that forage will be grazed uniformly. Fencing, salting, water development, herding, and riding all help to distribute livestock evenly.

Fencing is especially helpful on a cattle range, and it is generally needed in a rotation-deferred grazing system. Fencing should take into account natural barriers, differences in range sites, topography, natural drift, and size of units.

Salt properly placed often improves livestock distribution. Salt should not be placed in watering places or along creek bottoms, or in other places where livestock gather. Livestock do not need water immediately after salting; therefore, salt should be placed in the less accessible parts of the range, away from water.

Watering places should be developed with livestock distribution in mind. If wells or stock ponds are being considered, there may be considerable choice in location, and several hundred feet of pipeline and a trough can make a big difference in livestock distribution.

On most sheep ranges, a good herder is essential. On many cattle ranges, an alert rider can make the difference between good and poor distribution.

Time of use.—Livestock should not be turned out until the forage is ready to use. The date varies with the range site and with current weather conditions. The forage is ready to use when the soil is dry enough so it will not be damaged by trampling and when the key forage plants have reached a height of 4 to 6 inches.

Numbers of livestock.—Forage production on any range site varies from year to year with weather conditions. Ranchers should keep the herd size flexible, so as to avoid serious damage in dry years and take advantage of higher production in wet years. Herd flexibility is necessarily limited, however, and it helps to have a spare pasture or a feed surplus in dry years. The herd size should be such that in most years only half or less of the current year's growth of key forage plants will be grazed.

Brush control.—Big sagebrush is the most common shrub on the range in the Teton Area. It can be controlled by burning, chemical spraying, roto-beating, or railing or by manipulating the grazing season. The best method to use depends on plant cover, type of equipment available, slope, and range surface. Burning, spraying, and roto-beating should be used only when there is a good understory of native grass. Burning can be effective on big sagebrush but must be handled carefully. Because it damages Idaho fescue and other important forage plants, burning is generally not recommended in the Teton Area.

Roto-beating is generally the most expensive of the three practices. This method and burning leave the site clear of brush and make the forage readily accessible. Beating is not practical, however, where there are stones on the surface.

Spraying with chemicals is an effective way of controlling big sagebrush and three-tip sagebrush, but it also kills many desirable broad-leafed plants.

Railing with heavy rail drags or anchor chain is an inexpensive method of thinning out stands of big sagebrush. Under good conditions, this method kills 40 to 60 percent of the shrubs.

None of these methods is effective on rabbitbrush, horsebrush, and other shrubs that sprout from the root crown.

Plowing at least twice is necessary for effective control of these plants.

Big sagebrush is sensitive to grazing and can be controlled by heavy grazing by sheep late in fall after the grass is dormant. This can be a supplement to other methods.

Seeding.—Seeding is a means of getting deteriorated range back into production quickly. Hundreds of acres in the Teton Area have been seeded successfully. Seeding is expensive and must be done carefully to obtain a good stand. The following general rules apply: (1) Prepare a clean, firm seedbed; summer fallow if necessary; and kill all competing vegetation. (2) Use seed of high quality, and drill no deeper than ¾ inch. (3) Do not use a companion crop. (4) Plant late in fall or early in spring. (5) Protect the seeded area from grazing for at least two growing seasons. (6) Manage the seeded area carefully to insure continued high production.

Descriptions of Range Sites

The range sites of the Teton Area are described in this section. The description of each range site gives the important characteristics of climate and soils, the principal range plants, and information about how to use and manage the vegetation. The scientific and common names of the principal native and introduced plants in the Teton Area are given in the section "General Nature of the Area."

The three Loamy range sites have similar soils and topography, but there are significant differences in their potential plant communities because of climate differences.

Loamy range site, 13-inch to 16-inch precipitation zone

This site consists of soils that are mostly sloping to rolling, although they have a slope range of 0 to 35 percent. These soils adjoin dryfarmed areas. They are at an elevation of 5,800 to 7,000 feet and receive from 13 to 16 inches of precipitation annually, about half of which is snow. About one-third of the total precipitation occurs between May 1 and July 30.

These soils are silt loam in texture, except for a few small areas of silty clay loam and sandy loam. They are more than 20 inches deep, are well drained, and have a moderate to high available water capacity. Permeability is moderate to moderately slow.

Decreaser plants make up 55 to 70 percent of the potential native plant community. Bluebunch wheatgrass is the predominant decreaser; other decreasers are Idaho fescue, prairie junegrass, Nevada bluegrass, balsamroot, tapertip hawksbeard, and bitterbrush. Increaser plants make up 30 to 45 percent of the potential plant cover. They include Sandberg bluegrass, needle-and-thread, phlox, lupine, pussytoes, big sagebrush, threetip sagebrush, and sod-forming wheatgrasses. In some places there are traces of big rabbitbrush, gray horsebrush, and other undesirable shrubs.

The potential total yield, air dry, estimated on the basis of a limited number of plot clippings, ranges from 800 to 1,500 pounds per acre, depending upon the amount of precipitation.

This range site is suited to spring and fall grazing.

Bluebunch wheatgrass is the key management plant if the range is in excellent, good, or fair condition. Sandberg bluegrass becomes the key plant when the range is in poor condition.

This site is well suited to seeding. Grasses suitable for seeding include Nordan crested wheatgrass and Siberian wheatgrass, for grazing early in spring, and Whitmar wheatgrass, intermediate wheatgrass, pubescent wheatgrass, and Manchar smooth bromegrass, for grazing late in spring and in summer.

Gravelly range site

This site consists of soils that have a slope range of 0 to 12 percent and are at an elevation of 5,900 to 6,800 feet. Precipitation ranges from 13 to 18 inches annually, and about half of it is snow. Approximately one-third of the precipitation occurs between May 1 and July 30.

These soils are moderately deep to shallow and are gravelly loam in texture, except for a few areas of cobbly loam. They are well drained and have a low to moderate water-holding capacity. Permeability is moderate in the surface layer and very rapid in the underlying gravel. Gravel makes up 20 to 50 percent of the soil material in some places.

Decreaser plants make up 55 to 70 percent of the potential native plant community (fig. 15). Bluebunch wheatgrass is the predominant decreaser; other decreasers are prairie junegrass, Nevada bluegrass, Idaho fescue, bitterbrush, balsamroot, and tapertip hawksbeard. Increaser plants make up 30 to 45 percent of the potential plant cover. They include Sandberg bluegrass, needle-and-thread, phlox, lupine, pussytoes, big sagebrush, and sod-forming wheatgrasses. In some places there are traces of gray horsebrush, rabbitbrush, and other undesirable shrubs.

The potential total yield, air dry, estimated on the basis of a limited number of plot clippings, ranges from 600 to 1,200 pounds per acre, depending upon the amount of precipitation.

This range site is suitable for spring and fall grazing.

If the range is in excellent, good, or fair condition, bluebunch wheatgrass and Idaho fescue are the key management plants. If the range is in poor condition, Sandberg bluegrass becomes the key management plant.

This site can be seeded if the few areas of cobbly or very gravelly soils are avoided. Grasses suitable for seeding include Nordan crested wheatgrass and Siberian wheatgrass, for grazing early in spring, and Whitmar wheatgrass, for grazing late in spring and in summer.

Shallow Stony range site

This site consists of soils that are commonly on south and west slopes and have a slope range of 0 to 30 percent. They are at an elevation of 6,000 to 7,000 feet and receive from 12 to 15 inches of precipitation annually, half of it coming as snow. About one-third of the total precipitation comes between May 1 and July 30.

These are stony to extremely stony loams that are generally less than 20 inches deep to bedrock. They are well drained and are moderately permeable.

Decreaser plants make up 60 to 70 percent of the potential native plant community. Bluebunch wheatgrass is the predominant decreaser; others are prairie junegrass, big bluegrass, bitterbrush, balsamroot, and tapertip hawksbeard. Increaser plants make up 30 to 40 percent of the

Figure 15.—**Gravelly range site in good to excellent condition. The soils are Driggs gravelly loams. Bluebunch wheatgrass is the predominant grass. The scattered shrubs are big sagebrush.**

potential plant cover. They include dwarf sagebrush, big sagebrush, Sandberg bluegrass, needle-and-thread, squirreltail, phlox, Wyethia buckwheat, and sod-forming wheatgrass and scattered patches of gray horsebrush and little rabbitbrush. The invaders are cheatgrass, Russian-thistle, perennial thistle, and others.

The potential total yield, air dry, estimated on the basis of a limited number of clippings, ranges from 300 to 800 pounds per acre, depending upon the amount of precipitation.

This range site is suitable for spring and fall grazing.

Bluebunch wheatgrass is the key management plant if the range is in excellent, good, or fair condition. Sandberg bluegrass becomes the key management plant when the range is in poor condition.

Swanner stony loam, 0 to 12 percent slopes, and Swanner very stony loam, 0 to 12 percent slopes, are suitable for seeding.

Shallow South Slope range site

This site consists of soils on south and west slopes. These soils have a slope range of 30 to 80 percent. They are at an elevation of 6,000 to 7,000 feet and receive from 12 to 15 inches of precipitation annually, half of which is snow. About one-third of the total precipitation occurs between May 1 and July 30.

These soils are extremely stony loams. They are generally less than 20 inches deep to bedrock, and rock outcrops are common. Drainage is good, and permeability is moderate.

Decreasers make up to 50 to 70 percent of the potential native plant community. Bluebunch wheatgrass is the predominant decreaser; others are prairie junegrass, basin wildrye, bitterbrush, balsamroot, and tapertip hawksbeard. Increasers make up as much as 20 to 40 percent of the potential cover. They include needle-and-thread, Sandberg bluegrass, dryland sedges, big sagebrush, and snowberry. Cheatgrass, Russian-thistle, and perennial thistle are invaders.

The potential total yield, air dry, estimated on the basis of a limited number of plot clippings, ranges from 300 to 800 pounds an acre, depending upon the amount of precipitation.

This site is suitable for spring and fall grazing.

Preventing overuse is especially important because this site recovers slowly from a poor condition. The steeper the slope, the less intensively the range should be grazed. If the range is in excellent, good, or fair condition, bluebunch wheatgrass is the key management plant. If the ranges is in poor condition, Sandberg bluegrass is the key plant.

Most of the acreage is not suitable for seeding, although selected areas are seeded by broadcasting, followed by railing or by driving sheep over the seeded areas. Grasses suitable for seeding include Nordan crested wheatgrass and Siberian wheatgrass for grazing early in spring, and Whitmar wheatgrass, for grazing late in spring and in summer.

Loamy range site, 16-inch to 19-inch precipitation zone

This site consists mostly of gently sloping to hilly soils, although some are level and some have short slopes of as much as 40 percent. These soils are on the fringes of foothills and lower parts of mountains. They are intermingled with and farmed with higher, dryfarmed soils. The elevation ranges from 6,000 to 7,000 feet. The range of precipitation is 15 to 20 inches annually, but most areas receive 16 to 19 inches. Half of it is snow. About one-third of the precipitation comes between May 1 and July 30. The optimum growing season is from June 1 to August 15.

These soils are loam or silt loam in texture and are more than 20 inches deep. Drainage is good, and the available water capacity is moderate to very high. Permeability is moderate or moderately slow.

Decreaser plants make up 70 to 80 percent of the potential native plant community. Idaho fescue and bluebunch wheatgrass are predominant. Other decreasers are prairie junegrass, Columbia needlegrass, big bluegrass, bitter-

brush, and tapertip hawksbeard. Increaser plants make up 20 to 30 percent of the potential plant cover and include Sandberg bluegrass, thickspike wheatgrass, needle-and-thread, yarrow, geranium, Wyeth erigonum, sunflower, big sagebrush, three-tip sagebrush, snowberry, and serviceberry.

The potential total yield, air dry, estimated on the basis of a limited number of plot clippings, ranges from 1,200 to 2,000 pounds per acre, depending upon precipitation.

This site is suitable for grazing late in spring and in summer.

Bluebunch wheatgrass and Idaho fescue are the key management plants if the range is in excellent, good, or fair condition. Sandberg bluegrass becomes the key plant if the range is in poor condition.

This site is well suited to seeding. Grasses suitable for seeding include intermediate wheatgrass, pubescent wheatgrass, and Manchar smooth bromegrass. All of these can be grazed late in spring and in summer.

Loamy range site (aspen)

This site consists mostly of gently sloping to moderately steep or hilly soils. The slopes generally do not exceed 35 percent, but some areas have short slopes of as much as 60 percent. The elevation ranges from 6,000 to 7,000 feet, and the soils at the lower elevations have only north and east exposures. Precipitation ranges from 16 to 22 inches annually, more than half of it coming as snow.

These soils are loams and silt loams more than 20 inches deep. Some are gravelly or stony. Drainage is good, and the available water capacity is high. Permeability is moderate or moderately slow.

The potential native vegetation is 40 to 50 percent grasses, 30 to 40 percent tall forbs, and 10 to 15 percent browse plants. Important decreaser grasses are blue wildrye, bearded wheatgrass, slender wheatgrass, tall native bluegrasses, and oniongrass. Decreaser forbs include sweet-anise, yampa, vetch, tall aster, butterweed, and cowparsnip. Increaser grasses include pinegrass, mountain bromegrass, and Kentucky bluegrass. Increaser forbs are lupine, meadowrue, geranium, cinquefoil, and others. Increaser shrubby plants are snowberry, serviceberry, chokecherry, rose, and young aspen. Figure 16 shows the abundant forage on this site when it is in good condition.

The potential total yield, air dry, estimated on the basis of a limited number of plot clippings, ranges from 1,200 to 2,000 pounds per acre, depending upon the amount of precipitation.

This site is suitable for summer grazing.

Bearded wheatgrass, slender wheatgrass, and tall native bluegrasses are the key management plants if the range is grazed by cattle. Sweet-anise, horsemint, butterweed, and bluebells are the key plants if it is grazed by sheep. Pinegrass can be the key management plant if it completely dominates the site.

Because of the dense growth of aspen, this site cannot be seeded by conventional methods. Areas in poor to fair condition can be seeded by broadcasting seed from an airplane just before the aspens drop their leaves in the fall. Grasses suitable for seeding include intermediate wheatgrass and Manchar smooth bromegrass, which can be grazed late in spring and in summer. Orchardgrass also grows well.

Dranyon stony loam, 20 to 30 percent slopes, and Greys silt loams that have a slope of no more than 30 percent are suitable for seeding.

South Slope range site

This site consists of soils that have southeast, south, southwest, and west exposures. The slope range is commonly 30 to 60 percent, but some of the slopes are only 4 percent and some are as steep as 80 percent. The elevation ranges from 5,900 to 7,000 feet. The precipitation ranges from 15 to 22 inches annually, but most areas receive 16 to 19 inches. Half of it is snow. About one-third of the total precipitation comes between May 1 and July 30. The optimum growing season is from May 15 to August 1.

These soils are stony to extremely stony loams. Although rock outcrops are fairly common, the soil depth is generally more than 20 inches. Drainage is good, and the available water capacity is moderate to high. Permeability is moderate or moderately slow.

Decreaser plants make up 50 to 70 percent of the potential native vegetation. Bluebunch wheatgrass is predominant. Other decreasers are prairie junegrass, Columbia needlegrass, bunch sedges, bitterbrush, and tapertip hawksbeard. Increaser plants make up 30 to 50 percent of the potential plant cover. They include big sagebrush, three-tip sagebrush, snowberry, serviceberry, chokecherry, thickspike wheatgrass, needle-and-thread, basin wildrye, and Sandberg bluegrass, as well as many forbs.

The potential total yield, air dry, estimated on the basis of a limited number of plot clippings, ranges from 700 to 1,300 pounds per acre, depending upon precipitation.

This site is suitable for grazing late in spring and in summer.

Because of the steep slopes, the range recovers slowly from poor condition. Prevention of overgrazing is especially important. The steeper the slope, the less intensively the range should be grazed. Bluebunch wheatgrass is the key management plant if the range is in excellent to fair condition. Sandberg bluegrass becomes the key plant if the range is in poor condition.

This site is too stony to seed by conventional methods. If seeding is needed and is practical, seed can be broadcast and then covered by railing or by driving sheep across the area. Intermediate wheatgrass, pubescent wheatgrass, and Manchar smooth bromegrass are suitable for seeding.

Badgerton very stony loam, 4 to 8 percent slopes, can be seeded.

Stony range site

This site consists of soils that have a slope range of 2 to 30 percent. In many places, these soils adjoin those of the Loamy range site, 16-inch to 19-inch precipitation zone. The elevation ranges from 5,900 to 7,000 feet. The precipitation ranges from 15 to 22 inches annually, but most areas receive 16 to 19 inches. Half of it is snow. About one-third of the total precipitation falls between May 1 and July 30. The optimum growing season is from May 1 to August 15.

These soils are stony to extremely stony loams. They are well drained, have moderate to high available water capacity, and are moderately permeable.

Decreaser plants make up 50 to 70 percent of the potential native plant community. Bluebunch wheatgrass and Idaho fescue are predominant. Other decreasers are Columbia needlegrass, big bluegrass, prairie june-

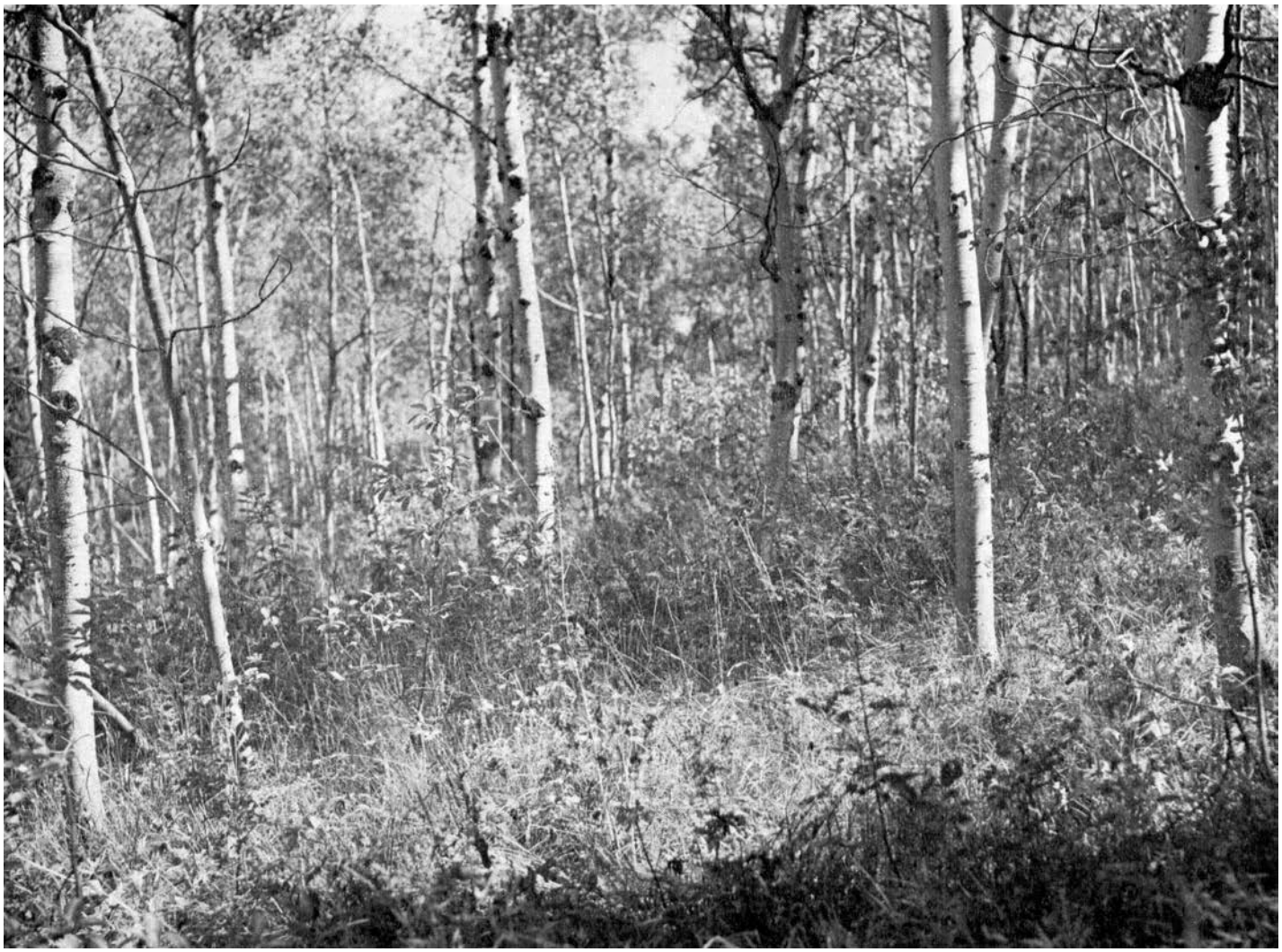

Figure 16.—**Loamy range site (aspen) in good condition. Greys soils.**

grass, bitterbrush, deervetch, and tapertip hawksbeard. Increaser plants make up 30 to 50 percent of the potential plant composition. They include big sagebrush, threetip sagebrush, snowberry, serviceberry, chokecherry, Sandberg bluegrass, needle-and-thread, thickspike wheatgrass, yarrow, geranium, and butterweed.

The potential yield, air dry, estimated on the basis of a limited number of clippings, ranges from 900 to 1,700 pounds per acre, depending upon precipitation.

This site is suitable for grazing late in spring or in summer.

Bluebunch wheatgrass and Idaho fescue are the key management plants if the range is in fair to excellent condition. Sandberg bluegrass becomes the key plant if the range is in poor condition.

This site is too stony and rocky to be seeded by conventional methods. If seeding is needed and is practical, the seed can be broadcast and then covered by railing or by driving sheep across the area. Intermediate wheatgrass, pubescent wheatgrass, and Manchar smooth bromegrass are suitable for seeding.

Dra very stony loam, 12 to 20 percent slopes, Rammel very stony loam, 2 to 12 percent slopes, and Ridgecrest stony loam, 4 to 30 percent slopes, can be seeded.

River Bottom range site

This site consists of long, narrow strips of soils along streams and rivers. Most areas of these soils are undulating because they are dissected by old channels and oxbows, but the range of slope is level to gently sloping. The elevation ranges from 5,800 to 6,700 feet, and the precipitation from 15 to 22 inches annually. The vegetation, however, is influenced more by the fluctuating water table and spring flooding than by the precipitation.

These soils are loams and gravelly loams. The available water capacity is moderate to very low, and the permeability is moderate.

The fluctuating water table, the changing stream channels, and the spring flooding produce a variety of conditions that constantly change the vegetation. Narrowleaf cottonwood, aspen, willow, alder, and birch trees are common, as well as various conifers. Rose, dogwood, big rabbit-

brush, sagebrush, serviceberry, spirea, and bitterbrush are common shrubs. Many kinds of grasses, sedges, and forbs also grow on this site. Some of the more common grasses are timothy, Kentucky bluegrass, basin wildrye, slender wheatgrass, redtop, tufted hairgrass, and sod-forming wheat grasses.

The potential total yield, air dry, ranges from 800 to 1,800 pounds per acre, depending upon precipitation.

This site is suitable for summer and fall grazing.

Timothy, slender wheatgrass, and tufted hairgrass are the key management plants if the range is in fair to excellent condition. Kentucky bluegrass and redtop are the key plants if the range is in poor condition.

This site is well suited to seeding. Suitable grasses for seeding include intermediate wheatgrass, pubescent wheatgrass, and Manchar smooth bromegrass, which can be grazed late in spring and in summer. Timothy also grows well. Other grasses that are suitable but are not usually grown are Nordan crested wheatgrass, Siberian wheatgrass, Whitmar wheatgrass, orchardgrass, meadow foxtail, and reed canarygrass. The Nordan crested wheatgrass and Siberian wheatgrass can be grazed early in spring. The Whitmar wheatgrass can be grazed late in spring and in summer.

Wet Meadow range site

This site is near the center of the valley along the Teton River. It consists of mostly level soils, although some areas are hummocky or undulating, and sloughs and potholes are common. These soils are at an elevation of 5,800 to 6,800 feet and receive from 13 to 20 inches of precipitation annually, at least half of it falling as snow. Precipitation however, does not affect this site so much as the high water table.

The soils are mucks and peats and silty clay loams. They are poorly or very poorly drained, and the water table is at or near the surface. Some areas are ponded for part of the year. The available water capacity is commonly very high or high but is moderate in some of the soils.

The original plant composition was probably about 15 percent grasses, 20 percent rushes, 10 to 15 percent willows, shrubby cinquefoil, and forbs, and 45 to 50 percent sedges. The predominant grasses were tufted hairgrass, mannagrass, meadow fescue, and redtop. The forbs included native clovers, and cinquefoil.

The total potential yield, air dry, ranges from 3,000 to 4,000 pounds per acre, depending upon precipitation.

This site can be grazed in summer and fall or whenever the soil is dry enough to prevent compaction.

Tufted hairgrass, redtop, and meadow fescue are the key management plants if the range is in good condition. Nebraska sedge is the key plant if the range is in fair or poor condition.

The high water table prohibits use of equipment on most of this site, and improvement is possible only by hand-sprigging or other special methods. A few areas can be renovated. In these areas old sod must be destroyed before seeding. It can be destroyed by any combination of rototilling, plowing, disking, and chiseling or by growing a grain crop for 2 years before reseeding to grass. Manchar smooth bromegrass, timothy, meadow foxtail, and reed canarygrass are suitable for seeding. Nitrogen is beneficial.

Dry Meadow range site

This site is near the center of the valley and adjoins the Wet Meadow range site. It consists of level to gently sloping soils, although most of them have a slope of less than 1 percent. These soils are at an elevation of 5,800 to 7,000 feet and receive from 13 to 20 inches of precipitation annually, at least half of which is snow. The precipitation does not affect this site so much as the presence of a high water table early in spring. There is a limited amount of irrigation water available.

These soils are loam to silty clay loam in texture and are more than 20 inches deep. A few areas are gravelly. Drainage is somewhat poor or poor, and the available water capacity is moderate to very high. Some areas are wet the year around because of excessive irrigation. Vegetation in these areas changes rapidly to a wet meadow type. The high lime content in some of the soils presents a management problem.

The potential native plant community is probably 70 to 80 percent grasses, 10 to 15 percent shrubs, and 15 to 20 percent forbs. The predominant decreaser grasses are tufted hairgrass, Idaho fescue, Nevada bluegrass, onion-grass, prairie junegrass, and Columbia needlegrass. The predominant increaser grasses are Kentucky bluegrass, basin wildrye, western wheatgrass, streambank wheatgrass, squirreltail, and various sedges and rushes. The shrubs include silver sagebrush, rabbitbrush, shrubby cinquefoil, and willow. The predominant forbs are yarrow, cudweed sage, aster, and sawtooth butterweed.

The potential total yield, air dry, ranges from 1,000 to 2,500 pounds per acre, depending upon precipitation.

This site is suitable for summer and fall grazing.

Nevada bluegrass and tufted hairgrass are the key management plants if the range is in good or excellent condition. Kentucky bluegrass and sod-forming sedges become the key plants if the range is in fair or poor condition.

This site is suitable for seeding to plants that can withstand a high water table in spring. Manchar smooth bromegrass and timothy are examples. Nitrogen is beneficial.

The irrigation of these soils is discussed in the preceding section of this publication.

North Slope range site

This site consists of soils that have mostly north and east exposures, especially in the canyons. The range of slope is generally 30 to 60 percent, but there are a few slopes of less than 30 percent and a few as steep as 80 percent. The elevation ranges from 6,800 to 7,000 feet, and the precipitation from 20 to 28 inches annually, about two-thirds of it falling as snow.

These soils are loams and silt loams, generally more than 20 inches deep. They are nonstony to extremely stony. Drainage is good. The available water capacity is commonly high or very high, but it is low to moderate in some of the soils. Permeability is moderate to slow.

This site is primarily woodland, but it can be grazed to a limited extent. Lodgepole pine is predominant in most places. Douglas-fir, subalpine fir, and aspen also occur, but generally in small patches or as scattered trees.

The understory consists of shrubs and grasses. Pinegrass is predominant, among small amounts of mountain bromegrass, blue wildrye, and slender wheatgrass. Snowberry, myrtle, boxleaf, dwarf juniper, chokecherry, and

spirea are the predominant shrubs. The few forbs include heartleaf arnica, timber lupine, Oregongrape, and meadowrue. Blue wildrye and slender wheatgrass are the key management plants if the site is in excellent or good condition.

The potential total yield, air dry, ranges from 300 to 700 pounds per acre, depending upon precipitation.

This site is suitable for summer grazing.

Mikesell stony silt loam, 20 to 30 percent slopes, and Turnerville silt loams that have a slope of no more than 30 percent are suitable for seeding.

Management of the Soils for Woodland [3]

About 26,000 acres of the Teton Area is woodland. On the rolling uplands there are almost pure stands of aspen. On the lower foothills are stands of lodgepole pine. And on the higher foothills, the influence of aspect and slope brings in with the lodgepole pine a mixture of Douglas-fir, subalpine fir, and, in the draws, a few spruce trees. In addition there are trees and shrubs on the bottom lands of creeks in the valley.

These forests provided ties in considerable quantity for railroads in the earlier development of the country and coal mining timbers for local use. A few small sawmills continue to produce timber products for use in the valley, but private ownership of woodland is not extensive, and the products from these holdings are limited.

Soil Properties That Affect Trees

Soils vary in their ability to produce trees. Depth, fertility, texture, and available water capacity, influenced by elevation, aspect, and climate, determine the kinds of trees and the yields that can be expected of any site. Available water capacity and the depth of the root zone are of major importance.

Soil productivity is rated by determining the average site index of even-aged, fully stocked, unmanaged stands. Site index is the average height of the dominant trees at a specified age. For Douglas-fir the age is 100 years, and for lodgepole pine and aspen 80 years.

Woodland Groups

The woodland soils of the Teton Area have been placed in groups on the basis of their suitability for trees. Each group is made up of soils that produce similar kinds of wood crops, need similar management, and have about the same productivity. For each group a site index is given, as well as a productivity rating of high, medium, or low. Average annual yields are given in terms of cubic feet, board feet, and other units of wood measurement. In addition, there are ratings of seedling mortality, erosion hazard, plant competition, and equipment limitations.

The productivity ratings are based on the average height of the trees at a specified age. The productivity for aspen is *high* if the average height is 66 feet or more at 80 years of age, *medium* if the average height is 50 to 65 feet, and *low* if the average height is 49 feet or less. The productivity for lodgepole pine is *high* if the average height is 76 feet or more at 80 years of age, *medium* if the average height is 56 to 75 feet, and *low* if the average height is 55 feet or less. The productivity for Douglas-fir is *high* if the average height is 95 feet or more at 100 years of age, *medium* if the average height is 80 to 94 feet, and *low* if the average height is 79 feet or less.

The potential yields of each woodland group were estimated on the basis of site index data from the following sources: For aspen, USDA Bul. No. 1291 (*2*);[4] for lodgepole pine, yield tables developed by the British Columbia Forest Service; for Douglas-fir, USDA Tech. Bul. No. 630 (*4*).

Only the soils used for woodland have been placed in woodland groups. The groups are not numbered consecutively. They are part of a system used by Idaho and Wyoming, and not all of the groups in the system are represented in the Teton Area.

The ratings of seedling mortality, erosion hazard, plant competition, and equipment limitations are defined in the following paragraphs.

Seedling mortality is *slight* if not more than 25 percent of the planted seedlings die, or if trees regenerate naturally in places where there are enough seeds; *moderate* if 25 to 50 percent of the planted seedlings die, or if trees do not regenerate naturally in adequate numbers; *severe* if more than 50 percent of the planted seedlings die, or if trees do not regenerate naturally.

Erosion hazard is rated according to the risk of erosion on well-managed woodland that is not protected by special practices. The hazard is *slight* where a slight loss of soil is expected. The hazard is *moderate* where there would be a moderate loss of soil if runoff is not controlled and the vegetative cover is not adequate for protection. It is *severe* where rapid runoff, slow permeability, and past erosion make the soil susceptible to severe erosion.

Plant competition is *slight* if unwanted plants present no special problem; *moderate* if the invaders delay but do not prevent the establishment of a normal, fully stocked stand; and *severe* if trees cannot regenerate naturally.

Equipment limitations are *slight* if there are no restrictions on the type of equipment or on the time of year that the equipment can be used; *moderate* if the soils are moderately steep or stony, or if they are wet in winter and early in spring and use of equipment would injure tree roots or damage soil structure; *severe* if equipment cannot be used more than 3 months a year, or if use of equipment would severely damage tree roots or soil structure and stability.

Woodland group 1

This group consists mostly of soils on uplands in areas of transition between forest and open grassland in the northern part of the survey Area. These are deep and very deep, undulating to steep soils of silt loam texture. Aspen is predominant.

Permeability is moderate in the surface layer and moderately slow in the subsoil. Roots penetrate deeply.

The productivity for aspen is medium. The average site index is 65. A fully stocked stand of aspen at the age of 70 years yields about 950 cubic feet of cordwood or 4,000

[3] MELVIN R. CARLSON, woodland conservationist, SCS, assisted in the preparation of this section.

[4] Italic numbers in parentheses refer to Literature Cited, p. 94.

linear feet of mining props per acre. The average annual growth is 28 cubic feet per acre.

Plant competition is slight after the aspen has been harvested. Harvested areas are generally restocked satisfactorily from root sprouts.

Because of the slope, there is a moderate equipment limitation. On the steeper slopes, use of equipment causes deterioration unless special care is taken to control erosion. Summer and fall are the most favorable times to use equipment.

The erosion hazard is slight under natural vegetation. Where the vegetation has been disturbed, the hazard is moderate to severe if the slope is less than 30 percent and very severe if the slope is more than 30 percent. Erosion can be controlled by the proper construction and maintenance of roads, skid trails, fire lanes, and landings.

Some areas of these soils have been cleared so they can be used for range.

Woodland group 2

This group consists of undulating to steep soils that have a surface layer of silt loam and a subsoil of light silty clay loam. The largest areas are on uplands in the northeastern part of the Area. Lodgepole pine is predominant.

Permeability is moderate in the surface layer and moderately slow in the subsoil. Roots penetrate deeply.

The productivity for lodgepole pine is medium. The average site index is 75. At 70 years of age a fully stocked stand yields about 28,560 board feet or 53 cords per acre. The average annual growth is 408 board feet per acre. Aspen occurs in small groups or as scattered trees. The productivity for aspen is high, as indicated by an average site index of 75.

Plant competition is moderate after trees are harvested, but it does not prevent adequate reestablishment of lodgepole pine.

Mortality of natural seedlings is slight if competition is controlled. The hazard of disease is moderate. Pine is affected by mistletoe, and aspen by cankers and rot.

Because of the slope, there is a moderate equipment limitation. If equipment is used on a slope of more than 30 percent during wet weather, runoff channels form in roads and skid trails, and gullies develop. Logging equipment can be used on these soils during winter, but logging should be discontinued by the end of March.

Where the vegetation has been disturbed, the erosion hazard is moderate if the slope is less than 12 percent and severe or very severe if the slope is more than 12 percent. Special care is needed in the construction and maintenance of roads, skid trails, and landings, so as to avoid causing erosion.

Woodland group 3

This group consists of extremely stony loams on mountain foothills and north-facing and east-facing canyon walls in the northern part of the Area. These soils are strongly sloping to very steep. They are moderately deep to rhyolitic bedrock. Lodgepole pine is predominant.

Permeability is moderate. Roots penetrate to the bedrock and form a mat over it in many places.

The productivity for lodgepole pine is medium. The average site index is 60. A fully stocked stand at the age of 60 years yields about 12,000 board feet or 22 cords per acre. At this rate the mean annual growth is 171 board feet per acre.

Plant competition does not prevent the establishment of desirable trees, nor does it delay natural regeneration of trees after harvest. Seedling mortality is slight.

Mistletoe infection is a serious hazard to lodgepole pine. Infected trees should be removed during improvement cutting and harvesting.

Because of steepness and stoniness, the equipment limitation is severe. Roads should be constructed on the contour. Roads are costly to construct and maintain.

Generally, the hazard of erosion is moderate to very severe. Roads and skid trails erode if water is channeled into them. After logging is over, they should be ditched and drained.

Woodland group 5

This group consists of dark-brown gravelly and stony loams on mountain foothills in the southern part of the Area. These soils are moderately steep and steep. They have a subsoil of gravelly light clay loam and are deep to sandstone bedrock. Aspen is predominant.

The permeability of the subsoil is moderately slow. Only a few roots penetrate to bedrock.

The productivity for aspen is high. The average site index is 68. A fully stocked stand at the age of 70 years yields about 1,750 cubic feet of cordwood or 6,500 linear feet of mining props per acre. The mean annual growth is 39 cubic feet per acre.

Plant competition is moderate and does not prevent the establishment of aspen. Seedling mortality is slight. Overgrazing limits the sprouting of aspen.

The equipment limitation is moderate. Where the vegetation is disturbed, the erosion hazard is severe if the slope is less than 30 percent and severe or very severe if the slope is more than 30 percent. Roads on the steeper slopes ought to be on the contour or on a gentle grade of 6 percent or less. After logging operations, the site should be properly drained by ditching and by removal of debris from normal drainage channels.

Woodland group 6

This group consists of light brownish-gray stony and very stony silt loams on mountain foothills in the southwestern part of the Area. These soils are moderately steep and steep. They have a subsoil of clay or heavy clay loam that overlies shale or sandstone at a depth of 40 to 65 inches. Douglas-fir, lodgepole pine, and subalpine fir are predominant.

The permeability of the surface layer is moderate, and that of the subsoil is slow. The clayey subsoil is difficult for roots to penetrate.

The productivity for Douglas-fir is medium. The average site index is 90. A fully stocked stand at 80 years of age yields about 18,500 board feet of saw timber. The mean annual growth is 230 board feet per acre.

Plant competition is moderate but does not prevent the establishment of desired trees. Natural regeneration is good if there is an adequate seed source available. Generally, seedling mortality is slight.

Rain and snow limit the use of equipment to summer and the first part of fall. Using equipment on these soils when they are wet is likely to damage soil structure, injure tree roots, and cause erosion.

The hazard of erosion is slight under natural vegetation but severe or very severe if the vegetation is removed. If roads and skid trails are on slopes of less than 30 percent, only limited maintenance is required to control erosion. If roads and skid trails cross short, steep slopes of up to 50 percent, special attention must be given to the construction and maintenance in order to control erosion. A grade of 8 percent or less is desirable for roads on steep slopes. After logging operations, excessive runoff must be drained from roads by properly placed ditches and barriers.

Woodland group 7

This group consists of level to gently sloping, shallow to moderately deep soils of loam texture. Most of these soils are along the more recent stream channels that dissect alluvial fans in the eastern part of the valley. Most of them are gravelly, and some are very gravelly. Flooding is a hazard during periods of high runoff. Cottonwood and aspen are predominant.

Permeability is moderate above the gravel and very rapid in the gravel. Roots penetrate into the gravel.

The productivity varies as a result of changes in soil material during flooding. The site index ranges from high to low. Plant competition, equipment limitation, and seedling mortality range from slight to severe.

Erosion is a severe hazard if these soils are overgrazed or overcut. They are especially susceptible to streambank erosion unless they are well managed.

Management of the Soils for Wildlife [5]

The Teton Area is favorable for many kinds of wildlife. The scattered and mingled areas of woodland, range, cultivated fields, and water provide food and cover for many mammals, birds, and fish.

Mule deer are the most abundant of the big game animals, but there are also populations of elk and moose. Beaver, mink, muskrat, and other small furbearers live along the streams and in the marshes. Waterfowl use the meadows and marshes and the Teton River during the migration and nesting seasons, and they feed in nearby fields. Shorebirds and other water-loving birds also live in these areas.

Of an estimated 3,000 sandhill cranes in North America, about 1,500 of them visit the marshes, wet meadows, and grain fields of the Teton Area during their fall migration. About 50 pairs of cranes nest in the marshes annually, and an additional 250 pairs are summer residents. The number of sandhill cranes is now so small that there is fear of their extinction. Several kinds of trout live in the Teton River and its tributaries.

The mourning dove and the cottontail rabbit are the main upland game species. In addition, the Chinese pheasant and the Hungarian partridge have been introduced. There are several kinds of grouse, including the sage, sharp-tailed, ruffed, blue, and Franklin grouse. The sage and sharp-tailed grouse were once abundant but are now scarce.

The wildlife population is largely determined by the suitability of the habitat—that is, the supply of food, cover, and water. Habitats differ in their capacity to provide these essential needs. Some of these differences are due to the soils; others are due to management. To improve the habitat for wildlife, good management practices are needed, including the integration of wildlife conservation with other uses of the soils.

Wildlife Habitat Types

The soils of the Teton Area are grouped into three wildlife habitat types (fig. 17). These types, in turn, are divided into subtypes to show more closely the relationships that exist between wildlife and soils.

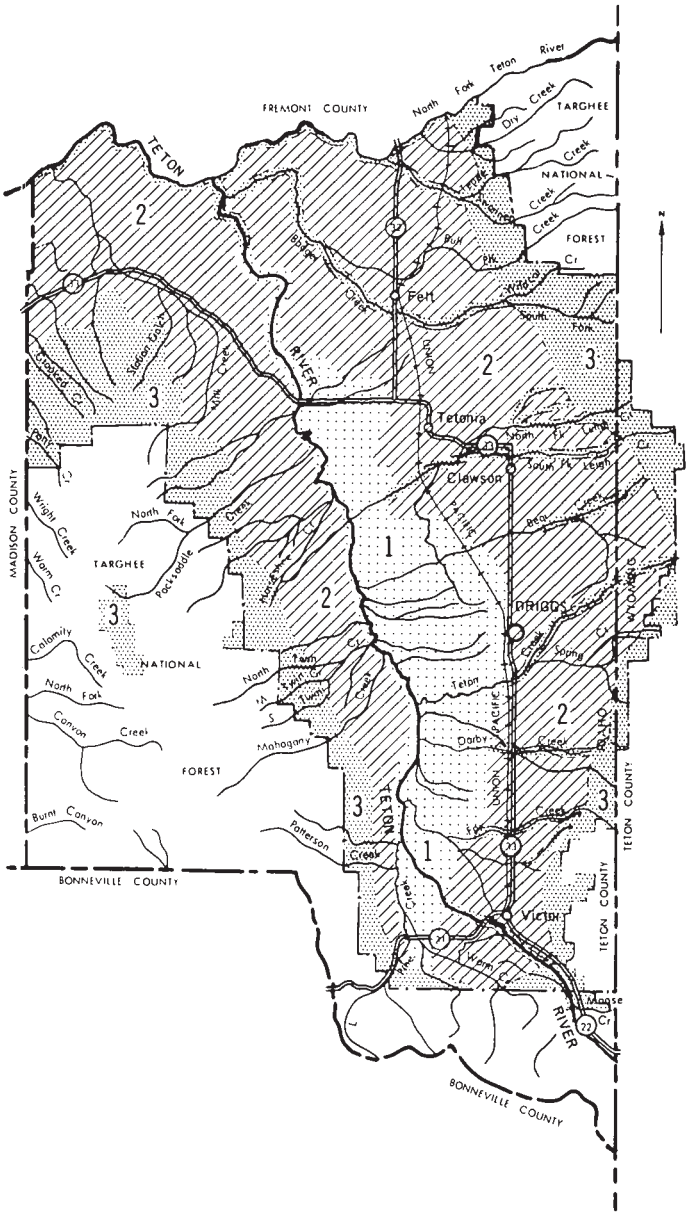

Figure 17.—**This map of the Teton Area shows the three wildlife habitat types: (1) marsh, wet meadow, dry meadow, and the Teton River; (2) cultivated land and range; and (3) mountain foot slopes, canyons of the Teton River and Badger Creek, and wooded channels of tributary streams.**

[5] Prepared with the assistance of PAUL M. SCHEFFER, biologist, SCS, and ROBERT SHERWOOD, game biologist, Idaho Department of Fish and Game.

In the following pages each habitat type and subtype is described, the characteristic wildlife species are listed, and the conservation problems and needs are discussed.

The scientific and common names of the principal plants that grow in the Teton Area are listed in the section "General Nature of the Area." Information related to wildlife management can also be found in the sections "Management of the Soils for Crops," "Management of the Soils for Range," and "Management of the Soils for Woodland."

Wildlife habitat type 1

This habitat type makes up about 15 percent of the Teton Area. It occurs along the center of the Teton River drainage basin and is surrounded by cultivated lands. It consists of soils that have impeded drainage and are permanently or seasonally wet, and it includes a section of the Teton River (fig. 18). Most of the acreage is used for pasture and hay crops.

The soils are mainly those of the Furniss, Zohner, Zundell, Cedron, Tonks, Foxcreek, Tepete, and Zufelt series.

There are four subtypes—Marsh, Wet Meadow, Dry Meadow, and Teton River.

MARSH

This habitat subtype consists mostly of Cedron, Furniss, Tepete, and Zohner soils and the miscellaneous land type, Marsh.

The vegetation is made up of cattails, bulrushes, spikerushes, marsh grasses, and other water-loving plants.

Waterfowl use these marshlands extensively during the migration and nesting seasons. Among the important kinds of waterfowl are the redhead and the mallard, the greenwinged, bluewinged, and cinnamon teal, the gadwall, the pintail, and the Canada goose.

These soils provide feeding and nesting places for such shorebirds as the Wilson snipe, the long-billed curlew, the Wilson phalarope, the western willet, the lesser yellowlegs, and the sandhill crane. Resident furbearers are the muskrat, mink, and beaver.

Overgrazing and trampling by livestock, marsh burning, and siltation of streams are the causes of the problems related to conservation of the wildlife habitat. The siltation is the result of erosion of soils along Teton Creek and Moose Creek and erosion of the dryfarmed soils on the west side of the Teton River. Overcoming these problems re-

Figure 18.—**In the foreground are Cedron soils, Marsh, and the Teton River, all in wildlife habitat type 1. In the background are mostly Dra, Dranyon, and Greys soils on the mountains in wildlife habitat type 3.**

quires control of grazing, protection from burning, and control of erosion.

WET MEADOW

This habitat subtype is made up of the slightly higher areas of Cedron, Furniss, Tepete, and Zohner soils and Marsh.

About 85 percent of the vegetation consists of grasses and grasslike plants, including sedges, some rushes, and a small amount of tufted hairgrass, redtop, and mannagrass. About 10 percent of the vegetation consists of willow, shrubby cinquefoil, and other shrubs, and the rest is made up of native clovers and other forbs. These percentages apply if the vegetation is in fair to good condition, as defined under range condition classes in the section "Management of the Soils for Range."

Waterfowl and shorebirds use these meadows during the nesting season. The most important of these are the mallard, the gadwall, the pintail, the Canada goose, and the greenwinged, bluewinged, and cinnamon teal. Others are the Wilson snipe, the long-billed curlew, the Wilson phalarope, the western willet, and the lesser yellowlegs.

Overgrazing and trampling, flooding, and insufficient food are the main causes of problems related to conservation of the wildlife habitat. Overcoming these problems requires control of gazing, control of surface water, and establishment of perennial food plants.

Cedron silty clay loam, Furniss silty clay loam, Zohner silty clay loam, and Zohner silty clay loam, moderately deep variant, are well suited to the construction of fish ponds.

DRY MEADOW

This habitat subtype consists mostly of Foxcreek, Latahco, Tonks, Zufelt, and Zundell soils.

Grasses and grasslike plants, mostly sedges, make up the plant cover. Some areas are irrigated and produce more grass than sedge.

Waterfowl and shorebirds, including many of those listed for Wet Meadow, use these areas for nesting.

Careful management of livestock is needed to prevent overgrazing and trampling. The habitat can be improved by planting annual and perennial food crops.

Latahco loam, cold variant, Tonks silty clay loam, Tonks-Cedron silty clay loams, and Zundell silty clay loam are well suited to the construction of fish ponds.

TETON RIVER

The Teton River is the habitat for many species of waterfowl, including those listed under Marsh. It is also used by the Wilson phalarope and by muskrat, mink, and beaver.

Trout are the most important game fish. The cutthroat is the only species native to the Teton River and its tributaries. The eastern brook trout and the rainbow trout, which have been introduced, are also present.

Before the Teton Area was settled, excellent spawning areas were available for trout, and the streams were generally clear. Over the years, siltation, loss of spawning grounds, diversion of irrigation water from the river and its tributaries, and other adverse changes in the habitat have reduced the number of cutthroat trout.

Siltation is the major factor contributing to the decreasing number of fish in the Teton River. It is the result of erosion of soils along Teton Creek, Moose Creek, and others and the erosion of dryfarmed soils on the west side of the Teton River. Chiefly because of siltation, one species of trout has replaced another in some streams, and eventually all trout may be replaced by rough, or "trash," fish.

A general plan is needed for improving fish and wildlife habitat along the river and its tributary streams. Particular attention should be given to such measures as the control of grazing on higher lying areas and the protection of streambanks from livestock trampling.

Wildlife habitat type 2

This habitat type makes up about 70 percent of the Teton Area and includes most of the cultivated soils and an appreciable acreage of scattered range. Undulating to rolling uplands form the northern part. Alluvial fans sloping toward the center of the Teton Valley from the steeper mountain slopes form the southern part. These fans are dissected by numerous wooded drainageways that are in habitat type 3.

The soils are mainly those of the Ard, Driggs, Felt, Feltonia, Karlan, Lantonia, Packsaddle, Richvale, Rin, Ririe, and Tetonia series. Packsaddle silt loam, 0 to 2 percent slopes, and Packsaddle silt loam, 2 to 4 percent slopes, are well suited to water impoundment for trout.

This habitat type is divided into two subtypes, Cultivated Land and Range.

CULTIVATED LAND

This habitat subtype consists mostly of Driggs, Felt, Feltonia, Packsaddle, Richvale, and Tetonia soils.

Wheat, barley, potatoes, peas, and alfalfa are the major crops. Grasses, forbs, and shrubs grow along roadsides and in odd areas.

Most of the cultivated crops provide food for ducks, geese, and sandhill cranes that live in the adjoining habitat type 1. Sometimes these birds damage the crops.

Included also are several kinds of upland game. The mourning dove and cottontail rabbit are common. There are a few sage grouse and sharp-tailed grouse—two native birds that once were abundant—and small populations of Chinese pheasant and Hungarian partridge.

The cultivated areas generally lack the vegetative cover that allows upland game to escape from enemies and to find protection from snow and wind in winter. They may also lack the cover needed for nesting.

These needs can be met through the use of windbreaks, hedges, and fencerows and by the seeding of permanent grass along field borders, in waterways, and in buffer strips.

RANGE

This habitat subtype consists of Packsaddle, Karlan, Ard, Ridgecrest, Ririe, and Wiggleton soils.

The vegetation is about 45 percent grasses, 45 percent shrubs, and 10 percent forbs. The predominant grasses are bluebunch wheatgrass, Idaho fescue, Sandberg bluegrass, junegrass, and needle-and-thread. The shrubs are big sagebrush, three-tip sagebrush, bitterbrush, and gray horsebrush. Balsamroot, tapertip hawksbeard, Wyeth hawksbeard, phlox, and yarrow are the predominant forbs. These percentages apply if the range vegetation is in fair to good condition, as defined in the section "Management of the Soils for Range."

Range is inhabited by upland game wildlife. Most common are the mourning dove and cottontail rabbit. There are a few sage grouse and sharp-tailed grouse and small

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populations of Chinese pheasant and Hungarian partridge. In addition, there is a winter population of mule deer.

The clearing of range for cultivation eliminates vegetation that is essential to wildlife. Also, in many places, the desirable forage has been depleted by overgrazing or burning.

Management is needed that improves the growth of the better forage plants, controls range fires, and provides larger areas for sage grouse, sharp-tailed grouse, and other wildlife that need as much as 160 acres for a habitat. The Wiggleton soils and others that are not suited to cultivation are highly suitable for grouse and other wildlife.

Wildlife habitat type 3

This habitat type makes up about 15 percent of the Teton Area. The largest part of it is in the higher positions between habitat type 2 and the Targhee National Forest (fig. 19). Most of the rest is in the canyons of the Teton River and Badger Creek and along some of the tributary streams. A small acreage occurs as an "island" surrounded by the Targhee National Forest west of the main Teton Area.

The soils are mainly those of the Greys, Dranyon, Turnerville, and Mikesell series.

Generally, the soils formed under sagebrush and grass, lodgepole pine and aspen, or cottonwood and aspen. These soils provide important winter habitats for big game animals.

The habitat subtypes are Mountain Foot Slopes, Canyons of the Teton River and Badger Creek, and Wooded Channels of Tributary Streams.

MOUNTAIN FOOT SLOPES

This habitat subtype consists of Dra, Dranyon, Greys, Ridgecrest, Judkins, Mikesell, Rin, Rammel, Swanner, and Turnerville soils.

It is made up of (1) woodland and range bordering both sides of the Teton Valley in the southern part of the Area, (2) dryfarmed soils, woodland, and range adjoining the Targhee National Forest in the northeast corner, and (3) cultivated slopes, dissected by deep, wooded ravines at higher elevations in the western part of the Area.

A large part of the acreage of Rin soils and a smaller acreage of Greys soils are dryfarmed for grain crops. Judkins and Turnerville soils have their original cover of lodgepole pine and other trees. Aspen, a tree that is rated highly as wildlife food, grows on soils of the Greys series. Most of the other soils have nearly the original vegetation.

The plant cover is about 45 percent grass, 40 percent

***Figure 19.*—A typical view of soils in wildlife habitat types 2 and 3. On the foothills in the background are mostly Dra, Dranyon, and Greys soils in type 3. In the foreground are gently sloping soils, mostly Lantonia, Tetonia, and Rin, in type 2.**

shrubs, and 15 percent forbs. Bluebunch wheatgrass, Idaho fescue, Sandberg bluegrass, and Columbia needlegrass are the predominant grasses. Big sagebrush, bitterbrush, snowberry, serviceberry, big rabbitbrush, and little rabbitbrush are the common shrubs. Balsamroot, deervetch, tapertip hawksbeard, butterweed, yarrow, and geranium are the forbs. These percentages apply if the vegetation is in fair to good condition.

These open slopes are grazed by livestock and big game animals. Mule deer, elk, and moose inhabit the area, mostly in winter, but a small number of deer are present all year long. Other kinds of wildlife are the cottontail rabbit, mourning dove, and Hungarian partridge and all the kinds of grouse common to the Area.

Conservation problems result from the lack of grassy nesting cover for upland birds, the competition for food between wildlife and livestock, and the limited capacity for production of food for big game animals during the winter. The habitat can be improved by seeding grass in waterways, buffer strips, and field borders, by controlling livestock grazing, and by promoting the growth of browse plants in winter range.

CANYONS OF THE TETON RIVER AND BADGER CREEK

This habitat subtype consists mainly of Judkins, Rammel, and Swanner soils, which are used for range. These soils are in the canyons of Badger Creek and the Teton River, including the north fork of that river.

The vegetation on the warm south slopes is about 60 percent shrubs, 30 percent grasses, and 10 percent forbs. Big sagebrush, bitterbrush, snowberry, serviceberry, and chokecherry are the common shrubs. Idaho fescue, Columbia needlegrass, bluebunch wheatgrass, and big bluegrass are the predominant grasses. Tapertip hawksbeard, balsamroot, phlox, Wyeth eriogonum, and others are the forbs. These percentages apply if the vegetation is in fair to good condition. On the cool north slopes, lodgepole pine is predominant.

Large numbers of mule deer, elk, and moose inhabit these canyons during winter, and a few deer stay in the canyons all year long. Beaver are present in many sections where there are streams of low gradient and a food supply of willow, alder, and similar woody plants. There are several kinds of trout in the streams.

Conservation problems are caused by range fires, by competition between domestic and wild animals for forage, and by the limited capacity to support wildlife in winter.

Prevention of fires and control of livestock grazing are essential. Careful management of livestock is needed, particularly in winter yards used by big game animals. The development of additional winter yards is desirable, as well as the control to keep the size of game herds commensurate with winter food resources.

WOODED CHANNELS OF TRIBUTARY STREAMS

This habitat subtype occurs as narrow strips bordering the smaller streams. The principal soils are those of the Badgerton and Wiggleton series and the shallow variants of the Foxcreek series.

The vegetation is about 60 percent trees and shrubs, 35 percent grasses, and 5 percent forbs. The common trees and shrubs are aspen, birch, narrowleaf cottonwood, conifers, willow, alder, dogwood, rose, big sagebrush, big rabbitbrush, and bitterbrush. Kentucky bluegrass, redtop, timothy, basin wildrye, and sod-forming wheatgrasses are the common grasses. Yarrow, lupine, larkspur, stinging nettle, geranium, and horsemint are the predominant forbs. These percentages are based on vegetation in fair to good condition.

These wooded stream channels have a year-long population of mule deer and are important winter habitats for elk and moose. In addition, they are used by big game animals as seasonal migration lanes to the Teton River and to the open, grassy slopes of the Teton Valley.

The upland game includes the ruffed grouse, mourning dove, and cottontail rabbit.

The main problem of management results from the competition between big game animals and livestock for browse and forage, especially during the winter. Control of livestock grazing is needed to improve the habitat.

Engineering Properties of the Soils [6]

Some soil properties are of special interest to engineers because they affect the construction and maintenance of roads, airports, pipelines, building foundations, water storage facilities, erosion control structures, irrigation and drainage systems, and sewage disposal systems. The properties most important to the engineer are permeability, shear strength, compaction characteristics, soil drainage, shrink-swell potential, grain size, plasticity, and pH. Topography and depth to the water table and to bedrock also are important.

Engineers can use the information in this publication to—

1. Make studies that will aid in selecting and developing industrial, business, residential, and recreational sites.
2. Plan the construction of drainage systems, farm ponds, irrigation systems, and other soil and water conservation structures.
3. Make preliminary evaluations of soils in selecting locations for highways, airports, pipelines, cables, and building locations and in planning detailed soil surveys at the selected locations.
4. Locate sources of sand, gravel, and other construction materials.
5. Correlate performance of engineering structures with soil mapping units and thus develop information for planning that will be useful in designing and maintaining such structures.
6. Determine the suitability of various soils for cross-country movement of vehicles and construction equipment.
7. Supplement information from other sources and make engineering maps and reports.
8. Develop other preliminary estimates for construction purposes pertinent to a specific area.

With the use of the soil map for identification, the engineering interpretations reported here can be useful for

[6] KEITH B. BLACKBURN, civil engineer, SCS, assisted in the preparation of this section.

many purposes. It should be emphasized that they do not eliminate the need for sampling and testing at the site of specific engineering works involving heavy loads and where the excavations are deeper than the depths of layers here reported. Even in these situations, the soil map is useful for planning more detailed field investigations and for indicating the kinds of problems that can be expected.

Most of the information in this section is given in table

TABLE 3.—*Engineering*

[Tests performed by the Bureau of Public Roads in accordance with standard

Soil name and location	Parent material	Report No.	Depth	Horizon	Moisture-density data [1]		Mechanical analysis [2]		
					Maximum dry density	Optimum moisture	Percentage passing sieve—		
							3-in.	¾-in.	No. 4 (4.7 mm.)
			In.		*Lb. per cu. ft.*	*Pct.*			
Cedron silty clay loam:									
NE¼SW¼ sec. 29, T. 4 N., R. 45 E.	Alluvium.	S32645	3–10	A12ca	76	38			
		S32646	18–24	C2cag	100	22			
SE¼SW¼ sec. 28, T. 4 N., R. 45 E.	Alluvium.	S32642	4–10	A12	81	33		100	98
		S32643	16–22	Ccag	92	28		100	98
		S32644	28–38	IICcag	120	13			
Driggs silt loam:									
NW¼NE¼ sec. 19, T. 5 N., R. 46 E.	Alluvium.	S31823	0–5	Ap	107	16		97	92
		S31824	14–22	B2t	111	15		100	98
SW cor., SE¼ sec. 2, T. 3 N., R. 45 E.	Alluvium.	S32639	0–2. 5	A11	98	20		99	97
		S32640	10–19	B2t	112	16		98	95
		S32641	38–48	IIC	129	9	96	61	36
Greys silt loam:									
NE¼ sec. 12, T. 6 N., R. 45 E.	Calcareous loess.	S31825	5–11	A13	105	17			
		S31826	17–26	B21t	110	16			
		S31827	56–84	C1ca	110	15			
NW cor., SW¼SW¼ sec. 2, T. 6 N., R. 45 E.	Loess.	S31828	1–4. 5	A12	96	20			
		S31829	8–13	A2	108	15			
		S31830	22–42	B22t	106	18			
Lantonia silt loam:									
SE¼SE¼SE¼ sec. 24, T. 7 N., R. 44 E.	Calcareous loess.	S31962	0–6	Ap	104	18			
		S31963	18–24	B1	111	15			
		S31964	37–52	C1ca	111	15			
		S31965	68–110	C3	111	14			
SW¼ sec. 30, T. 7 N., R. 44 E.	Calcareous loess.	S31834	0–8	Ap	100	19			
		S31835	19–30	B21	111	15			
		S31836	63–80	Cca	111	15			
Ririe silt loam:									
SW¼SW¼ sec. 28, T. 7 N., R. 43 E.	Calcareous loess.	S31831	0–6	Ap	108	15			
		S31832	14–25	C2ca	108	16			
		S31833	49–65	C5ca	110	15			
NE¼SE¼NE¼ sec. 36, T. 7 N., R. 43 E.	Calcareous loess.	S31966	0–5	Ap	108	15			
		S31967	14–23	C2ca	108	17			
		S31968	37–51	C4ca	108	16			
Tetonia silt loam:									
0.2 mile S. and 100 feet W. of NE cor., sec. 36, T. 7 N., R. 43 E.	Calcareous loess.	S31837	0–6	Ap	104	17			
		S31838	18–24	B2	109	16			
		S31839	24–35	C1ca	107	17			
		S31840	50–70	IIC4ca	106	16			
SW¼SE¼NW¼ sec. 5, T. 6 N., R. 44 E.	Calcareous loess.	S31976	0–7	Ap	101	20			
		S31977	13–19	B1	110	16			
		S31978	24–35	C1ca	108	16			
		S31979	64–110	IIC5ca	110	15			

See footnotes at end of table.

3, "Engineering test data," table 4, "Estimated engineering properties of the soils," and table 5, "Engineering interpretations of the soils."

Some of the terms used in this publication have special meanings in soil science that do not correspond with the meanings of the same terms in engineering. These terms are defined in the Glossary according to their meanings in soil science.

test data

procedures of the American Association of State Highway Officials (AASHO)]

Mechanical analysis [2]—Continued							Liquid limit	Plasticity index	Classification	
Percentage passing sieve—Con.			Percentage smaller than—							
No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.			AASHO	Unified [3]
		98	95	81	59	49	75	29	A–7–5(20)	MH
100	99	97	95	77	52	34	39	14	A–6(10)	ML–CL
98	97	91	88	70	48	38	68	26	A–7–5(18)	MH
97	91	82	80	64	48	37	41	10	A–5(8)	ML
	100	61	51	33	18	12	23	6	A–4(5)	ML–CL
90	83	74	70	44	25	18	30	9	A–4(8)	CL
97	90	80	76	52	35	28	35	16	A–6(10)	CL
96	91	82	77	44	20	14	33	5	A–4(8)	ML
93	90	82	74	42	21	17	30	10	A–4(8)	CL
28	15	6	6	4	2	2	[4] NP	NP	A–1–a(0)	GW–GM
		98	89	46	21	16	28	4	A–4(8)	ML
		99	90	50	27	23	32	11	A–6(8)	CL
		98	85	42	20	16	27	4	A–4(8)	ML
		97	89	48	22	16	36	7	A–4(8)	ML
		98	89	48	21	16	26	3	A–4(8)	ML
		99	93	57	36	31	40	19	A–6(12)	CL
	100	94	85	47	24	18	30	7	A–4(8)	ML–CL
		96	87	48	24	20	29	9	A–4(8)	CL
		97	86	47	24	19	27	6	A–4(8)	ML–CL
		96	85	38	17	12	22	2	A–4(8)	ML
		98	87	45	23	18	32	5	A–4(8)	ML
		98	90	50	25	21	27	6	A–4(8)	ML–CL
		98	90	50	22	16	26	4	A–4(8)	ML–CL
		97	83	42	19	15	26	4	A–4(8)	ML–CL
		99	91	55	32	24	30	8	A–4(8)	ML–CL
		98	87	40	14	10	26	4	A–4(8)	ML–CL
		97	87	46	22	18	26	5	A–4(8)	ML–CL
		99	91	55	32	24	29	8	A–4(8)	CL
		97	84	39	15	10	25	4	A–4(8)	ML–CL
		97	87	46	21	15	28	5	A–4(8)	ML
		98	88	48	24	19	28	6	A–4(8)	ML–CL
		98	89	54	29	23	29	7	A–4(8)	ML–CL
		97	85	40	15	11	26	3	A–4(8)	ML
		98	90	45	22	16	29	6	A–4(8)	ML
		99	90	50	24	22	29	8	A–4(8)	CL
		98	90	52	27	21	28	6	A–4(8)	ML–CL
		98	86	39	16	11	24	3	A–4(8)	ML

TABLE 3.—*Engineering*

Soil name and location	Parent material	Report No.	Depth	Horizon	Moisture-density data [1]		Mechanical analysis [2]		
					Maximum dry density	Optimum moisture	Percentage passing sieve—		
							3-in.	¾-in.	No. 4 (4.7 mm.)
			In.		*Lb. per cu. ft.*	*Pct.*			
Turnerville silt loam:									
NW¼SE¼ sec. 8, T. 6 N., R. 46 E.	Calcareous loess.	S31973	1. 5–7	A22	102	16	--------	--------	--------
		S31974	15–29	B21t	106	19	--------	--------	--------
		S31975	52–70	B31t	109	17	--------	--------	--------
SW¼NW¼ sec. 36, T. 7 N., R. 45 E.	Calcareous loess.	S31969	5–9	A23	103	16	--------	--------	--------
		S31970	19–30	B21t	107	18	--------	--------	--------
		S31971	39–53	B3t	110	16	--------	--------	--------
		S31972	53–85	C1ca	106	18	--------	--------	--------
Zohner silty clay loam:									
NE¼NW¼ sec. 34, T. 5 N., R. 45 E.	Alluvium.	S32647	3–8	A12ca	81	34	--------	--------	--------
		S32648	16–25	C4cag	109	18	100	95	93
		S32649	25–37	IIC5cag	129	8	100	82	63
SW¼NE¼ sec. 32, T. 5 N., R. 45 E.	Alluvium.	S32650	1. 5–7	A12ca	75	40	--------	99	99
		S32651	17–28	IICcag	107	19	100	78	72
		S32652	36–49	IIICag	126	9	--------	90	74
Zundell silty clay loam:									
SE¼NE¼ sec. 30, T. 5 N., R. 45 E.	Alluvium.	S32656	0–6	Apca	81	35	--------	--------	--------
		S32657	17–27	C3ca	99	23	--------	--------	--------
		S32658	42–62	IIIC6ca	130	9	--------	93	68
SE¼NW¼ sec. 32, T. 5 N., R. 45 E.	Alluvium (low terrace).	S32653	0–5. 5	Apca	84	32	--------	--------	--------
		S32654	19–25	C3ca	99	23	--------	100	97
		S32655	39	IIC5ca	128	9	100	71	40

[1] Based on method described in Moisture-Density Relations of Soils Using 5.5-lb. Rammer and 12-in. Drop, AASHO Designation: T 99–57, Method A (*1*).

[2] Mechanical analysis according to AASHO Designation: T 88 (*1*). Results by this procedure may differ somewhat from results obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHO procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey

TABLE 4.—*Estimated engineering*

[Absence of data indicates no estimate was made because classification

Soil series and map symbols	Depth from surface	Classification	
		USDA texture	Unified
	Inches		
Ard (ArD, ArB, ArF).	0 to 32	Silt loam	ML–CL
	32	Fractured rhyolite bedrock	--------
Badgerton (BaA, BaB, BdA, BgA BgB, BgC, BvC, BwA).	0 to 30	Loam, gravelly loam, or very stony loam	SM, SC, ML, or CL
For Wiggleton part of BwA, see Wiggleton series.	30	Loose gravel and sand	GW or GM
Cedron (Ce).	0 to 27	Silty clay loam	ML–CL
	27 to 42	Silt loam	ML or CL
	42	Sand and gravel	GP or GM
Dra (DaE, DeE, DeG).	0 to 21	Silt loam or very stony loam	ML or CL
	21 to 32	Very stony heavy loam	CL
	32	Fractured sandstone bedrock	--------

test data—Continued

Mechanical analysis [2]—Continued							Liquid limit	Plasticity index	Classification	
Percentage passing sieve—Con.			Percentage smaller than—						AASHO	Unified [3]
No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.				
100	99	98	90	46	17	11	24	2	A–4(8)	ML
		98	90	55	34	29	36	16	A–6(10)	CL
		98	90	55	32	26	35	15	A–6(10)	CL
		99	90	45	17	12	25	2	A–4(8)	ML
		98	90	54	34	30	39	19	A–6(12)	CL
		98	90	50	29	24	33	13	A–6(9)	CL
100	97	91	84	52	32	25	31	10	A–4(8)	CL
	100	94	92	77	54	40	55	16	A–7–5(13)	MH
90	81	73	69	56	41	32	36	15	A–6(10)	CL
52	32	21	18	12	5	4	21	2	A–1–b(0)	SM
99	98	94	91	77	57	44	63	19	A–7–5(16)	MH
70	65	61	60	46	32	25	43	22	A–7–6(10)	CL
67	48	32	28	17	7	4	20	2	A–2–4(0)	SM
100	99	95	92	75	55	45	61	23	A–7–5(17)	MH
100	98	91	86	67	46	38	39	14	A–6(10)	ML–CL
58	35	17	15	9	4	3	NP	NP	A–1–b(0)	SM
100	97	92	88	68	46	38	55	19	A–7–5(15)	MH
96	89	82	78	63	49	38	42	17	A–7–6(11)	CL
34	15	5	4	3	2	2	NP	NP	A–1–a(0)	GP–GM

procedure, the fine material is analyzed by the pipette method, and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analysis used in this table is not suitable for use in naming textural classes of soils.

[3] SCS and BPR have agreed that all soils having plasticity indexes within two points of A-line are to be given a borderline classification such as ML–CL.

[4] NP=Nonplastic.

properties of the soils

is inapplicable, material is varied, or information is insufficient]

Classification—Continued	Percentage passing sieve			Permeability	Available water capacity	Reaction	Shrink-swell potential
AASHO	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)				
				Inches per hour	*Inches per inch of soil*	*pH value*	
A–4	95–100	95–100	85–95	0.80–2.50	0.18–0.20	7.4–9.0	Low to moderate.
A–4 or A–6	60–95	50–90	40–60	0.80–2.50	0.13–0.17	7.4–8.4	Low.
A–1	20–30	15–25	0–12	>10	0.04–0.05	7.4–7.8	Low.
A–4 or A–6	100	95–100	85–100	0.05–0.80	0.18–0.20	7.4–8.4	Moderate.
A–4 or A–6	95–100	95–100	60–70	0.80–2.50	0.18–0.20	7.4–8.4	Low to moderate.
A–1	35–50	25–40	0–12	>10	0.04–0.05	7.4–8.4	Low.
A–4 or A–6	60–95	50–90	30–80	0.80–2.50	0.12–0.20	6.1–7.3	Low to moderate.
A–6	40–50	20–30	15–25	0.80–2.50	0.08–0.09	7.4–8.4	Low.

TABLE 4.—*Estimated engineering*

Soil series and map symbols	Depth from surface	Classification	
		USDA texture	Unified
	Inches		
Dranyon (DgG, DgF).	2 to 0	Organic material	Pt
	0 to 47	Stony loam	ML or CL
	47	Fractured sandstone	
Driggs (DsA, DtA, DsB, DsC, DrA, DrB, DrD, DoA, DwA).	0 to 25	Silt loam or gravelly or cobbly loam	SM, ML, or CL
For Wiggleton part of DwA, see Wiggleton series.	25 to 35	Very gravelly coarse sandy loam	GM
	35	Sand and gravel	GW
Felt (FlA, FlB, FlC, FlD, FeD).	0 to 34	Loam or gravelly loam	SM, ML, or CL
	34	Sand and gravel	GP or GW
Feltonia (FnA, FnB, FoB, FoD).	0 to 36	Loam	ML or CL
	36 to 49	Very gravelly loam	GM or SM
	49	Sand and gravel or sand	SW or SM
Foxcreek (Fs, Fr).	0 to 19	Loam or gravelly loam	SM, SC, ML, or CL
	19	Loose sand and gravel	GW, GP, or GM
Foxcreek, shallow variant (Ft, Fu).	0 to 11	Loam or gravelly loam	SM or SC
	11	Sand and gravel	GW
Foxcreek, heavy subsoil variant (Fv).	2 to 0	Organic matter	Pt
	0 to 30	Silty clay loam	MH
	30	Sand and gravel	GP or GM
Furniss (Fx, Fw).	2 to 0	Organic matter	Pt
	0 to 30	Silty clay loam	MH
	30 to 35	Heavy fine sandy loam	SM or SC
	35	Sand and gravel	GP or GM
Greys (GeD, GeE, GeF, GrE).	1.5 to 0	Forest litter	
For Rin part of GrE, see Rin series.	0 to 17	Silt loam	ML
	17 to 38	Heavy silt loam	CL
	38 to 84	Silt loam	ML–CL
Greys, thick surface variant (GlG).	2 to 0	Forest litter	Pt
	0 to 36	Silt loam	ML–CL
	36 to 71	Heavy silt loam	CL
	71	Tuffaceous rhyolite	
Judkins (JuH, JuF, JuG).	2 to 0	Forest litter	Pt
	0 to 39	Extremely stony loam	ML or CL
	39	Rhyolite or latite bedrock	
Karlan (KaD, KaB, KaE, KaF).	0 to 18	Silt loam	ML–CL
	18 to 26	Gravelly heavy silt loam	SM or ML
	26 to 32	Extremely stony loam	ML or CL
	32	Rhyolitic tuff bedrock	
Lantonia LaCD, LaA, LaB, LaC, LaD, LaE, LaE2, LaF, LrD, LrE, LtB, LtC, LtD, LtE, and LtE2.	0 to 110	Silt loam	ML–CL
For Rin part of LrD and LrE, see Rin series; for Tetonia part of LtB, LtC, LtD, LtE, and LtE2, see Tetonia series.			
Latahco, cold variant (Lv).	0 to 29	Heavy loam	ML or CL
	29 to 52	Silty clay	CL or CH
	52 to 61	Gravelly loam	SM
Marsh (Ma).			
Mikesell (MkF, MvG).	1.5 to 0	Forest litter	Pt
	0 to 15	Stony or very stony silt loam	ML or CL
	15 to 45	Gravelly or cobbly light clay	CL or CH
	45 to 59	Cobbly clay loam	CL
	59	Weathering shale or sandstone	

properties of the soils—Continued

Classification—Continued	Percentage passing sieve			Permeability	Available water capacity	Reaction	Shrink-swell potential
AASHO	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)				
				Inches per hour	*Inches per inch of soil*	*pH value*	
				5. 00–10. 00		5. 6–6. 0	
A–4 or A–6	80–90	70–80	50–70	0. 20–0. 80	0. 10–0. 12	5. 6–6. 0	Low.
A–4 or A–6	80–100	60–95	40–85	0. 80–2. 50	0. 10–0. 20	6. 6–7. 3	Low to moderate.
A–1	40–60	20–40	5–15	>10	0. 05–0. 06	6. 6–7. 8	Low.
A 1	25–35	15–25	0–5	>10	0. 04–0. 05	6. 6–7. 8	Low.
A–4 or A–6	80–95	60–95	40–70	0. 80–2. 50	0. 10–0. 14	7. 4–8. 4	Low.
A–1	30–45	25–35	0–5	>10	0. 04–0. 05	7. 4–8. 4	Low.
A–4 or A–6	90–100	95–100	50–60	0. 80–2. 50	0. 14–0. 16	7. 4–8. 4	Low.
A–1 or A–2	50–60	20–50	10–20	5. 0–10. 0	0. 06–0. 10	7. 4–8. 4	Low.
A–1, A–2, or A–3	30–100	25–100	0–25	>10	0. 04–0. 05	7. 5–8. 5	Low.
A–4 or A–6	80–95	60–95	40–70	0. 80–2. 50	0. 10–0. 16	6. 6–7. 3	Low.
A–1	35–50	25–40	0–15	>10	0. 04–0. 05	7. 4–8. 4	Low.
A–4 or A–6	80–95	60–95	40–50	0. 80–2. 50	0. 10–0. 16	7. 4–8. 4	Low.
A–1	20–30	15–25	0–5	>10	0. 04–0. 05	7. 4–8. 4	Low.
				>10		7. 4–7. 8	
A–7	100	100	80–100	0. 20–0. 80	0. 18–0. 20	7. 4–8. 4	Moderate.
A–1	35–50	25–40	0–12	>10	0. 04–0. 05	7. 4–8. 4	Low.
				>10		7. 4–7. 8	
A–7	100	100	80–100	0. 20–0. 80	0. 18–0. 20	7. 4–8. 4	Moderate.
A–2	100	100	25–35	2. 50–5. 00	0. 13–0. 15	7. 4–8. 4	Low.
A–1	35–50	25–40	0–12	>10	0. 04–0. 05	7. 4–8. 4	Low.
				>10		5. 6–6. 5	
A–4	100	100	90–100	0. 80–2. 50	0. 18–0. 20	5. 6–6. 5	Low to moderate.
A–6	100	100	90–100	0. 20–0. 80	0. 18–0. 20	6. 1–7. 3	Moderate.
A–4	100	100	80–90	0. 80–2. 50	0. 18–0. 20	7. 4–8. 4	Low to moderate.
				>10		4. 5–6. 0	
A–4	100	100	90–100	0. 80–2. 50	0. 18–0. 20	5. 1–6. 0	Low to moderate.
A–6	100	100	90–100	0. 20–0. 80	0. 18–0. 20	5. 6–6. 0	Moderate.
				>10			
A–4 or A–6	30–40	20–30	10–20	0. 80–2. 50	0. 04–0. 05	5. 6–6. 0	Low.
A–4	95–100	95–100	80–90	0. 80–2. 50	0. 18–0. 20	6. 1–7. 3	Low to moderate.
A–4 or A–6	60–90	50–80	40–60	0. 80–2. 50	0. 11–0. 13	6–1–7. 3	Low.
A–4 to A–6	30–40	20–30	10–20	0. 80–2. 50	0. 04–0. 05	7. 4–7. 8	Low.
A–4	100	100	80–100	0. 80–2. 50	0. 18–0. 20	5. 6–8. 4	Low to moderate.
A–4 or A–6	95–100	95–100	60–70	0. 80–2. 50	0. 15–0. 17	5. 6–6. 0	Moderate.
A–7	100	100	90–100	0. 05–0. 20	0. 15–0. 17	5. 1–6. 0	Moderate.
A–4	85–100	60–80	40–50	0. 80–2. 50	0. 10–0. 12	6. 1–6. 5	Low.
						5. 1–6. 0	
A–4 or A–6	30–60	20–50	15–30	0. 80–2. 50	0. 08–0. 12	5. 6–6. 0	Low.
A–4, A–7	70–85	70–80	40–60	0. 05–0. 20	0. 10–0. 12	5. 6–6. 0	Moderate.
A–6	70–90	65–85	40–60	0. 20–0. 80	0. 10–0. 12	6. 1–6. 5	Low to moderate.
						6. 1–7. 3	

TABLE 4.—*Estimated engineering*

Soil series and map symbols	Depth from surface	Classification	
		USDA texture	Unified
	Inches		
Packsaddle (PcA, PcB, PaD).	0 to 40	Light silty clay loam	CL
	40	Sand and gravel	GW
Rammel (RaG, RaF, RaH, ReD, RfH). For Swanner part of RfH, see Swanner series.	0 to 39	Very stony or extremely stony loam	ML or CL
	39	Rhyolite bedrock	
Richvale (RhA, RhB).	0 to 38	Silt loam	ML or CL
	38 to 65	Gravelly loam	SM
	65	Very gravelly sandy loam	GW
Ridgecrest (RoG, RoF).	0 to 37	Very cobbly loam	ML or CL
	37	Limestone bedrock	
Rin (RpCD, RpB, RpC, RpD, RpE, RpF, RrE). For Greys part of RrE, see Greys series.	0 to 104	Silt loam	ML–CL
Ririe (RsD2, RsD3, RsE2, RsE3, RsF2, RtD, RtE, RtE3). For Tetonia part of RtD, RtE, and RtE3, see Tetonia series.	0 to 125	Silt loam	ML or CL
Rock land (Ru).			
Swanner (SwF, SeD, SvD, SwG, SwH).	0 to 15	Stony, very stony, or extremely stony loam	ML or CL
	15	Rhyolite bedrock	
Tepete (Te, Ta).	0 to 29	Peat	Pt
	29 to 43	Silty clay loam	CL
	43	Sand and gravel	GP or GM
Tetonia (TkAB, TkA, TkB, TkC, TkCD, TkD, TkE, TlD, TlE, TnD, TnE). For Lantonia part of TlD and TlE, see Lantonia series; for Ririe part of TnD and TnE, see Ririe series.	0 to 95	Silt loam	ML
Tonks (To, Tr). For Cedron part of Tr, see Cedron series.	0 to 41	Silty clay loam	MH
	41 to 58	Loam	ML or CL
	58 to 78	Light coarse sandy loam	SM
	78	Sand and gravel	GW
Tonks, strongly calcareous variant (TsB, TsA).	0 to 80	Silt loam	ML or CL
Turnerville (TuD, TuE, TuF, TuG).	2 to 0	Forest litter	Pt
	0 to 15	Silt loam	ML
	15 to 86	Heavy silt loam or light silty clay loam	CL
	86	Rhyolite bedrock	
Wiggleton (We, Wo, Wg, Wt). For Badgerton part of Wt, see Badgerton series.	0 to 14	Gravelly loam or very gravelly loam	GM or SM
	14	Loose sand and gravel	GW or GM
Zohner (Zc, Zd).	0 to 27	Silty clay loam	CL or MH
	27 to 39	Gravelly coarse sandy loam	SM or SC
	39 to 45	Very gravelly loamy coarse sand	GM or SM
	45	Sand and gravel	GP
Zufelt (Ze, Zf). For Foxcreek part of Zf, see Foxcreek series.	0 to 33	Loam	ML or CL
	33	Sand and gravel	GW
Zundell (Zu).	0 to 27	Silty clay loam	MH
	27 to 42	Gravelly silt loam	SM or ML
	42 to 62	Very gravelly loamy coarse sand	GM

properties of the soils—Continued

Classification—Continued	Percentage passing sieve			Permeability	Available water capacity	Reaction	Shrink-swell potential
AASHO	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)				
				Inches per hour	*Inches per inch of soil*	*pH value*	
A–6	90–100	85–95	80–95	0. 20–0. 80	0. 18–0. 20	7. 4–8. 4	Moderate.
A–1	25–35	15–25	0–12	>10	0. 04–0. 05	7. 4–8. 4	Low.
A–4	30–60	20–50	10–20	0. 80–2. 50	0. 04–0. 06	6. 1–8. 3	Low.
A–4	95–100	90–100	80–90	0. 80–2. 50	0. 18–0. 20	6. 6–7. 8	Low to moderate.
A–4	60–90	50–80	35–50	0. 80–2. 50	0. 10–0. 12	7. 4–7. 8	Low.
A–1	30–50	15–25	0–10	>10	0. 05–0. 06	7. 4–8. 4	Low.
A–4	30–60	25–50	20–40	0. 80–2. 50	0. 05–0. 07	7. 4–9. 0	Low.
A–4	100	100	90–100	0. 80–2. 50	0. 18–0. 20	5. 6–7. 8	Low to moderate.
A–4	100	100	90–100	0. 80–2. 50	0. 18–0. 20	7. 4–8. 5	Low to moderate.
A–4	15–60	10–50	5–25	0. 80–2. 50	0. 04–0. 07	6. 6–8. 4	Low.
				>10	0. 50	5. 6 6. 5	
A–6	100	100	90–100	0. 20–0. 80	0. 18–0. 20	6. 6–7. 8	Moderate.
A–1	35–50	25–40	0–12	>10			Low.
A–4	100	100	90–100	0. 80 -2. 50	0. 18–0. 20	7. 4–8. 4	Low to moderate.
A–7	100	100	90–100	0. 20–0. 80	0. 18–0. 20	7. 4–7. 8	Moderate.
A–4	95–100	95–100	60–70	0. 80–2. 50	0. 14–0. 16	7. 4–7. 8	Low to moderate.
A–2	95–100	95–100	25–35	>10	0. 10–0. 12	7. 4–7. 8	Low.
A–1	30–50	15–25	0–5	>10	0. 04–0. 05		
A–4	100	100	90–100	0.80–2.50	0.18–0.20	7.4–8.4	Low to moderate.
						5.1–6.5	
A–4	100	100	90–100	0.80–2.50	0.18–0.20	5.6–6.5	Low to moderate.
A–6	100	100	90–100	0.20–0.80	0.18–0.20	5.1–6.0	
A–1	20–95	15–50	10–35	0.80–2.50	0.05–0.08	7.4–8.4	Low.
A–1	50–65	35–50	5–10	>10	0.04–0.05	7.4–8.4	Low.
A–6 or A–7	100	100	90–100	0.20–0.80	0.18–0.20	7.4–8.4	Moderate.
A–2	60–80	50–70	20–35	>10	0.06–0.08	7.9–8.4	Low.
A–2 to A–1	20–60	15–50	5–15	>10	0.05–0.06	7.4–8.4	Low.
A–1	35–50	25–40	0–12	>10	0.04–0.05	7.4–8.4	Low.
A–4	100	100	50–70	0.80–2.50	0.14–0.16	7–4–8.4	Low to moderate.
A–1	30–50	15–25	0–5	>10	0.04–0.05	7.9–8.4	Low.
A–6	100	100	90–100	0. 20–0. 80	0. 18–0. 20	7. 9–9. 0	Moderate.
A–4	60–90	50–80	40–60	0. 80–2. 50	0. 11–0. 13	7. 9–8. 4	Low.
A–2 or A–1	20–60	15–50	10–15	>10	0. 04–0. 05	7. 9–8. 4	Low.

TABLE 5.—*Engineering*

Soil series and map symbols	Suitability as a source of—			Soil features affecting	
	Topsoil	Sand and gravel (for road subbase)	Road fill	Highway location	Dikes or levees
Ard (ArD, ArB, ArF)	Surface layer good.	Unsuitable.	Fair; side slopes erodible.	Cut slopes erodible; rhyolite substratum.	Piping.
Badgerton (BaA, BaB, BdA, BgA, BgB, BgC, BvC, BwA). For Wiggleton part of BwA, see Wiggleton series.	Surface layer good.	Good.	Fair; side slopes erodible	Cut slopes erodible; spring flooding.	Piping.
Cedron (Ce)	Surface layer fair.	Fair; may be difficult to obtain; high water table most of year.	Poor to fair.	High water table; spring flooding.	Low shear strength.
Dra (DaE, DeE, DeG)	Surface layer poor to fair; some soils stony.	Unsuitable.	Fair.	Sliding.	Piping.
Dranyon (DgG, DgF)	Surface layer poor to fair; stony.	Unsuitable.	Fair.	Sliding.	Piping.
Driggs (DsA, DtA, DsB, DsC, DrA, DrB, DrD, DoA, DwA). For Wiggleton part of DwA, see Wiggleton series.	Surface layer good.	Good.	Fair; side slopes erodible.	Cut slopes erodible.	Piping.
Felt (FlA, FlB, FlC, FlD, FeD).	Surface layer good.	Good.	Fair; side slopes erodible.	Cut slopes erodible.	Piping.
Feltonia (FnA, FnB, FoB, FoD).	Surface layer good.	Good.	Fair; side slopes erodible.	Cut slopes erodible.	Piping.

interpretations of the soils

Soil features affecting—Continued					Limitations for septic tank systems
Farm ponds		Agricultural drainage	Irrigation	Waterways	
Reservoir area	Embankment				
Excessive seepage.	Piping	Surface drainageways subject to erosion from spring snowmelt, summer storms, and excessive irrigation.	Erodibility on steeper slopes; moderate intake rate; moderate to very high available water capacity.	Severe erodibility on steeper slopes.	Slight to moderate on 0 to 12 percent slopes; severe on 20 to 35 percent slopes.
Excessive seepage.	Piping	Surface drainageways subject to erosion from spring snowmelt, summer storms, and excessive irrigation.	Erodibility on steeper slopes; moderate intake rate; moderate to very high available water capacity.	Moderate erodibility on steeper slopes.	Slight on 0 to 4 percent slopes; moderate on 4 to 8 percent slopes.
Slow to moderately slow permeability. Some areas suitable.	Low shear strength.	Adequate outlets difficult to obtain in some areas because of river mossing, which holds water at high level. Suitable for subsurface drainage if outlets are adequate.	Moderately slow intake rate; high to very high available water capacity. Suitable for irrigation if drained.	Vegetation easily established.	Severe.
Excessive seepage.	Piping. Larger stones must be removed to obtain satisfactory compaction.	Existing surface drainageways generally nonerodible.	Steepness and stoniness. Unsuitable.	Steepness and stoniness. Existing waterways generally nonerodible.	Severe.
Excessive seepage.	Piping. Larger stones must be removed to obtain satisfactory compaction.	Existing surface drainageways generally nonerodible.	Steepness and stoniness. Unsuitable.	Steepness and stoniness; existing waterways generally nonerodible.	Severe.
Excessive seepage.	Piping	Surface drainageways subject to erosion from spring snowmelt, summer storms, and excessive irrigation.	Erodibility on steeper slopes; moderate intake rate; moderate to very high available water capacity in nongravelly soils and low to moderate available water capacity in gravelly soils.	Moderate erodibility on steeper slopes.	Slight on 0 to 4 percent slopes; moderate on 4 to 8 percent slopes.
Excessive seepage.	Piping	Surface drainageways subject to erosion from spring snowmelt, summer storms, and excessive irrigation.	Erodibility on steeper slopes; moderate intake rate; moderate to very high available water capacity in nongravelly soils and low to moderate available water capacity in gravelly soils.	Moderate erodibility on steeper slopes.	Slight on 0 to 4 percent slopes; moderate on 4 to 12 percent slopes.
Excessive seepage.	Piping	Surface drainageways subject to erosion from spring snowmelt, summer storms, and excessive irrigation.	Erodibility on steeper slopes; moderate intake rate; moderate to very high available water capacity.	Moderate erodibility on steeper slopes.	Slight on 0 to 4 percent slopes; moderate on 4 to 12 percent slopes.

TABLE 5.—*Engineering interpretations*

Soil series and map symbols	Suitability as a source of—			Soil features affecting	
	Topsoil	Sand and gravel (for road subbase)	Road fill	Highway location	Dikes or levees
Foxcreek (Fs, Ft, Fr, Fu, Fv)	Surface layer fair to good.	Fair; seasonal high water table.	Fair; side slopes erodible.	Seasonal high water table; spring flooding.	Piping
Furniss (Fx, Fw)	Surface layer fair	Fair; may be difficult to obtain; high water table most of year.	Poor to fair	High water table; spring flooding.	Low shear strength.
Greys (GeD, GeE, GeF, GIG, GrE). For Rin part of GrE, see Rin series.	Surface layer good	Unsuitable	Fair; side slopes erodible.	Cut slopes erodible; rhyolite substratum.	Piping
Judkins (JuH, JuF, JuG)	Surface layer poor to fair; extremely stony.	Unsuitable	Fair	Sliding	Piping
Karlan (KaD, KaB, KaE, KaF).	Surface layer good	Unsuitable	Fair; side slopes erodible.	Cut slopes erodible; rhyolite substratum.	Piping
Lantonia (LaCD, LaA, LaB, LaC, LaD, LaE, LaE2, LaF, LrD, LrE, LtB, LtC, LtD, LtE, LtE2). For Rin part of LrD and LrE, see Rin series; for Tetonia part of LtB, LtC, LtD, LtE, and LtE2, see Tetonia series.	Surface layer good	Unsuitable	Fair; side slopes erodible.	Cut slopes erodible; rhyolite substratum.	Piping
Latahco (Lv)	Surface layer fair	Fair; seasonal high water table.	Poor to fair	High water table early in season; spring flooding; moderate shrink-swell ratio; frost action.	Low shear strength.
Marsh (Ma)	Poor; generally under water.	Poor; generally under water.	Poor; generally under water.	Poor; generally under water.	Low shear strength; generally under water.
Mikesell (MkF, MvG)	Surface layer poor to fair; generally low in fertility.	Unsuitable	Fair; side slopes erodible.	Cut slopes in upper horizons erodible; sandstone and weathered shale substratum.	Low shear strength.

of the soils—Continued

Soil features affecting—Continued					Limitations for septic tank systems
Farm ponds		Agricultural drainage	Irrigation	Waterways	
Reservoir area	Embankment				
Excessive seepage	Piping	Seasonal high water table. Suitable for subsurface drainage if outlets are adequate.	Moderate intake rate; very low to high available water capacity. Suitable for irrigation if drained.	Vegetation easily established.	Severe.
Slow to moderately slow permeability; some areas suitable.	Low shear strength.	Adequate outlets difficult to obtain in some areas because of river mossing, which holds water at high level. Suitable for subsurface drainage if outlets are adequate.	Moderately slow intake rate; high to very high available water capacity. Suitable for irrigation if drained.	Vegetation easily established.	Severe.
Excessive seepage	Piping	Surface drainageways subject to erosion from spring snowmelt, summer storms, and excessive irrigation.	Erodibility on steeper slopes; moderate intake rate; moderate to very high available water capacity.	Severe erodibility on steeper slopes.	Slight on 0 to 4 percent slopes; moderate on 4 to 12 percent slopes; severe on 12 to 60 percent slopes.
Excessive seepage	Piping. Larger stones must be removed to obtain satisfactory compaction.	Existing surface drainageways generally nonerodible.	Steepness and stoniness. Unsuitable.	Steepness and stoniness. Existing waterways generally nonerodible.	Severe.
Excessive seepage	Piping	Surface drainageways subject to erosion from spring snowmelt, summer storms, and excessive irrigation.	Erodibility on steeper slopes; moderate intake rate; moderate to very high available water capacity.	Severe erodibility on steeper slopes.	Slight on 0 to 4 percent slopes; moderate on 4 to 12 percent slopes; severe on 12 to 40 percent slopes.
Excessive seepage	Piping	Surface drainageways subject to erosion from spring snowmelt, summer storms, and excessive irrigation.	Erodibility on steeper slopes; moderate intake rate; moderate to very high available water capacity.	Severe erodibility on steeper slopes.	Slight on 0 to 4 percent slopes; moderate on 4 to 12 percent slopes; severe on 12 to 30 percent slopes.
Slow to moderately slow permeability. Some areas suitable.	Cracking when dry.	Seasonal high water table. Suitable for subsurface drainage if outlets are adequate.	Moderate to moderately slow intake rate; high to very high available water capacity. Suitable for irrigation if drained.	Vegetation easily established.	Severe.
Generally under water.	Generally under water.	Cannot obtain outlets	Cannot be drained	Not applicable	Severe.
Slow permeability. Some areas suitable.	Low shear strength; clay layer has slow permeability. Possibly suitable as core material.	Existing surface drainageways generally nonerodible.	Steepness; stoniness; moderately low fertility. Unsuitable.	Steepness and stoniness; existing drainageways generally nonerodible.	Severe.

TABLE 5.—*Engineering interpretations*

Soil series and map symbols	Suitability as a source of—			Soil features affecting	
	Topsoil	Sand and gravel (for road subbase)	Road fill	Highway location	Dikes or levees
Packsaddle (PcA, PcB, PaD)	Surface layer good	Good	Fair; side slopes erodible.	Cut slopes erodible.	Cracking when dry.
Rammel (RaG, RaF, RaH, ReD, RfH). For Swanner part of RfH, see Swanner series.	Surface layer poor to fair; extremely stony.	Unsuitable	Fair	Sliding	Piping
Richvale (RhA, RhB)	Surface layer good	Good	Fair; side slopes erodible.	Cut slopes erodible.	Piping
Ridgecrest (RoG, RoF)	Surface layer poor to fair; stony.	Unsuitable	Fair	Sliding	Piping
Rin (RpCD, RpB, RpC, RpD, RpE, RpF, RrE). For Greys part of RrE, see Greys series.	Surface layer good	Unsuitable	Fair; side slopes erodible.	Cut slopes erodible; rhyolite substratum.	Piping
Ririe (RsD2, RsD3, RsE2, RsE3, RsF2, RtD, RtE, RtE3). For Tetonia part of RtD, RtE, and RtE3, see Tetonia series.	Surface layer good	Unsuitable	Fair; side slopes erodible.	Cut slopes erodible; rhyolite substratum.	Piping
Rock land (Ru)	Poor, shallow to bedrock or bedrock exposed.	Unsuitable	Poor; shallow to bedrock or bedrock exposed.	Shallow to bedrock or bedrock exposed; steep slopes.	Not applicable
Swanner (SwF, SeD, SvD, SwG, SwH).	Surface layer poor to fair; stony to extremely stony.	Unsuitable	Fair	Sliding	Piping
Tepete (Te, Ta)	Surface layer of peat is a good soil amendment for established vegetation.	Fair; difficult to obtain in some places; high water table year around.	Unsuitable; peat	High water table; peat.	High water table; peat; unsuitable.
Tetonia (TkAB, TkA, TkB, TkC, TkCD, TkD, TkE, TlD, TlE, TnD, TnE). For Lantonia part of TlD and TlE, see Lantonia series; for Ririe part of TnD and TnE, see Ririe series.	Surface layer good.	Unsuitable	Fair; side slopes erodible.	Cut slopes erodible; rhyolite substratum.	Piping

of the soils—Continued

Soil features affecting—Continued					Limitations for septic tank systems
Farm ponds		Agricultural drainage	Irrigation	Waterways	
Reservoir area	Embankment				
Moderately slow permeability.	Cracking when dry; moderately slow permeability.	Surface drainageways subject to erosion from spring snowmelt, summer storms, and excessive irrigation.	Erodibility on steeper slopes; moderate intake rate; moderate to very high available water capacity.	Moderate erodibility on steeper slopes.	Severe.
Excessive seepage.	Piping. Larger stones must be removed to obtain satisfactory compaction.	Existing surface drainageways generally nonerodible.	Steepness and stoniness; unsuitable.	Steepness and stoniness; existing waterways generally nonerodible.	Moderate on 2 to 12 percent slopes; severe on 12 to 80 percent slopes.
Excessive seepage.	Piping	Surface drainageways subject to erosion from spring snowmelt, summer storms, and excessive irrigation.	Erodibility on steeper slopes; moderate intake rate; moderate to very high available water capacity.	Moderate erodibility on steeper slopes.	Slight to moderate.
Excessive seepage.	Piping. Larger stones must be removed to obtain satisfactory compaction.	Existing surface drainageways generally nonerodible.	Steepness and stoniness. Unsuitable.	Steepness and stoniness; existing waterways generally nonerodible.	Moderate on 4 to 12 percent slopes; severe on 12 to 60 percent slopes.
Excessive seepage.	Piping	Surface drainageways subject to erosion from spring snowmelt, summer storms, and excessive irrigation.	Erodibility on steeper slopes; moderate intake rate; moderate to very high available water capacity.	Severe erodibility on steeper slopes.	Slight to moderate on 2 to 12 percent slopes; severe on 12 to 30 percent slopes.
Excessive seepage.	Piping	Surface drainageways subject to erosion from spring snowmelt, summer storms, and excessive irrigation.	Erodibility on steeper slopes; moderate intake rate; moderate to very high available water capacity.	Severe erodibility on steeper slopes.	Slight to moderate on 4 to 12 percent slopes; severe on 12 to 30 percent slopes.
Not applicable	Not applicable	Not applicable	Shallow to bedrock or bedrock exposed.	Steep slopes; shallow to bedrock or bedrock exposed.	Severe.
Excessive seepage.	Piping. Larger stones must be removed to obtain satisfactory compaction.	Existing surface drainageways generally nonerodible.	Steepness and stoniness. Unsuitable.	Steepness and stoniness; existing waterways generally nonerodible.	Severe.
High water table; peat; unsuitable.	High water table; peat; unsuitable.	Suitable for subsurface drainage if outlets are adequate.	Rapid intake rate; very high available water capacity. Could be reclaimed by drainage; subsidence will occur as drained peat decomposes.	Vegetation easily established.	Severe.
Excessive seepage.	Piping	Surface drainageways subject to erosion from spring snowmelt, summer storms, and excessive irrigation.	Erodibility on steeper slopes; moderate intake rate; moderate to very high available water capacity.	Severe erodibility on steeper slopes.	Slight to moderate on 0 to 12 percent slopes; severe on 12 to 20 percent slopes.

TABLE 5.—*Engineering interpretations*

Soil series and map symbols	Suitability as a source of—			Soil features affecting	
	Topsoil	Sand and gravel (for road subbase)	Road fill	Highway location	Dikes or levees
Tonks (To, Tr, TsB, TsA)—For Cedron part of Tr, see Cedron series.	Surface layer fair	Fair; seasonal high water table.	Poor to fair	High water table early in season; spring flooding; moderate shrink-swell ratio; frost action.	Low shear strength.
Turnerville (TuD, TuE, TuF, TuG).	Surface layer fair	Unsuitable	Fair; side slopes erodible.	Cut slopes erodible; rhyolite substratum.	Piping
Wiggleton (We, Wo, Wg, Wt)—For Badgerton part of Wt, see Badgerton series.	Surface layer poor to fair; generally shallow and gravelly.	Good	Fair	Spring flooding	Piping
Zohner (Zc, Zd)	Fair to poor; soils extremely high in carbonates and have a high water table.	Fair; may be difficult to obtain; high water table most of year.	Poor to fair	High water table; spring flooding.	Low shear strength.
Zufelt (Ze, Zf)—For Foxcreek part of Zf, see Foxcreek series.	Surface layer fair to good.	Fair; seasonal high water table.	Fair; side slopes erodible.	Seasonal high water table; spring flooding.	Piping
Zundell (Zu)	Fair to poor; soils high in carbonates and have a seasonal high water table.	Fair; seasonal high water table.	Poor to fair	High water table early in season; spring flooding; moderate shrink-swell ratio; frost action.	Low shear strength.

Engineering Classification Systems

Two systems of soil classification are in general use by engineers. They are the system used by the American Association of State Highway Officials (*1*) and the Unified system used by the U.S. Army, Corps of Engineers (*14*). Estimated classifications of all the soils according to these two systems and according to the textural classification used by the U.S. Department of Agriculture (*11*) are shown in table 4. The two engineering classification systems are explained in a publication of the Portland Cement Association (*6*) and are discussed briefly here.

The American Association of State Highway Officials (AASHO) has developed a classification system based on field performance and on gradation, liquid limit, and plasticity index. In this system soils are placed in seven groups ranging from A–1 through A–7. Soils in the A–1 group are gravelly and have high bearing capacity; those in the A–7 group are clayey and have low bearing capacity when wet. Within each group the relative engineering value of the soil material is indicated by a group index number ranging from 0 for the best material to 20 for the poorest. The group index numbers are in parentheses and are shown only in the test data in table 3.

The Unified system, developed by the Waterways Experiment Station, Corps of Engineers, and adopted by the U.S. Department of Agriculture, is based on the texture and plasticity of soils, as well as their performance. Three soil fractions are recognized—gravel, sand, and fines (silt and clay). Soils are classified as coarse grained (eight classes), fine grained (six classes), and highly organic (one class) according to their content of the three soil fractions. A letter symbol indicates the principal characteristics of the soils. The coarse-grained soils are gravel (G) and sand (S), and each of these is divided into four secondary groups. Fine-grained soils are subdivided into silt (M)

of the soils—Continued

Soil features affecting—Continued					Limitations for septic tank systems
Farm ponds		Agricultural drainage	Irrigation	Waterways	
Reservoir area	Embankment				
Slow to moderately slow permeability. Some areas suitable.	Cracking when dry.	Seasonal high water table. Suitable for subsurface drainage if outlets are adequate.	Moderate to moderately slow intake rate; high to very high available water capacity. Suitable for irrigation if drained.	Vegetation easily established.	Severe.
Excessive seepage.	Piping.	Surface drainageways subject to erosion from spring snowmelt, summer storms, and excessive irrigation.	Erodibility on steeper slopes; moderate intake rate; moderate to very high available water capacity.	Severe erodibility on steeper slopes.	Severe.
Excessive seepage.	Piping.	Shallowness; gravel; spring flooding. Generally unsuitable for cultivation.	Shallowness; low available water capacity; channeled relief. Generally unsuitable.	Low available water capacity; shallowness. Vegetation difficult to establish.	Slight.
Slow to moderately slow permeability; some areas suitable.	Low shear strength.	Adequate outlets difficult to obtain in some areas because of river mossing, which holds water at a high level; suitable for subsurface drainage if outlets are adequate.	Moderately slow intake rate; high to very high available water capacity. Suitable for irrigation if drained.	Vegetation easily established.	Severe.
Excessive seepage.	Piping.	Seasonal high water table. Suitable for subsurface drainage if outlets are adequate.	Moderate intake rate; very low to high available water capacity. Suitable for irrigation if drained.	Vegetation easily established.	Severe.
Slow to moderately slow permeability; some areas suitable.	Cracking when dry.	Seasonal high water table. Suitable for subsurface drainage if outlets are adequate.	Moderate to moderately slow intake rate; high to very high available water capacity. Suitable for irrigation if drained.	Vegetation easily established.	Severe.

and clay (C), depending on liquid limit and plasticity index. The silt and clay groups are each divided into secondary groups according to whether the soils have low (L) or high (H) liquid limit. The highly organic soils, such as peat and muck, are generally very compressible and have undesirable construction characteristics. They are placed in one group designated by the symbol Pt.

Engineering Test Data

To evaluate the soils for engineering purposes, samples from nine of the principal soil series of the Teton Area were tested by standard AASHO procedures. Only selected layers of each soil were sampled. The results of these tests are presented in table 3.

The engineering soil classifications in table 3 are based on data obtained by grain-size analysis and by tests to determine liquid limit and plastic limit. The grain-size analysis was made by a combination of the sieve and hydrometer methods.

Liquid limit and plastic limit tests measure the effect of water on the consistency of soil material. As the moisture content of a clayey soil increases, the material changes from semisolid to plastic, and, as the moisture content further increases, the material changes from plastic to liquid. The plastic limit is the moisture content, expressed as a percentage of the oven-dry weight of the soil, at which the soil material passes from a semisolid to a plastic state. The liquid limit is the moisture content at which the material passes from plastic to liquid. The plasticity index is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which the soil material is in a plastic condition. Some silty and sandy soils are nonplastic; that is, they do not become plastic at any moisture content.

Moisture-density data in table 3 were obtained by me-

chanical compaction. If soil material is compacted at successively higher moisture content and the compaction effort remains constant, the density of the compacted material increases until the optimum moisture content is reached. After that, the density decreases with increase in moisture content. The highest dry density obtained in the compaction test is the maximum dry density. Moisture-density data are important in earthwork, for, as a rule, soil is most stable if it is compacted to the maximum dry density when it is at the optimum moisture content.

Estimates of Soil Properties

Table 4 contains estimates of soil properties that affect engineering. The estimates are given for soil series and variants. Estimates of percentages passing sieves were based on test data, if available, and on the USDA textural classification. The AASHO and Unified classifications of fine-textured soils were determined by using a standard summary chart that shows the relationship of AASHO and Unified classifications to USDA textural classifications. AASHO and Unified classifications of coarse-textured soils were determined from the USDA soil descriptions. The soil properties referred to in table 4 are defined here.

Permeability is the quality of a soil that enables water or air to move through it. It is expressed as the rate at which water percolates through undisturbed soil and is measured in inches per hour. Permeability is important because it affects the settlement rate of structures and the performance of drainage systems and sewage disposal fields.

Available water capacity is the difference between the amount of water in a soil at field capacity and the amount at the permanent wilting point. The difference is the amount of water available to plants. The estimates in table 4 are based on ranges suggested by Shockley (*7*). Available water capacity must be considered in planning irrigation.

Soil reaction is the acidity or alkalinity expressed in pH value. The lower values indicate acidity, and the higher values alkalinity.

Shrink-swell potential is the change in volume that can be expected as the moisture content of a soil changes. The estimates are based on textural classification and field observation. Fine-textured soils generally have a higher shrink-swell potential than coarse-textured soils.

Engineering Interpretations of the Soils

In table 5 the soil series are rated according to their suitability as construction material, and features of the soils are given that affect specific engineering practices.

Formation and Classification of the Soils

This section explains the soil-forming factors and relates them to the soils of the Teton Area. It also explains the current system of classifying soils above the series level and shows the classification of the soil series.

Factors of Soil Formation

Soil is produced by the action of soil-forming processes on material deposited or accumulated by geologic agencies. The characteristics of the soil at any given point are determined by the nature of the parent material from which the soil formed; the climate under which the soil has existed; the plant and animal life in and on the soil; the relief, or lay of the land; and the length of time the factors of soil formation have acted on the soil material (*9*).

Parent material

Figure 20 shows the kinds and sources of the regolith in which the soils of the Teton Area formed (*12*, *13*).

Most of the northern part of the Area is covered with a deep mantle of loess. The loess overlies flows of rhyolite, latite, and rhyolitic welded tuff or, in places, glacial gravel, sand, and boulders. The Lantonia, Tetonia, Ririe, Greys,

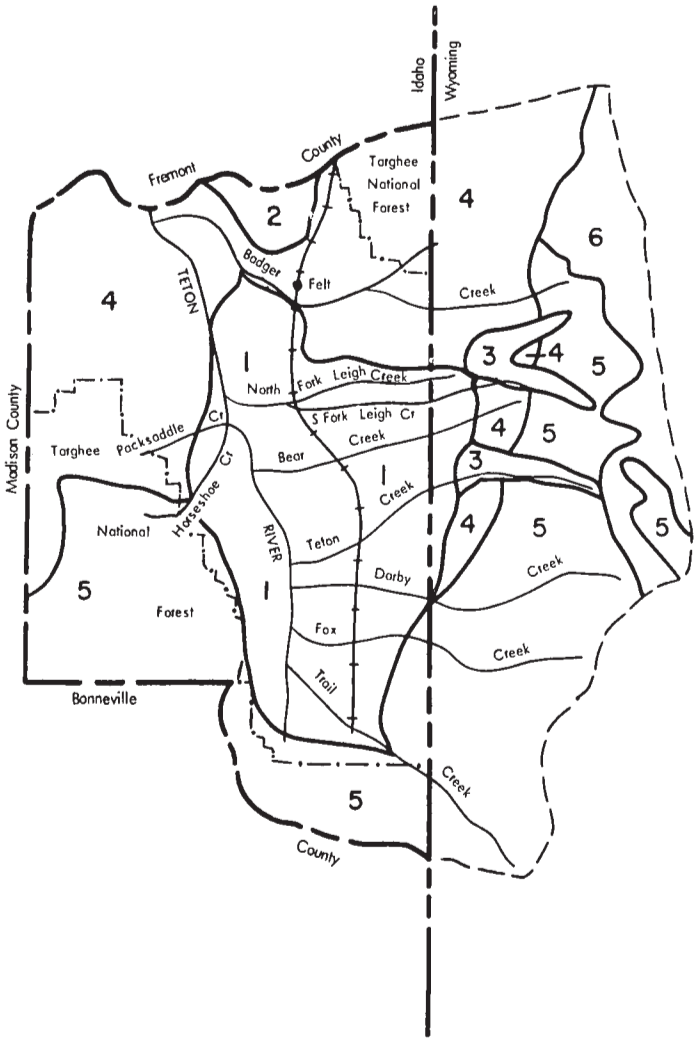

Figure 20.—**Kinds and sources of regolith in which the soils of the Teton Area formed: 1=Alluvium—Quaternary (Recent); 2=Glacial gravel, sand, and boulders—Quaternary, loess covered; 3=Glacial gravel, sand, and boulders—Quaternary; 4=Volcanic rocks, mainly silicic—Tertiary, mostly loess covered; 5=Hard sedimentary rocks—Cretaceous and older; 6=Precambrian rocks, undivided, chiefly granite.**

and Turnerville soils formed in this deep loess. They have been little influenced by the underlying formations. At the northern end of the Big Hole Mountains and also on the canyon walls, the loessal mantle is thin and the underlying rocks are weathered and are a part of the soil material. The Ard, Karlan, Swanner, Rammel, and Judkins soils formed in these areas.

Most of the soils in the southern part of the Area formed in alluvium washed from the surrounding mountains. The alluvium was deposited as large, gently sloping, coalescing alluvial fans. The fans slope from both sides of the valley toward the Teton River. As is usual with water-transported material, the sediments are coaser textured on the upper part of the alluvial fans and finer textured near the bottom of the valley. In many places, the alluvium is overlain by loess and locally wind-reworked sediments.

The alluvium is derived from rocks of different mineral composition. For example, in the Horseshoe Creek district there is an unbroken sequence of sedimentary rocks that range in age from lower Mississippian to upper Cretaceous. Lithologically, this sequence includes limestone, sandstone, phosphorite, conglomerate, shale, and quartzite (*3*). In the areas around the Teton peaks, the rocks are Precambrian and are chiefly granite. Some of the foothills are covered with rhyolite flows of Tertiary age.

Most of the alluvium is Recent. Its composition varies, depending on the source, and this variation is apparent in the soils that formed on the different alluvial fans.

The alluvium on the fans of Teton Creek, Badger Creek, and the north and south forks of Leigh Creek contains a large amount of material weathered from granite and gneiss of the Teton peaks. Mica flakes are visible in the soils. The alluvium also contains material derived from sandstone, quartzite, rhyolite, limestone, dolomite, and other rocks. Some of the soils in the Driggs series formed on these fans. Generally they are noncalcareous as far down as the underlying gravel.

Alluvium derived from limestone is predominant on the fans of Darby, Fox, and Trail Creeks. There are also large amounts of material weathered from dolomite, sandstone, and associated sedimentary rocks of Devonian, Cambrian, and Pennsylvanian age. Some of the Driggs soils formed in this material, but because of the carbonates, they have formed more slowly than the Driggs soils on the fans previously described. Generally the Driggs soils that formed in this material have a layer of carbonate accumulation fairly near the surface.

On the western side of the valley, as far north as the alluvial fan of Horseshoe Creek, the alluvium was derived from sedimentary rocks, mainly limestone, sandstone, and shale. Most of the soils in this area are noticeably red, probably because of the red sandstone formations in the mountains of this area. Richvale soils formed in this type of alluvium.

Packsaddle soils formed on the alluvial fans and drainageways of Horseshoe Creek and Packsaddle Creek. They are generally finer textured than soils on the other alluvial fans. Most of the parent material appears to have been derived from sandstone, shale, coal beds, and conglomerate (*3*) of the Frontier and similar formations of Upper Cretaceous age.

The soils on mountain foot slopes generally formed in residuum from the sedimentary formations mentioned in the preceding paragraphs. Most of these soils formed in the residuum of the underlying rocks and have not had the mixing of parent materials that is characteristic of soils on the alluvial fans. The Ridgecrest, Dranyon, Dra, and Mikesell soils formed in this type of parent material.

Climate

The cool summers and the long, cold winters in this Area do not promote the rapid clay formation that occurs in warmer climates. The variation in the amount of precipitation accounts for many of the differences in the soils. Water dissolves minerals and moves them from one layer to another. Thus, different kinds of soils form. The annual precipitation ranges from about 13 to 28 inches or more and increases from east to west. The higher elevations generally receive more precipitation than the lower elevations.

The following illustrates the effect of precipitation on soil formation. Ririe soils formed in loess on southerly slopes in the western part of the Area, where the annual precipitation is about 12 to 15 inches. Only the surface layer of these soils has been leached of lime; it is mildly to moderately alkaline. Eastward, as precipitation increases, the layer of lime accumulation is progressively deeper in the profile. In the eastern part of the Area, it occurs at a depth of about 5 feet. Turnerville soils also formed in loess, but in the eastern part of the Area where the annual precipitation is about 20 to 28 inches. Generally these soils are leached of lime to a depth of more than 5 feet. Some of their horizons are strongly acid. The clay content is only about 7 or 8 percent in the surface layer but is about 25 to 30 percent in the subsoil. This fact is evidence of the downward movement of clay and also of the weathering of minerals in place.

Precipitation has had little effect on the soils of the wet bottom lands. The amount of moisture received from seepage and overflow far exceeds that received from precipitation.

Living organisms

Different types of vegetation absorb different amounts and kinds of nutrients from the soil, return different kinds of residue, and thus influence the kind of soil that forms.

In most of the Area, the soils formed under a cover of bunchgrass and scattered sagebrush and associated vegetation. The Tetonia, Lantonia, Driggs, and Rin soils are examples of soils that formed under grass.

The soils along stream channels on the alluvial fans, Badgerton and Wiggleton soils for example, formed under cottonwood, scattered aspen, and other trees. They are youthful soils and have been little influenced by the vegetation.

Greys soils formed under aspen, which occurs as scattered patches on the north and east slopes in the northwestern part of the Area and as almost pure stands at slightly higher elevations on the uplands and lower foothills.

Turnerville soils are generally under lodgepole pine, which occurs on higher, more moist sites than aspen.

At still higher elevations, the vegetation consists of Douglas-fir, subalpine fir, and a few spruce trees.

Furniss, Foxcreek, Zohner, and Tepete soils formed on the wet bottom lands under sedges, rushes, willows, and other water-tolerant vegetation.

Animal activity also influences the development of soils. Rodents, badgers, coyotes, and other burrowing

animals burrow deep on the south slopes of the loessal uplands. They bring part of the calcareous subsoil to the surface, mix material from the various horizons, and slow down soil formation. The activity of rodents is evident in the Ririe soils and in some of the soils on the alluvial fans where the underlying gravel has been brought to the surface and some soils are more gravelly than others. The activity of earthworms is noticeable in a few areas where soil material has been removed from one horizon and deposited in another.

Relief

Relief influences the formation of soils through its effect on runoff, drainage, and exposure. The steeper the slope, the more rapid the runoff. The loss of moisture is highly significant on southern exposures.

The Driggs, Richvale, Packsaddle, and other soils of the alluvial fans are generally very gently sloping, and they absorb most of the moisture that falls.

The Badgerton soils, which are along the recent stream channels, receive extra moisture from seepage from the streams. Sometimes they are flooded during periods of rapid runoff from the mountains. On the nearly level parts of the alluvial fans, the soils are poorly drained and the water table is at or near the surface much of the time. These soils support only water-tolerant vegetation. They differ from the well-drained soils higher on the alluvial fans in having the gray colors characteristic of soils that lack oxygen and consequently have an accumulation of reduced iron. In places where the water table fluctuates and allows oxygen to enter through cracks or root channels, there are mottles of yellow or rusty brown.

The Zohner, Zundell, Cedron, and Zufelt soils contain large amounts of carbonates because of a high water table. The Furniss soils receive an excessive amount of water and are completely leached of free carbonates.

Exposure strongly influences the formation of soils in the Teton Area. Its effect on the Ririe, Tetonia, and Lantonia soils is shown in figure 21.

In winter, the snow blows from the south slopes of the Ririe soils and piles up on the north slopes. When spring comes, what little snow is left on the south slopes is exposed to the direct rays of the sun. It melts early, often before a general thaw. The water runs off, taking some soil with it and leaving many rills. The soil loses not only moisture but some of its surface layer. The vegetation on the south slopes was probably never tall enough to help keep the snow from blowing or to protect the soils from the direct rays of the sun.

On the broad ridgetops the snow becomes fairly deep on Tetonia soils, and there is enough vegetation to help keep the snow in place. These soils generally receive a normal amount of moisture.

The Lantonia soils, which have north and east slopes, receive the snow blown from the south slopes. Because the snow is not exposed to the direct rays of the sun, it melts slowly. These soils are cool and have luxuriant vegetation, including trees. They have a thick, dark-colored surface horizon that is high in organic-matter content and absorbs moisture readily. They lose very little moisture through runoff.

Time

The length of time the parent material has been in place is an important factor in soil formation. The soil material

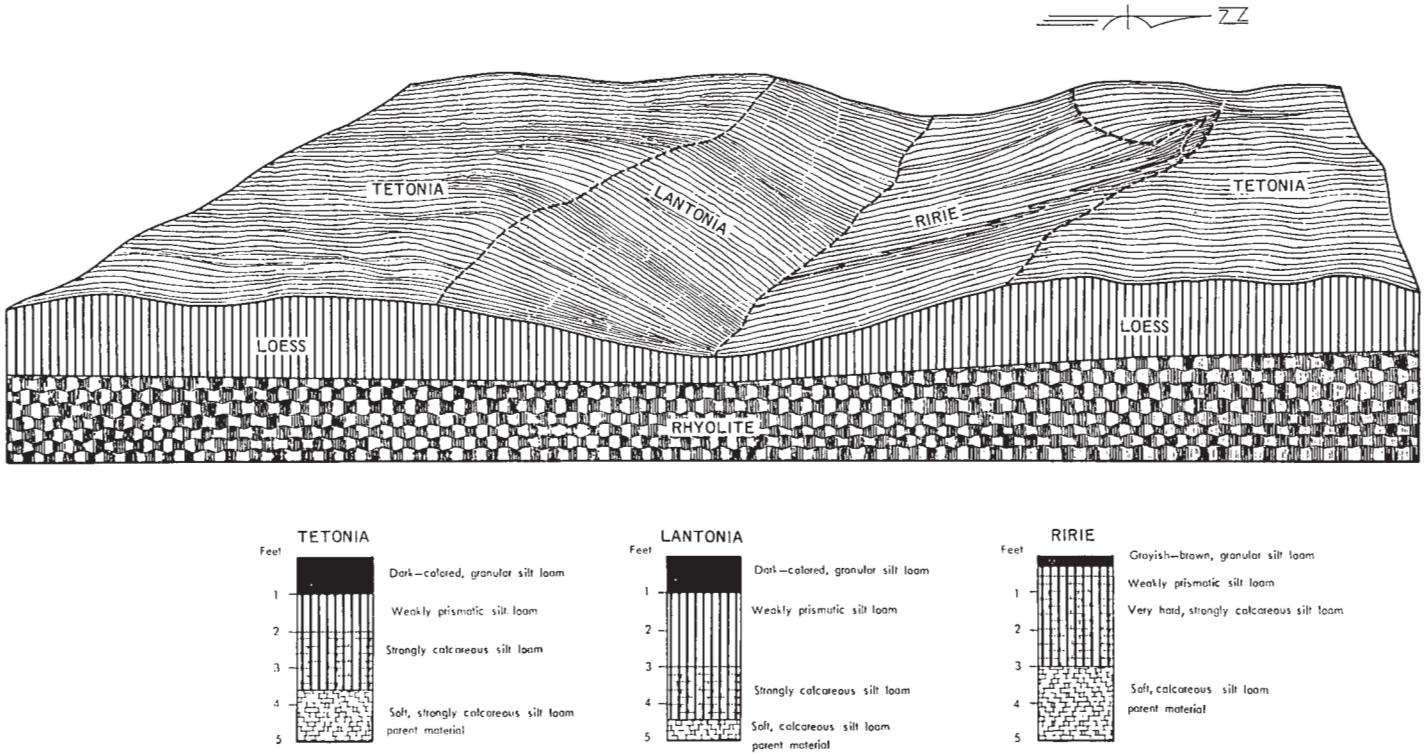

***Figure 21.*—Relative positions of Ririe, Tetonia, and Lantonia soils. The profile sketches show the effect of exposure on the formation of these soils.**

along the stream channels in this Area has been deposited only recently. The Badgerton soils, for example, formed in recently deposited alluvium. They show little or no modification of the original material by the soil-forming processes. In other areas, the alluvium has been in place for thousands of years. In fact, most of the soil material of the Teton Area has been in place long enough to have soil characteristics that result from the genetic processes of soil formation. The alluvium in which the Driggs soils formed was similar to that in which the Badgerton soils formed, but it had been in place long enough to have lost many of the characteristics of the original alluvium. The Driggs soils are more uniform in texture and color than the Badgerton soils. They also have more clay in the subsoil than in the surface soil.

The age of the loess is not known, but on the more gentle slopes in the northern part of the Area, carbonates have been leached to a depth of about 2 feet, and there is a slight increase in clay above the carbonates. In the eastern part of this same area where rainfall is greater, carbonates are leached to a depth of several feet and the soils show a definite clay increase in the B horizon. The soils on the alluvial fans generally have a weak textural B horizon. Those on the mountain foothills, Dra soils for example, generally have a more strongly developed textural B horizon, probably because the soil material has been in place for a longer time.

Classification of the Soils

The soils of the Teton Area have been classified according to the current system of classification (*10*), which has been used by the National Cooperative Soil Survey since 1965.

The current system has six categories. Beginning with the most inclusive, these categories are the order, the suborder, the great group, the subgroup, the family, and the series. In this system the criteria for classification are the observable or measurable properties. The properties are so chosen that soils of similar mode of origin are grouped together. Placement of some soil series in the current system of classification, particularly in families, may change as more precise information becomes available. Readers interested in the development of this system should refer to the latest available literature (*8, 10*).

Table 6 shows the classification of each soil series of the Teton Area by family, subgroup, and order of the current classification system.

General Nature of the Area

The Teton Valley was discovered by John Coulter in 1807. It was first known as Pierre's Hole, after Vaux Pierre, a trapper who visited the area in 1812. It was a fur-trapping ground and the site of trading between the Indians and early companies.

The first permanent settlers came to the Teton Valley in 1882, but development did not begin until 1888 when Mormon settlers from Salt Lake City established Driggs. The next year Mormons from Cache Valley, Utah, founded Victor.

In 1960 the population of the Area was about 2,800. Driggs, the county seat of Teton County, Idaho, and the largest community in the Area, had a population of 824; Victor, a population of 240; and Tetonia, 194.

Climate[7]

Data on the climate of the Teton Area are given in tables 7, 8, 9, and 10. Table 7 gives average daily maximum and minimum temperatures, average monthly precipitation, and other data at Driggs. Tables 8 and 9 show probabilities of freezing temperatures in spring and fall at Driggs and at the Tetonia Experiment Station. Table 10 contains data on precipitation at Felt and Tetonia and the Tetonia Experiment Station.

The Teton Area, because of its elevation, has a rigorous climate of long, cold winters and moderately warm summers. Distribution of precipitation throughout the year permits dryfarming, although about one-third of the cropland is irrigated. The short growing season limits the kinds of crops that can be grown.

Snowfall is an important source of water for crops and pasture. Snow cover is continuous on the valley floor for about 140 days each winter.

Rains in spring and early in summer aid in preventing droughts during the growing season, but dry spells late in summer and early in autumn occasionally interfere with preparation of the soil and the seeding of winter grains.

Sunshine is generally ample during the growing season. The hours of sunshine are more than 50 percent of the possible number of hours in April and May, more than 60 percent in June, and 70 to 80 percent in July, August, and September. The possible hours of sunshine each day are about 13 in mid-April, 14 in mid-May, 15 in mid-June, 15 in mid-July, 14 in mid-August and 12 in mid-September.

There are few damaging storms. Hail and destructive winds are uncommon. Drifting snow occasionally blocks traffic, but blizzards such as those experienced in the Great Plains are almost unknown.

Freezing weather can occur any month of the year. At Driggs the average dates of the last 32-degree temperature in spring and the first in fall are June 22 and August 14, and there are about 53 days of freeze-free weather. Most of the vegetation in the Area, however, probably can withstand a temperature of 32 degrees but would be damaged by a temperature of 28 degrees. A 28-degree temperature occurs, on the average, as late as May 29 and as early as September 8, a span of 102 days.

Daytime temperature varies only a little from one part of the valley to another, but nighttime temperature is affected by slope and elevation and by type of cover. Under clear skies and with light winds, slopes that allow cooling air to run off are generally warmer than depressions in which cool air collects.

Variation in precipitation from place to place within the Teton Area is not adequately documented. Records of climate have been kept at Driggs since 1907, but at other locations such records have been kept for shorter periods. At Felt, for example, the records cover the period from June 1919 to May 1932, when the equipment was moved to

[7] By D. J. Stevlingson, State climatologist for Idaho, U.S. Weather Bureau, Department of Commerce.

TABLE 6.—*Soil series classified according to the current system of classification*

Series	Family	Subgroup	Order
Ard	Coarse-loamy, mixed	Calcic Cryoborolls	Mollisols.
Badgerton	Coarse-loamy over sandy or sandy-skeletal, mixed.	Pachic Haploxeric Cryoborolls	Mollisols.
Cedron	Fine-silty, carbonatic	Calcic Cryaquolls	Mollisols.
Dra	Fine-loamy, mixed	Argic Cryoborolls	Mollisols.
Dranyon	Fine-loamy, mixed	Argic Pachic Cryoborolls	Mollisols.
Driggs	Fine-loamy over sandy or sandy-skeletal, mixed	Argic Cryoborolls	Mollisols.
Felt	Coarse-loamy over sandy or sandy-skeletal, mixed.	Calcic Cryoborolls	Mollisols.
Feltonia	Coarse-loamy, mixed	Calcic Pachic Cryoborolls	Mollisols.
Foxcreek	Fine-loamy over sandy or sandy-skeletal, mixed, noncalcareous.	Typic Cryaquolls	Mollisols.
Foxcreek, shallow variant	Coarse-loamy over sandy or sandy-skeletal, mixed, noncalcareous, thin.	Typic Cryaquolls	Mollisols.
Foxcreek, heavy subsoil variant	Fine-loamy over sandy or sandy-skeletal, mixed, noncalcareous.	Typic Cryaquolls	Mollisols.
Furniss	Fine-loamy, mixed, noncalcareous	Typic Cryaquolls	Mollisols.
Greys	Fine-silty, mixed	Boralfic Cryoborolls	Mollisols.
Greys, thick surface variant	Fine-silty, mixed	Cryic Paleborolls	Mollisols.
Judkins	Loamy-skeletal, mixed	Mollic Cryoboralfs	Alfisols.
Karlan	Fine-loamy, mixed	Pachic Cryoborolls	Mollisols.
Lantonia	Coarse-silty, mixed	Pachic Cryoborolls	Mollisols.
Latahco, cold variant	Fine, montmorillonitic, frigid	Argiaquic Xeric Argialbolls	Mollisols.
Mikesell	Fine, montmorillonitic	Typic Cryoboralfs	Alfisols.
Packsaddle	Fine-loamy, mixed	Argic Pachic Cryoborolls	Mollisols.
Rammel	Fine-loamy, mixed	Argic Cryoborolls	Mollisols.
Richvale	Fine-loamy, mixed	Calcic Pachic Cryoborolls	Mollisols.
Ridgecrest	Loamy-skeletal, carbonatic	Cryic Rendolls	Mollisols.
Rin	Coarse-silty, mixed	Pachic Cryoborolls	Mollisols.
Ririe	Coarse-silty, mixed, frigid	Calcic Entic Haploxerolls	Mollisols.
Swanner	Loamy-skeletal, mixed, frigid	Calcic Lithic Haploxerolls	Mollisols.
Tepete	[1]	[1]	Histosols.
Tetonia	Coarse-silty, mixed	Pachic Cryoborolls	Mollisols.
Tonks	Fine-loamy, mixed, calcareous	Typic Cryaquolls	Mollisols.
Tonks, strongly calcareous variant	Fine-silty, mixed, frigid	Aquic Cryoborolls	Mollisols.
Turnerville	Fine-silty, mixed	Glossic Cryoboralfs	Alfisols.
Wiggleton	Coarse-loamy over sandy or sandy-skeletal, mixed.	Typic Cryoborolls	Mollisols.
Zohner	Fine, carbonatic	Calcic Cryaquolls	Mollisols.
Zohner, moderately deep variant	Fine-loamy over sandy or sandy-skeletal, carbonatic.	Calcic Cryaquolls	Mollisols.
Zufelt	Fine-loamy over sandy or sandy-skeletal, mixed	Calcic Cryaquolls	Mollisols.
Zundell	Fine, carbonatic	Calcic Cryoborolls	Mollisols.

[1] Not classified.

Tetonia. In May 1952 the thermometer shelter and rain gage were moved from Tetonia to the experiment station, which is 6½ miles north-northwest. Tables 7 and 10 summarize data from the four locations, but, because of the varying periods of record, positive statements about differences in precipitation are not possible.

Despite the inadequate concurrent records from different locations and the lack of ideal distribution of the stations at which observations have been made, it is possible to reach some conclusions about distribution of precipitation. Topography has an important effect on precipitation, especially where mountains are as prominent as those around the Teton Valley. As most storms, with their moisture-laden air, approach the Area from the west or southwest, the air is forced up the west side of the mountains. The moist air, as it is forced upward, cools by expansion and releases some of its moisture as rain or snow. The first effect, then, of moist air approaching the valley from westerly or southwesterly direction, is precipitation west or south of the Area. When this air first enters the Teton Valley, it is moving downslope and precipitation decreases for a short distance eastward from the crest of the range. Traveling across the valley, the air soon encounters mountains even higher than those over which it has just passed. The lifting and cooling process is repeated, and precipitation again results.

Frequency of precipitation, as well as amount, varies considerably from month to month and from year to year. On the average, Driggs receives measurable precipitation (0.01 inch or more) on 83 days per year. The number of days each month ranges from 5 or 6 in the months of July through November to 8 or 9 in December, January, March, May, and June. Intensity of precipitation is generally low. A total of 0.50 inch or more in 24 hours occurs only 8 to 10 times a year, and 1 inch or more about once in 2 years.

Water Supply

Precipitation in the Teton Area is not adequate to provide enough moisture for most crops. Irrigation water is obtained from tributaries of the Teton River. Very little is taken from the river itself. The largest flows are from

TABLE 7.—*Temperature and precipitation at Driggs*

[All data, except that on snow, based on records from 1931 to 1960; data on snow based on records from 1907 to 1919]

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 with snow cover	Average depth of snow on days with 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		Inches
January	30	5	44	−19	1. 41	0. 5	2. 7	31	12
February	34	8	47	−14	1. 40	. 4	3. 2	28	16
March	40	15	52	−8	1. 17	. 3	1. 8	29	12
April	52	25	67	10	1. 10	. 5	1. 8	12	7
May	63	33	78	23	1. 74	. 3	3. 0	[1]	1
June	71	40	81	31	2. 05	. 5	3. 4	0	0
July	82	46	91	37	. 86	. 3	2. 0	0	0
August	81	43	89	34	1. 22	. 2	3. 3	0	0
September	72	37	84	24	1. 11	. 2	2. 0	[1]	1
October	59	28	74	17	1. 29	. 1	2. 3	2	1
November	42	16	58	−5	1. 05	. 3	2. 2	12	3
December	34	10	46	−13	1. 39	. 5	3. 2	28	7
Year	55	26	[2] 92	[3] −26	15. 79	11. 5	21. 4	143	10

[1] Less than 0.5 day. [2] Average annual highest maximum. [3] Average annual lowest minimum.

TABLE 8.—*Probabilities of last freezing temperatures in spring and first in fall at Driggs*

[Based on 29 years of record between 1934 and 1965]

Probability	Dates for given probability and temperature				
	16° F. or lower	20° F. or lower	24° F. or lower	28° F. or lower	32° F. or lower
Spring:					
1 year in 10 later than	May 3	May 11	May 27	June 12	July 8
2 years in 10 later than	April 28	May 6	May 22	June 7	July 3
5 years in 10 later than	April 17	April 25	May 11	May 27	June 22
Fall:					
1 year in 10 earlier than	October 5	September 15	September 5	August 22	August 1
2 years in 10 earlier than	October 12	September 22	September 12	August 29	August 8
5 years in 10 earlier than	October 25	October 5	September 25	September 11	August 22

TABLE 9.—*Probabilities of last freezing temperatures in spring and first in fall, Tetonia Experiment Station*

[Based on 12 years of record between 1953 and 1965]

Probability	Dates for given probability and temperature				
	16° F. or lower	20° F. or lower	24° F. or lower	28° F. or lower	32° F. or lower
Spring:					
1 year in 10 later than	May 3	May 19	May 26	June 19	July 11
2 years in 10 later than	April 28	May 14	May 21	June 14	July 6
5 years in 10 later than	April 17	May 3	May 10	June 3	June 25
Fall:					
1 year in 10 earlier than	October 1	September 16	September 6	August 22	August 9
2 years in 10 earlier than	October 8	September 23	September 13	August 29	August 16
5 years in 10 earlier than	October 21	October 6	September 26	September 11	August 29

TABLE 10.—*Average monthly and annual precipitation at Felt and Tetonia and the Tetonia Experiment Station*

Month	Felt [1]	Tetonia [2]	Tetonia Experiment Station [3]
	Inches	*Inches*	*Inches*
January	1.09	0.95	1.13
February	.84	.92	.92
March	.75	.89	1.11
April	1.02	.95	1.11
May	1.46	1.61	1.59
June	1.21	1.93	1.62
July	.96	.96	.55
August	1.31	1.13	.74
September	1.35	1.17	.73
October	1.02	1.13	1.02
November	.82	1.04	.92
December	1.09	1.15	1.15
Average annual	12.92	13.83	12.59

[1] Based on records for period June 1919 to May 1932.
[2] Based on records for period June 1932 to May 1952.
[3] Based on records for period June 1952 to December 1960.

streams on the east side of the valley, which originate in the high Teton Mountains. Streams from the south and west, which originate in the lower Big Hole Mountains, are much smaller, and their contribution to the water supply is relatively small.

All tributary streams are affected by seasonal fluctuations in runoff. The peak flow is ordinarily reached in the latter part of May or the first part of June, after which the flow decreases rapidly. At irrigation diversion locations, stream flow may be more than 300 cubic feet per second at the peak and less than 15 cubic feet per second in the latter part of the irrigation season. Trail Creek, which originates in the Teton Mountains in the southeastern part of the watershed, is less subject to fluctuation than other tributaries and is the only one that flows all the way to the Teton River throughout the season.

Irrigation.—High runoff in spring provides ample irrigation water, but low runoff late in summer causes a shortage of irrigation water. The shortage may be very severe when the runoff comes early and is of short duration. Large conveyance losses occur in the water distribution systems, especially in ditches where water flows for long distances across the alluvial fans.

Water rights are complex in the Teton Area. Most of the prior rights are held by water users in Madison County, which is downstream from the Teton Valley. Water rights are further complicated by the fact that several of the east-side streams, which originate in Wyoming, are subject to diversion in that State.

Ground water.—The ground water in the Teton Valley is generally low in dissolved solids and is moderately hard. The water is of satisfactory chemical quality for domestic use, livestock, and irrigation. The water issuing from springs along the base of the Snake River range and the Big Hole Mountains contains appreciably greater amounts of sulfate, but otherwise is similar to that in the valley (*5*).

The chief aquifer in the valley is sand and gravel deposited by streams discharging from the surrounding mountains. The depth to water ranges from less than 1 foot in the waterlogged areas along the Teton River to more than 200 feet near the east and west margins of the valley. The depth to water is governed in part by the topography and in part by local conditions of recharge and discharge. During the spring and fall, water levels vary as much as 100 feet along the east side of the valley. The water table is lowest early in spring. It rises during May, June, and July, as the snow in the surrounding mountains melts and the water is carried into the valley by streams. During the latter part of the summer, the water table drops rapidly, as the water is discharged into the Teton River from the waterlogged lower parts of the valley. The porous rock beneath the valley serves as a storage reservoir, which is recharged largely during the late part of spring and early part of summer and which discharges continuously into the Teton River throughout the year. This tends to even out the river flow and keep it relatively stable throughout the year.

Vegetation

The Teton Area is characteristic of the semiarid zones of the Northern Rocky Mountains. The vegetation consists of many kinds of grasses, shrubs, trees, and other plants, most of which are native but some of which have been brought from other parts of North America or from other continents. Crested wheatgrass and redtop, for example, were intentionally introduced; Canada thistle, cheatgrass, and others came uninvited as vagrants or weeds.

Following is a list of the plants that commonly grow in the Area:

Common name	*Scientific name*
Alder	*Alnus tenuifolia*
Alpine fir	*Abies lasiocarpa*
Arrowgrass	*Triglochin maritima*
Aspen	*Populus tremuloides*
Aster	*Aster* spp.
Baltic-rush	*Juncus balticus*
Balsamroot	*Balsamorhiza sagittata*
Basin wildrye	*Elymus cinereus*
Beaked sedge	*Carex rostrata*
Bearded wheatgrass	*Agropyron subsecundum*
Big bluegrass	*Poa ampla*
Big rabbitbrush	*Chrysothamnus nauseosus*
Big sagebrush	*Artemisia tridentata*
Birch	*Betula* spp.
Bitterbrush	*Purshia tridentata*
Bluebunch wheatgrass	*Agropyron spicatum*
Blue wildrye	*Elymus glaucus*
Canada thistle	*Cirsium arvense*
Cheatgrass	*Bromus tectorum*
Chokecherry	*Prunus virginiana*
Columbia needlegrass	*Stipa columbiana*
Cowparsnip	*Heracleum lanatum*
Crested wheatgrass	*Agropyron cristatum*
Cudweed sage	*Artemisia ludoviciana*
Cushion eriogonum	*Eriogonum ovalifolium*
Deathcamas	*Zigadenus* spp.
Desert wheatgrass	*Agropyron desertorum*
Dogwood	*Cornus* spp.
Douglas-fir	*Pseudotsuga menziesii*
Dwarf sagebrush	*Artemisia arbuscula*
Five-finger	*Potentilla* spp.
Geranium	*Geranium richardsonii*
Giant wildrye	*Elymus condensatus*
Ground juniper	*Juniperus montanus*
Heartleaf arnica	*Arnica cordifolia*
Herbaceous cinquefoil	*Potentilla* spp.
Idaho fescue	*Festuca idahoenis*
Iris	*Iris missouriensis*
Indian paintbrush	*Castilleja* spp.
Intermediate wheatgrass	*Agropyron intermedium*
Kentucky bluegrass	*Poa pratensis*

Liddon sedge	*Carex petasata*
Little rabbitbrush	*Chrysothamnus viscidiflorus*
Lodgepole pine	*Pinus contorta*
Manchar smooth bromegrass	*Bromus inermis*
Lupine	*Lupinus* spp
Meadow fescue	*Festuca elatior*
Meadow foxtail	*Alopecurus pratensis*
Meadowrue	*Thalictrum fendleri*
Milkvetch	*Astragalus* spp.
Mountain bromegrass	*Bromus carinatus*
Mountain-mahogany	*Cercocarpus Ledifolius*
Myrtle boxleaf	*Pachistima mysinites*
Narrowleaf cottonwood	*Populus angustifolia*
Clover	*Trifolium* spp.
Nebraska sedge	*Carex nebraskensis*
Needle-and-thread	*Stipa comata*
Nevada bluegrass	*Poa nevadensis*
Nordan crested wheatgrass	*Agropyron desertorum*
Oniongrass	*Melica bulbosa*
Orchardgrass	*Dactylis glomerata*
Oregongrape	*Berberis aquifolium*
Perennial thistle	*Cirsium* spp.
Phlox	*Phlox* spp.
Prairie junegrass	*Koeleria cristata*
Pinegrass	*Calamagrostis rubescens*
Pubescent wheatgrass	*Agropyron trichophorum*
Pussytoes	*Antennaria* spp.
Rabbitbrush	*Chrysothamnus* spp.
Redtop	*Agrostis alba*
Reed canarygrass	*Phalaris arundinacea*
Rose	*Rosa* spp.
Rushes	*Juncus* spp.
Russian-thistle	*Salsola Kali var. tenuifolia*
Sandberg bluegrass	*Poa secunda*
Sawtooth butterweed	*Senecio serra*
Serviceberry	*Amelanchier alnifolia*
Sedge	*Carex* spp.
Senecio	*Senecio* spp.
Shrubby cinquefoil	*Potentialla fruticosa*
Siberian wheatgrass	*Agropyron sibericum*
Silver sagebrush	*Artemisia cana*
Slender wheatgrass	*Agropyron trachycaulum*
Smooth bromegrass	*Bromus inermis*
Snowberry	*Symphoricarpos* spp.
Sod sedge	*Carex elcocharis*
Spineless gray horsebrush	*Tetradymia canescens*
Spirea	*Spirea Douglasii*
Squirreltail	*Sitanion hystrix*
Streambank wheatgrass	*Agropyron riparium*
Sunflower	*Helianthus nuttallii*
Sweet-anise	*Osmorhiza occidentalis*
Tall bluebells	*Mertensia ciliata*
Tapertip hawksbeard	*Crepis acuminata*
Thickspike wheatgrass	*Agropyron dasystachyum*
Threetip sagebrush	*Artemisia tripartita*
Timber lupine	*Lupine parviflorus*
Timothy	*Phleum pratense*
Tufted hairgrass	*Deschampsia caespitosa*
Valerian	*Valeriana scouleri*
Vetch	*Vicia americana*
Water birch	*Betula occidentalis*
Western wheatgrass	*Agropyron smithii*
Whitmar wheatgrass	*Agropyron incrme*
Willow	*Salix* spp.
Wyeth eriogonum	*Eriogonum heracleoides*
Yampa	*Perideridia gairdneri*
Yarrow	*Achillea millefolium*

Agriculture

Because the survey Area is not a county unit but is made up of parts of two counties, precise agricultural data are not available. Most of the acreage, however, is in Idaho, and the following data on Teton County, Idaho, gives a fairly accurate picture of farming in the entire Area.

In 1964 there were 327 farms, and they averaged about 574 acres in size. About 187,600 acres, or 64 percent of the land, was in farms. About 37,000 acres was irrigated. There were 56 cash grain farms, 73 dairy farms, 48 livestock farms other than poultry or dairy, 57 general farms, and 66 miscellaneous and unclassified farms.

Wheat and barley are the main crops. Most of the winter wheat is grown in the northern part of the Area. The acreages of the principal crops grown in Teton County, Idaho, in 1964 were as follows:

Crops:	*Acres in 1964*
Small grains harvested:	
Winter wheat	7,882
Spring wheat	15,674
Barley	12,043
Oats	1,541
Potatoes	2,777
Crops cut for hay:	
Alfalfa and alfalfa mixtures	18,546
Clover, timothy, and mixtures	4,890
Small grains	660
Wild hay	1,770

Spring wheat and barley are the principal irrigated grain crops. Spring wheat is generally dryfarmed only in areas susceptible to winterkill, and barley is dryfarmed in areas that have the shorter growing season. Oats generally are grown where there is a high water table.

Potatoes are the principal row crop, and they receive intensive management. Because of the short growing season, the potatoes generally do not mature before frost and are grown mainly for seed. Because of the climate and the isolation from other potato-growing areas, this crop is not damaged by insects and disease.

Alfalfa and alfalfa-grass mixtures are the most important hay crops in the Area. Most of the hay is fed to livestock. Alfalfa is generally limited to two irrigations because of the shortage of irrigation water. One crop of hay is commonly grown. If water is available late in the season, two crops are grown.

Clover, timothy, and mixtures of clover and grass are also grown for hay, generally on the wet soils that can be tilled. Wild hay is grown in the wetter areas where the high water table hinders tillage. Some grain is grown for hay on the wet bottom lands, and some grain that does not reach maturity because of drought or frost is also cut for hay.

Peas are grown on a small acreage each year. They are grown on contract, are handpicked, and are shipped in the pod to east-coast markets.

Livestock production is important to the local economy. Many beef and dairy cattle are raised. Sheep are raised mostly in small farm flocks. A few bands of sheep are wintered in the valley. They spend the summer in the National Forest and on privately owned range surrounding the Area. Commercial poultry raising is not important locally. In 1964 the number and kinds of livestock in Teton County, Idaho, were as follows:

Livestock:	*Number in 1964*
Cattle and calves	14,808
Cows (Including heifers that have calved)	6,738
Milk cows	2,528
Sheep and lambs	11,084
Hogs and pigs	281
Chickens	4,817

Industry

Agriculture is the main source of income for the Area. At one time coal mining was fairly extensive around Horseshoe Creek. Only one mine is operated at present. It is worked by two or three men, mostly in the winter. Considerable limestone is in the mountains surrounding the valley. One quarry is operated by the Utah-Idaho Sugar Company just across the state line in Wyoming on Fox Creek. It employs about 15 men during the summer months. The limestone is loaded on railroad cars at Chapin and shipped to the sugar factories to be used in refining sugar.

Two cheese factories at Driggs and Victor employ 8 to 10 people and make mostly Swiss and American cheese. A few small sawmills operate in the Area. There is still some trapping, mostly for muskrat and beaver. There are a few guest ranches and summer camps.

Transportation, Markets, and Utilities

One railroad traverses the Area from the north and ends at Victor. There are no railroad facilities in the Jackson Hole, Wyoming, area to the east. Victor has been an important shipping point for livestock that are trailed over the mountains from Jackson Hole as well as from the southern part of the Teton Area. Improvement of roads and an increase in trucking have curtailed this activity somewhat in the last few years. Some grain is shipped from the grain elevators at Tetonia. Most of the potatoes are trucked out by individual sellers or buyers. There are facilities for icing cars and shipping fresh vegetables from Driggs. One company ships about 50 cars of green peas annually to eastern markets, primarily New York.

State Highways No. 33, 32, and 31 link the major population centers and connect with a good system of secondary roads, most of which have been graded and gravelled and are kept open the year around.

Electric power is generally available throughout the Area. Telephone service is available in Tetonia, Driggs, and Victor, and on most of the farms and ranches.

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Glossary

A horizon. See Horizon, soil.

Alluvial fan. A fan-shaped deposit of sand, gravel, and fine material dropped by a stream where its gradient lessens abruptly.

Available water capacity. The difference between the inches of water held in the soil at field capacity and the amount held at the wilting point. This difference is the amount of moisture available to plants. The ratings used in this survey are as follows: *very high*—more than 11 inches; *high*—7 to 11 inches; *moderate*—4 to 7 inches; *low*—2 to 4 inches; *very low*—less than 2 inches.

Field moisture capacity is the moisture content of a soil, expressed as a percentage of the oven-dry weight, after the gravitational, or free, water has been allowed to drain away; the field moisture content 2 or 3 days after a soaking rain; also called normal field capacity, normal moisture capacity, or capillary capacity.

The wilting point (or permanent wilting point) is the moisture content of soil, on an oven-dry basis, at which plants (specifically sunflower) wilt so much that they do not recover when placed in a dark, humid atmosphere. At wilting point the percentage of water available to plants approximates the minimum content of moisture in the soil at a depth below that affected by surface evaporation.

Calcareous soil. A soil containing enough calcium carbonate (often with magnesium carbonate) to effervesce (fizz) visably when treated with cold, dilute hydrochloric acid. The ratings used in this survey are as follows: *weakly calcareous*—1 to 3 percent calcium carbonate equivalent; *moderately calcareous*—3 to 15 percent; *strongly calcareous*—15 to 30 percent; *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.

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; dry or moist soil will not hold together in a mass.

Friable.—When moist, soil crushes easily under gentle to moderate pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, soil crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, soil is 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, soil adheres to other material; tends to stretch somewhat and pull apart, rather than pull free from other material.

Hard.—When dry, soil is moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, soil breaks into powder or individual grains under very slight pressure.

Cemented.—Soil is hard and brittle; little affected by moistening.

Depth of usable soil. Effective depth to which plant roots can readily penetrate without being impeded by a cemented layer, by gravel or stones, or by bedrock. The depth classes used in this survey are as follows: *Shallow*—6 to 20 inches; *moderately deep*—20 to 36 inches; *deep*—36 to 60 inches; *very deep*—more than 60 inches.

Drainage, soil. The rapidity and extent of the removal of water from the soil by runoff, by flow through the soil to underground spaces, or by a combination of these processes.

Dryfarming. Production of crops that require some tillage in a semiarid region, without irrigation. Usually involves periods of fallow, during which enough moisture accumulates in the soil to allow production of a cultivated crop.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes. The major horizons are designated by capital letters. Small letters are used with the capital letters to denote special features. For example, ca denotes an accumulation of carbonates of alkaline earths, commonly of calcium. These are the major horizons:

O horizon.—The layer of organic matter on the surface of a mineral soil; consists of decaying plant residue.

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. It may have lost some 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 by (1) accumulation of clay, sesquioxides, or humus; (2) prismatic or blocky structure; (3) redder or stronger colors than the A horizon; or (4) some combination of these. The combined A and B horizon is 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.

Massive. See Structure, soil.

Mottling, soil. Irregular marking of the soil with patches of color 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,* 5 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 (soil). The disintegrated, partly weathered rock from which soil has formed.

Peat. Unconsolidated soil material, largely undecomposed organic matter, that has accumulated where there has been excess moisture.

Permeability, soil. The quality of a soil horizon that enables water or air to move through it. Terms used to describe permeability are as follows: *Very slow, slow, moderately slow, moderate, moderately rapid, rapid,* and *very rapid.*

Poorly graded soil (engineering). A soil material consisting mainly of particles nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material. See Horizon, soil.

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. 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

Runoff. The part of the precipitation upon a drainage area that is discharged from the area in stream channels. The water that flows off the soil surface without sinking in is called surface runoff; that which enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz, but sand may be of any mineral composition. As a textural class, soil that is 85 percent or more sand and not more than 10 percent clay.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Slope classes. As used in this survey—

Simple	*Complex*	*Range of slope Percent*
Nearly level	Nearly level	0 to 2
Very gently sloping	Gently undulating	2 to 4
Gently sloping	Undulating	4 to 8
Moderately sloping	Rolling	8 to 12
Strongly sloping	Strongly rolling	12 to 20
Moderately steep	Hilly	20 to 30
Steep	Steep	30 to 60
Very steep	Very steep	More than 60

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates 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 (1) *single grain* (each grain by itself, as in dune sand) or (2) *massive* (the particles adhering without any regular cleavage, as in many claypans and hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the profile below plow depth.

Substratum. Any layer lying beneath the solum, or true soil; the C or R horizon.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. (See also clay, sand, and silt.) The basic textural classes, in order of increasing proportions of fine particles are as follows: sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, and clay. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

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.

Well-graded soil (engineering). A soil or soil material consisting of particles that are well distributed over a wide range in size. Such a soil has good stability. It can easily be increased in density and bearing strength by compaction.

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 7. Engineering uses of the soils, tables 3, 4, and 5, pages 70 through 85.
Estimated yields, table 2, page 55.

Absence of a symbol, name, or number indicates that the mapping unit was not placed in the specified classification.

Map symbol	Mapping unit	Described on page	Capability unit Irrigated Symbol	Irrigated Page	Dryland Symbol	Dryland Page	Range site Name	Range site Page	Woodland group Number	Woodland group Page
ArB	Ard silt loam, 0 to 4 percent slopes	9	------	--	IVe-47	50	Loamy, 13-inch to 16-inch precipitation zone	58	---	--
ArD	Ard silt loam, 4 to 12 percent slopes	8	------	--	IVe-47	50	Loamy, 13-inch to 16-inch precipitation zone	58	---	--
ArF	Ard silt loam, 20 to 35 percent slopes	9	------	--	VIe-2	53	Loamy, 13-inch to 16-inch precipitation zone	58	---	--
BaA	Badgerton loam, 0 to 2 percent slopes	10	------	--	IVw-3	52	River Bottom	61	7	65
BaB	Badgerton loam, 2 to 4 percent slopes	10	------	--	IVw-3	52	River Bottom	61	7	65
BdA	Badgerton loam, deep, 0 to 2 percent slopes	10	------	--	IVw-3	52	River Bottom	61	---	--
BgA	Badgerton gravelly loam, 0 to 2 percent slopes	10	------	--	IVw-3	52	River Bottom	61	7	65
BgB	Badgerton gravelly loam, 2 to 4 percent slopes	10	------	--	IVw-3	52	River Bottom	61	7	65
BgC	Badgerton gravelly loam, 4 to 8 percent slopes	10	------	--	VIs-4	53	River Bottom	61	7	65
BvC	Badgerton very stony loam, 4 to 8 percent slopes	10	------	--	VIs-4	53	South Slope	60	---	--
BwA	Badgerton-Wiggleton complex, 0 to 2 percent slopes	10								
	Badgerton loam	--	------	--	IVw-3	52	River Bottom	61	7	65
	Wiggleton gravelly loam	--	------	--	IVw-3	52	Gravelly	58	7	65
Ce	Cedron silty clay loam	11	------	--	Vw-1	53	Wet Meadow	62	---	--
DaE	Dra silt loam, 12 to 20 percent slopes	11	------	--	IVe-4	50	Loamy, 16-inch to 19-inch precipitation zone	59	---	--
DeE	Dra very stony loam, 12 to 20 percent slopes	12	------	--	VIs-4	53	Stony	60	---	--
DeG	Dra very stony loam, 30 to 60 percent slopes	12	------	--	VIIs-1	53	South Slope	60	---	--
DgF	Dranyon stony loam, 20 to 30 percent slopes	13	------	--	VIe-2	53	Loamy (aspen)	60	5	64
DgG	Dranyon stony loam, 30 to 60 percent slopes	12	------	--	VIIe-1	53	Loamy (aspen)	60	5	64
DoA	Driggs cobbly loam, 0 to 2 percent slopes	14	IVs-2	52	VIs-4	53	Gravelly	58	---	--
DrA	Driggs gravelly loam, 0 to 2 percent slopes	14	IVs-2	52	VIs-4	53	Gravelly	58	---	--
DrB	Driggs gravelly loam, 2 to 4 percent slopes	14	IVe-1	49	VIs-4	53	Gravelly	58	---	--
DrD	Driggs gravelly loam, 4 to 12 percent slopes	14	------	--	VIs-4	53	Gravelly	58	---	--
DsA	Driggs silt loam, 0 to 2 percent slopes	13	IIIs-1	49	IVs-4	52	Loamy, 13-inch to 16-inch precipitation zone	58	---	--
DsB	Driggs silt loam, 2 to 4 percent slopes	14	IIIe-2	47	IVs-4	52	Loamy, 13-inch to 16-inch precipitation zone	58	---	--
DsC	Driggs silt loam, 4 to 8 percent slopes	14	IIIe-5	48	IVe-74	50	Loamy, 13-inch to 16-inch precipitation zone	58	---	--
DtA	Driggs silt loam, 0 to 2 percent slopes, channeled	14	------	--	IVs-4	52	Loamy, 13-inch to 16-inch precipitation zone	58	---	--
DwA	Driggs-Wiggleton gravelly loams, 0 to 2 percent slopes	15	IVs-2	52	VIs-4	53	Gravelly	58	7	65
FeD	Felt gravelly loam, 4 to 12 percent slopes	16	------	--	VIs-4	53	Gravelly	58	---	--
FlA	Felt loam, 0 to 2 percent slopes	15	IIIs-1	49	IVs-4	52	Loamy, 13-inch to 16-inch precipitation zone	58	---	--
FlB	Felt loam, 2 to 4 percent slopes	16	IIIe-2	47	IVs-4	52	Loamy, 13-inch to 16-inch precipitation zone	58	---	--
FlC	Felt loam, 4 to 8 percent slopes	16	IIIe-5	48	IVe-74	50	Loamy, 13-inch to 16-inch precipitation zone	58	---	--
FlD	Felt loam, 8 to 12 percent slopes	16	------	--	IVe-74	50	Loamy, 13-inch to 16-inch precipitation zone	58	---	--
FnA	Feltonia loam, 0 to 2 percent slopes	17	IIIc-1	49	IIIc-4	49	----------	--	---	--
FnB	Feltonia loam, 2 to 4 percent slopes	17	IIIe-1	47	IIIc-4	49	----------	--	---	--
FoB	Feltonia loam, sandy substratum, 2 to 4 percent slopes	17	IIIe-1	47	IIIc-4	49	----------	--	---	--
FoD	Feltonia loam, sandy substratum, 4 to 12 percent slopes	17	------	--	IIIe-4	48	----------	--	---	--
Fr	Foxcreek gravelly loam	18	IVw-1	51	------	--	Dry Meadow	62	---	--
Fs	Foxcreek loam	18	IVw-1	51	------	--	Dry Meadow	62	---	--
Ft	Foxcreek loam, shallow variant	18	------	--	IVw-3	52	River Bottom	61	7	65
Fu	Foxcreek gravelly loam, shallow variant	18	------	--	IVw-3	52	River Bottom	61	7	65
Fv	Foxcreek silty clay loam, heavy subsoil variant	19	------	--	Vw-1	53	Wet Meadow	62	---	--
Fw	Furniss mucky silty clay loam	20	------	--	Vw-1	53	Wet Meadow	62	---	--
Fx	Furniss silty clay loam	19	------	--	Vw-1	53	Wet Meadow	62	---	--
GeD	Greys silt loam, 4 to 12 percent slopes	20	------	--	IIIe-4	48	Loamy (aspen)	60	1	63
GeE	Greys silt loam, 12 to 20 percent slopes	21	------	--	IIIe-49	48	Loamy (aspen)	60	1	63
GeF	Greys silt loam, 20 to 30 percent slopes	21	------	--	IVe-4	50	Loamy (aspen)	60	1	63
GlG	Greys silt loam, thick surface variant, 30 to 60 percent slopes	21	------	--	VIIe-1	53	Loamy (aspen)	60	1	63
GrE	Greys-Rin silt loams, 12 to 20 percent slopes	22								
	Greys silt loam	--	------	--	IIIe-49	48	Loamy (aspen)	60	1	63
	Rin silt loam	--	------	--	IIIe-49	48	Loamy, 16-inch to 19-inch precipitation zone	59	---	--
JuF	Judkins extremely stony loam, 12 to 30 percent slopes	23	------	--	VIIs-1	53	North Slope	62	3	64
JuG	Judkins extremely stony loam, 30 to 60 percent slopes	23	------	--	VIIs-1	53	North Slope	62	3	64
JuH	Judkins extremely stony loam, 60 to 80 percent slopes	22	------	--	VIIs-1	53	North Slope	62	3	64
KaB	Karlan silt loam, 0 to 4 percent slopes	23	------	--	IVe-47	50	Loamy, 16-inch to 19-inch precipitation zone	59	---	--
KaD	Karlan silt loam, 4 to 12 percent slopes	23	------	--	IVe-47	50	Loamy, 16-inch to 19-inch precipitation zone	59	---	--
KaE	Karlan silt loam, 12 to 20 percent slopes	23	------	--	IVe-4	50	Loamy, 16-inch to 19-inch precipitation zone	59	---	--
KaF	Karlan silt loam, 20 to 40 percent slopes	24	------	--	VIe-2	53	Loamy, 16-inch to 19-inch precipitation zone	59	---	--
LaA	Lantonia silt loam, 0 to 4 percent slopes	24	------	--	IIIc-4	49	----------	--	---	--
LaB	Lantonia silt loam, 2 to 4 percent slopes	24	IIIe-1	47	IIIc-4	49	----------	--	---	--
LaC	Lantonia silt loam, 4 to 8 percent slopes	24	IIIe-3	47	IIIe-4	48	----------	--	---	--
LaCD	Lantonia silt loam, 4 to 12 percent slopes	24	------	--	IIIe-4	48	----------	--	---	--
LaD	Lantonia silt loam, 8 to 12 percent slopes	25	IVe-2	50	IIIe-4	48	----------	--	---	--
LaE	Lantonia silt loam, 12 to 20 percent slopes	25	------	--	IIIe-49	48	----------	--	---	--
LaE2	Lantonia silt loam, 12 to 20 percent slopes, eroded	25	------	--	IIIe-49	48	----------	--	---	--
LaF	Lantonia silt loam, 20 to 30 percent slopes	25	------	--	IVe-4	50	----------	--	---	--
LrD	Lantonia-Rin silt loams, 4 to 12 percent slopes	25	------	--	IIIe-4	48	----------	--	---	--
LrE	Lantonia-Rin silt loams, 12 to 20 percent slopes	25	------	--	IIIe-49	48	----------	--	---	--
LtB	Lantonia-Tetonia silt loams, 0 to 4 percent slopes	25	------	--	IIIc-4	49	----------	--	---	--
LtC	Lantonia-Tetonia silt loams, 4 to 8 percent slopes	25	IIIe-3	47	IIIe-4	48	----------	--	---	--
LtD	Lantonia-Tetonia silt loams, 4 to 12 percent slopes	25	------	--	IIIe-4	48	----------	--	---	--
LtE	Lantonia-Tetonia silt loams, 12 to 20 percent slopes	25	------	--	IIIe-49	48	----------	--	---	--

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GUIDE TO MAPPING UNITS--CONTINUED

Map symbol	Mapping unit	Described on page	Capability unit Irrigated Symbol	Irrigated Page	Dryland Symbol	Dryland Page	Range site Name	Range site Page	Woodland group Number	Woodland group Page
LtE2	Lantonia-Tetonia silt loams, 12 to 20 percent slopes, eroded	25	------	--	IIIe-49	48	----------	--	---	--
Lv	Latahco loam, cold variant	26	IIIw-1	48	IIIw-4	48	Dry Meadow	62	---	--
Ma	Marsh	26	------	--	VIIIw-1	54	----------	--	---	--
MkF	Mikesell stony silt loam, 20 to 30 percent slopes	27	------	--	VIe-3	53	North Slope	62	6	64
MvG	Mikesell very stony silt loam, 30 to 50 percent slopes	28	------	--	VIIs-1	53	North Slope	62	6	64
PaD	Packsaddle loam, 4 to 12 percent slopes	29	------	--	IVe-74	50	----------	--	---	--
PcA	Packsaddle silt loam, 0 to 2 percent slopes	28	IIIc-1	49	IVc-1	53	Loamy, 13-inch to 16-inch precipitation zone	58	---	--
PcB	Packsaddle silt loam, 2 to 4 percent slopes	29	IIIe-1	47	IVc-1	53	Loamy, 13-inch to 16-inch precipitation zone	58	---	--
RaF	Rammel extremely stony loam, 12 to 30 percent slopes	30	------	--	VIIs-1	53	Stony	60	---	--
RaG	Rammel extremely stony loam, 30 to 60 percent slopes	29	------	--	VIIs-1	53	South Slope	60	---	--
RaH	Rammel extremely stony loam, 60 to 80 percent slopes	30	------	--	VIIs-1	53	South Slope	60	---	--
ReD	Rammel very stony loam, 2 to 12 percent slopes	30	------	--	VIs-4	53	Stony	60	---	--
RfH	Rammel-Swanner extremely stony complex, 60 to 80 percent slopes	30								
	Rammel extremely stony loam	--	------	--	VIIs-1	53	South Slope	60	---	--
	Swanner extremely stony loam	--	------	--	VIIs-1	53	Shallow Stony	58	---	--
RhA	Richvale silt loam, 0 to 2 percent slopes	30	IIIc-1	49	IIIc-4	49	----------	--	---	--
RhB	Richvale silt loam, 2 to 4 percent slopes	31	IIIe-1	47	IIIc-4	49	----------	--	---	--
RoF	Ridgecrest stony loam, 4 to 30 percent slopes	32	------	--	VIe-2	53	Stony	60	---	--
RoG	Ridgecrest stony loam, 30 to 60 percent slopes	31	------	--	VIIe-1	53	South Slope	60	---	--
RpB	Rin silt loam, 2 to 4 percent slopes	32	IIIe-1	47	IIIc-4	49	Loamy, 16-inch to 19-inch precipitation zone	59	---	--
RpC	Rin silt loam, 4 to 8 percent slopes	32	IIIe-3	47	IIIe-4	48	Loamy, 16-inch to 19-inch precipitation zone	59	---	--
RpCD	Rin silt loam, 4 to 12 percent slopes	32	------	--	IIIe-4	48	Loamy, 16-inch to 19-inch precipitation zone	59	---	--
RpD	Rin silt loam, 8 to 12 percent slopes	33	IVe-2	50	IIIe-4	48	Loamy, 16-inch to 19-inch precipitation zone	59	---	--
RpE	Rin silt loam, 12 to 20 percent slopes	33	------	--	IIIe-49	48	Loamy, 16-inch to 19-inch precipitation zone	59	---	--
RpF	Rin silt loam, 20 to 30 percent slopes	33	------	--	IVe-4	50	Loamy, 16-inch to 19-inch precipitation zone	59	---	--
RrE	Rin-Greys silt loams, 12 to 20 percent slopes	33								
	Rin silt loam	--	------	--	IIIe-49	48	Loamy, 16-inch to 19-inch precipitation zone	59	---	--
	Greys silt loam	--	------	--	IIIe-49	48	Loamy (aspen)	60	1	63
RsD2	Ririe silt loam, 4 to 12 percent slopes, eroded	34	------	--	IVe-45	50	----------	--	---	--
RsD3	Ririe silt loam, 4 to 12 percent slopes, severely eroded	34	------	--	IVe-45	50	----------	--	---	--
RsE2	Ririe silt loam, 12 to 20 percent slopes, eroded	34	------	--	IVe-45	50	----------	--	---	--
RsE3	Ririe silt loam, 12 to 20 percent slopes, severely eroded	34	------	--	VIe-4	53	----------	--	---	--
RsF2	Ririe silt loam, 20 to 30 percent slopes, eroded	34	------	--	VIe-4	53	Loamy, 13-inch to 16-inch precipitation zone	58	---	--
RtD	Ririe-Tetonia silt loams, 4 to 12 percent slopes	34	------	--	IVe-45	50	----------	--	---	--
RtE	Ririe-Tetonia silt loams, 12 to 20 percent slopes	34	------	--	IVe-45	50	----------	--	---	--
RtE3	Ririe-Tetonia silt loams, 12 to 20 percent slopes, severely eroded	35	------	--	VIe-4	53	----------	--	---	--
Ru	Rock land	35	------	--	VIIIs-1	54	----------	--	---	--
SeD	Swanner stony loam, 0 to 12 percent slopes	35	------	--	VIs-4	53	Shallow Stony	58	---	--
SvD	Swanner very stony loam, 0 to 12 percent slopes	35	------	--	VIs-4	53	Shallow Stony	58	---	--
SwF	Swanner extremely stony loam, 12 to 30 percent slopes	35	------	--	VIIs-1	53	Shallow Stony	58	---	--
SwG	Swanner extremely stony loam, 30 to 60 percent slopes	35	------	--	VIIs-1	53	Shallow South Slope	59	---	--
SwH	Swanner extremely stony loam, 60 to 80 percent slopes	35	------	--	VIIs-1	53	Shallow South Slope	59	---	--
Ta	Tepete peat	36	------	--	Vw-1	53	Wet Meadow	62	---	--
Te	Tepete peat, shallow	36	------	--	Vw-1	53	Wet Meadow	62	---	--
TkA	Tetonia silt loam, 0 to 2 percent slopes	38	IIIc-1	49	IIIc-4	49	----------	--	---	--
TkAB	Tetonia silt loam, 0 to 4 percent slopes	36	------	--	IIIc-4	49	----------	--	---	--
TkB	Tetonia silt loam, 2 to 4 percent slopes	38	IIIe-1	47	IIIc-4	49	----------	--	---	--
TkC	Tetonia silt loam, 4 to 8 percent slopes	38	IIIe-3	47	IIIe-4	48	----------	--	---	--
TkCD	Tetonia silt loam, 4 to 12 percent slopes	38	------	--	IIIe-4	48	----------	--	---	--
TkD	Tetonia silt loam, 8 to 12 percent slopes	38	IVe-2	50	IIIe-4	48	----------	--	---	--
TkE	Tetonia silt loam, 12 to 20 percent slopes	38	------	--	IIIe-49	48	----------	--	---	--
TlD	Tetonia-Lantonia silt loams, 4 to 12 percent slopes	38	------	--	IIIe-4	48	----------	--	---	--
TlE	Tetonia-Lantonia silt loams, 12 to 20 percent slopes	38	------	--	IIIe-49	48	----------	--	---	--
TnD	Tetonia-Ririe silt loams, 4 to 12 percent slopes	38	------	--	IIIe-4	48	----------	--	---	--
TnE	Tetonia-Ririe silt loams, 12 to 20 percent slopes	38	------	--	IIIe-49	48	----------	--	---	--
To	Tonks silty clay loam	38	IVw-2	51	-------	--	Dry Meadow	62	---	--
Tr	Tonks-Cedron silty clay loams	39								
	Tonks silty clay loam	--	IVw-2	51	-------	--	Dry Meadow	62	---	--
	Cedron silty clay loam	--	IVw-2	51	-------	--	Wet Meadow	62	---	--
TsA	Tonks silt loam, strongly calcareous variant, 0 to 2 percent slopes	40	IIIw-1	48	IIIw-4	48	Dry Meadow	62	---	--
TsB	Tonks silt loam, strongly calcareous variant, 2 to 4 percent slopes	39	IIIw-1	48	IIIw-4	48	Dry Meadow	62	---	--
TuD	Turnerville silt loam, 4 to 12 percent slopes	40	------	--	IVe-93	51	North Slope	62	2	64
TuE	Turnerville silt loam, 12 to 20 percent slopes	42	------	--	VIe-3	53	North slope	62	2	64
TuF	Turnerville silt loam, 20 to 30 percent slopes	42	------	--	VIe-3	53	North Slope	62	2	64
TuG	Turnerville silt loam, 30 to 45 percent slopes	42	------	--	VIIe-1	53	North Slope	62	2	64
We	Wiggleton gravelly loam	42	IVs-1	52	VIs-4	53	Gravelly	58	7	65
Wg	Wiggleton loam	43	IVs-1	52	-------	--	Gravelly	58	7	65
Wo	Wiggleton very gravelly loam	43	------	--	VIs-4	53	Gravelly	58	7	65
Wt	Wiggleton-Badgerton gravelly loams	43								
	Wiggleton gravelly loam	--	IVs-1	52	VIs-4	53	Gravelly	58	7	65
	Badgerton gravelly loam	--	------	--	IVw-3	52	River Bottom	61	7	65
Zc	Zohner silty clay loam	43	------	--	Vw-1	53	Wet Meadow	62	---	--
Zd	Zohner silty clay loam, moderately deep variant	44	------	--	Vw-1	53	Wet Meadow	62	---	--
Ze	Zufelt loam	45	IVw-1	51	-------	--	Dry Meadow	62	---	--
Zf	Zufelt-Foxcreek loams	45	IVw-1	51	-------	--	Dry Meadow	62	---	--
Zu	Zundell silty clay loam	45	IVw-2	51	-------	--	Dry Meadow	62	---	--

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